Interreg Danube Region

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Be Ready

D.2.1.1 Mapping report

Mapping report of the state-of-the-art good practices for tackling UHI in the Danube region

June 2025

This mapping report was supported as part of *UrBan hEat islands REsilience, prepAreDness and mitigation strategy (Be Ready),* an Interreg Danube Region Programme project co-funded by the European Union.

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Introduction

PURPOSE OF THE REPORT

This mapping report consolidates the state-of-the-art technical solutions, community-based approaches, and policy frameworks that can reduce Urban Heat Island (UHI) risks in the Danube Region. It serves five concrete purposes:

- Provide evidence base for city pilots – to inform the design parameters, KPIs, and budgeting of the Be Ready project pilot actions.
- Catalogue of transferable models – to offer municipalities and practitioners ready-made examples that can be adapted beyond the lifetime of the project.
- Strategic input for policy – to support national and local authorities when mainstreaming UHI mitigation into climate adaptation and spatial planning instruments.
- Learning & peer exchange platform – to encourage partner cities to benchmark, learn, and co create additional solutions through the online repository.
- Living digital resource – to remain updatable; the English master file will be translated into partner languages and the Annexes can be expanded as new practices are added to the Be Ready online platform.

The report therefore bridges research, policy, and practice, ensuring that good ideas travel quickly from one Danube city to another.

This mapping report marks the end of the *diagnostic* phase of Be Ready and the start of the *implementation* phase. Prior to this, each partner city had mapped its own 'heat hotspots' — the streets, squares and housing blocks that overheat the most in summer and where vulnerable residents live. A series of practical methodology workshops then transformed these local maps into comparable data and a shortlist of sites ready for action. This report brings together those findings, demonstrates effective solutions and packages the know-how so it can be shared across borders. In the next stage, the partners will use this selection of measures to design small, high-impact blue, green and white pilot projects, and later to create a shared Strategic Framework and local Action Plans that will keep the mitigation of urban heat islands firmly on the political agenda.

Shared origins

The mapping is grounded in a collective evidence base compiled by the Be Ready project consortium. Good practices and expert insights were gathered from twelve Danube countries taking part in the project: Austria (AT), Bosnia & Herzegovina (BA), Bulgaria (BG), Croatia (HR), Czech Republic (CZ), Hungary (HU), Moldova (MD), Montenegro (ME), Romania (RO), Serbia (RS), Slovakia (SK) and Slovenia (SI). Their varied climatic and urban contexts guarantee that the report captures the full spectrum of challenges and solutions across the macro region.

CONTEXT OF THE BE READY PROJECT AND THE IMPORTANCE OF ADDRESSING UHI IN THE DANUBE REGION

The Be Ready project is an Interreg Danube initiative that draws together municipalities, research institutes, SMEs, and civil society organisations from twelve countries along the river basin. The partnership spans markedly different climatic zones – from Alpine foothills to humid lowlands – yet all members share one escalating risk: **urban overheating**.

- **Why focus on Urban Heat Islands?** Across Europe, heatwaves already claim more lives than any other weather-related hazard. In Danube capitals such as Budapest and Belgrade, the number of tropical nights (> 20 °C) has tripled since the 1980s. Urban Heat Islands (UHIs) intensify these extremes, concentrating heat in dense historic cores where vegetation is scarce and vulnerable residents are many.
- **A visible entry point for adaptation.** Cooling interventions – a pocket park in a paved square, a high albedo roof, a citizen science heat map – lower temperatures almost immediately and are easy for both politicians and residents to grasp. They therefore offer a pragmatic launchpad for wider climate resilience measures.
- **Technology + community.** The Be Ready project promotes an integrated toolbox: **technical fixes** (blue, green, white measures, innovative materials, smart sensors) are paired with **community engagement models** This dual approach helps ensure that solutions endure after project funding ends and reach those who need them most.
- **Scaling up success.** By documenting proven practices across the consortium and from EU countries, the Be Ready project is assembling a transferable toolkit that can feed into EU Mission Adaptation portfolios, national resilience plans, and future Interreg calls. The lessons gathered here are intended for open reuse, far beyond the confines of the project.

This mapping report distils the consortium's shared knowledge into one coherent resource, providing the evidence base for action against UHIs throughout the Danube Region.

MAPPING METHODOLOGY

To ensure all examples were comparable and evidence-based, the consortium followed a single data collection protocol. The inventory is based on thorough desk research: we reviewed scientific papers, municipal climate strategies, Interreg and Horizon deliverables, vendor catalogues, and local media. The strong municipal representation in the partnership also gave us direct access to urban projects. As the collection focuses on the Danube Region, most case studies originate from within the river basin. However, a small set of examples from Central and Eastern Europe broadens the range of proven solutions.

The consortium applied a partner-driven process to ensure that the mapping is both evidence-based and regionally balanced:

1. **Unified template**: A common Word/Excel form captured all core descriptors of each practice, using the unified structure.
2. **Partner-level data collection**: Each partner combined desk research with stakeholder interviews and targeted screening of national strategies, peer-reviewed literature and vendor catalogues to populate the unified template.
3. **Contextual mapping and data screening:** Task leader then carried out additional desk research, and policy screening to capture evidence that does not comfortably fit into the template format. These contextual datasets enrich the narrative and provide a broader backdrop for interpreting individual practices.

Output. The shortlist contains more than 30 good practices from eight Danube countries and covers the full typology of measures and community models. Detailed cards appear in Annex A.

In addition to the cases collected by project partners, several good practices were submitted by municipalities and non-governmental organisations outside the Be Ready consortium. All validated examples, both internal and external, are openly available on the Be Ready online platform, to which new entries can be added at any time.

DATA-COLLECTION WORKFLOW

- Draft template circulated
- Partners submit cases via online form.
- Quality Assurance check by task leaders
- Upload to internal repository & tagging.

Publication on the Be Ready Good-Practice Platform. Validated cases are uploaded to the public online map (https://be-uhi-ready.net/good-practices-map-visualization/) where they are openly accessible and the wider community can contribute additional examples.

Overview of the Urban Heat Island (UHI) Problem

DEFINITION AND IMPACTS

The Urban Heat Island (UHI) effect is the persistent, well-documented phenomenon whereby built-up areas record higher air- and surface-temperature values than their rural surroundings. Across Europe, the average difference is 4–6 °C, but during the July 2024 heat-wave night-time deviations reached up to 10 °C in Budapest and Belgrade (World Meteorological Organization & Copernicus Climate Change Service 2025; Unkasevic & Tosic 2024).

Three mutually reinforcing drivers explain the effect:

- **Heat storage in materials**: dark, impervious surfaces—roofs, asphalt and concrete—absorb short-wave radiation and re-radiate it as sensible heat. long after sunset, keeping urban fabrics warmer well into the night. (European Environment Agency; 2012)
- **Reduced evaporative cooling and shading**

  Trees cool cities via two main processes:

  - **Shading** can strongly reduce daytime land-surface temperatures (LSTs), especially over asphalt, where unobstructed sun can drive surface highs above 60 °C.
  - **Transpiration** draws heat from the air as water vapor is released through leaves—studies show that urban trees can lower local LSTs by 4–12 °C under hot extremes in Central Europe. The magnitude of cooling depends on species, leaf area index and local moisture availability; regional analyses reveal stronger tree-driven cooling in temperate zones than in water-limited Mediterranean climates. (Schwaab, J., Meier, R., Mussetti, G. *et al.*; 2021)
- **Anthropogenic heat release**: traffic, air-conditioning exhaust and industrial processes add an extra 1–2 °C to evening street-canyon temperatures in densely built cores (Environmental Protection Agency, United States; 2025).

  UHI is a climate-risk multiplier. Beyond discomfort, chronic overheating cascades into public-health crises, energy-system stress and ecosystem decline.

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Table 1: Impact

Impact domain	Observable effect	Evidence snapshot
Public health	↑ heat-stroke incidence, cardiovascular mortality	Summer 2022 heat-wave caused an estimated 61 000 excess deaths in Europe, with highest rates in urban cores (Ballester J., et al.; 2023)
Energy demand	↑ peak electricity load for cooling	Southern Danube cities saw a 25 % spike in July 2024 evening demand relative to winter peak (ENTSO-E; 2024)
Urban nature	↓ tree vitality, ↑ pest outbreaks	Street tree mortality in dry, heat exposed sites is 1.8× higher than in shaded parks (Vienna tree census 2023).
Public space & mobility	↓ walkability, ↑ heat related infrastructure buckling	Nemry (2012) found that extreme summer heat routinely drives rail-surface temperatures above 50 °C in parts of Europe, necessitating speed restrictions and accelerated track maintenance to prevent buckling

Take-home message: UHI is not an academic curiosity—it amplifies social inequality and economic loss. Fixing it pays a triple dividend: healthier people, lower energy bills, more liveable streets.

Fact-box

The number of warm-night events across Europe has more than doubled since the 1990s, with Central European hotspots experiencing the sharpest rise. (World Meteorological Organization & Copernicus Climate Change Service; 2025)

SPECIFIC CHALLENGES IN THE DANUBE REGION

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The twelve city UHI reports produced within Be Ready reveal a common pattern across the Danube Region's otherwise diverse climates and urban histories: night-time heat is rising fast, historic streets offer little canopy shade, and many smaller towns still lack dense sensor networks to track the problem. The overview below highlights the key data and explains why this mix turns the Urban Heat Island into one of the region's most immediate threats to public health and liveability.

European data show the trend, while partner data show the speed. While the European State of the Climate 2024 report states that the summer anomaly across the continent is **+1.1 °C** (WMO & C3S, 2025) above the 1991–2020 baseline, and that the number of tropical nights has roughly doubled since the 1990s, cities in the Be Ready consortium have recorded an even sharper spike. Podgorica now experiences around 30 tropical nights per year, while Budapest experiences around 35. Climate modelling for Kranj projects an increase of up to **60** additional tropical nights by 2100. Similarly, the average tree canopy cover in the analysed historic city centres is 11–13%, which is roughly half of the 20% comfort threshold recommended by the EEA for temperate zones. This confirms that Danube cities are heating up faster than the **European average and from a lower resilience base**, underscoring the need for tailor-made, high-urgency countermeasures.

To illustrate how these headline figures translate into day-to-day urban realities, the list of challenges below summarises the most critical Urban Heat Island (UHI) pain points reported by each Be Ready partner city. Each row pairs a hard datum — ranging from tropical-night counts to surface-temperature gaps or energy bills — with its practical implications for local policy and design. All numbers are drawn from the Be Ready project deliverable **"Urban Heat-Island Vulnerability and Risk-Assessment Report"** (UHI Report), providing a ground-truth snapshot of where the Danube Region is most exposed and where pilot interventions should begin.

Table 2: Table of Challenges

Challenge	Hard evidence from city UHI reports	Why it matters	Source
Night-time heat is rising fast	Podgorica recorded 30–31 tropical nights (> 20 °C) in 2024, roughly triple the 1990s average	Hotter nights stop buildings and bodies from cooling, raising mortality and energy demand	Podgorica UHI Report
Tree canopy below comfort level	Galați pilot area: 11.2 % canopy; Niš-Medijana: 12.8 % canopy and < 15 % shaded streets	Canopy under 20 % lifts summer surface temps by 5–9 °C	Galați UHI Report; Niš UHI Report
Public perception / equity hotspot	In Podgorica, 90 % of residents link dense	Clear public mandate and evidence that the	Podgorica UHI Report

Challenge	Hard evidence from city UHI reports	Why it matters	Source
	construction + lack of greenery to sleepless tropical nights and demand more trees	most vulnerable suffer most	
Sparse sensor network	Ratiboř has only two new weather stations; Aug 2024 showed a 7 °C gap between vegetated and asphalt sites	Few sensors leave street-level hot-spots unmapped, slowing targeted action	Ratiboř UHI Report
Heat-and-cloudburst combo	Ratiboř logged 179 mm rainfall (298 % of normal) in Sept 2024 after a very dry summer	Cooling measures must also manage flash floods and drought	Ratiboř UHI Report
Extreme surface-temperature gradient	Sofia registers up to 26 °C difference between coolest vegetated and hottest sealed surfaces	Indicates risk of pavement damage and unsafe pedestrian micro-climates	Sofia UHI Report
No reliable green-asset data	Hévíz lacks a full GIS inventory of canopy; current figures are only estimates	Without a baseline, greening targets and monitoring are guess-work	Hévíz UHI Report
Ageing, energy-poor housing stock	In Kranj, 60 % of dwellings were built 1960-1990 and need energy-plus-heat retrofits	Old fabric overheats easily; retrofits must combine insulation and shading	Kranj UHI Report
Shrinking & undocumented greenery	Chișinău's urban green area fell from 4 141 ha (1990) to 3 657 ha (2018); current inventory unknown	Loss of shade plus missing records hampers planning new parks or tree planting	Chișinău UHI Report
High cooling load in public facilities	Varaždin's city pool complex uses 1.19 GWh primary energy per year – the top municipal consumer	Public buildings drive peak electricity load; cool-/green-roof retrofits could cut bills and emissions	Varaždin UHI Report

Challenge	Hard evidence from city UHI reports	Why it matters	Source
Impervious surfaces dominate land cover	Zenica's built surfaces cover 61.85 % of the city; vegetation only 31.70 %	High sealing intensifies heat storage and runoff peaks	Zenica UHI Report

Key takeaways

The evidence collected in the Urban Heat Island Vulnerability and Risk Assessment Reports confirms that UHIs are **the fastest and most localised amplifier of climate change in the Danube region**. Data from partner cities highlight the continent-wide trend at street level and reveal four systemic weaknesses that must be addressed in any response:

- **Hotter — and accelerating — nights**. While Europe as a whole has warmed by +1.1 °C, partner cities are already reporting summer anomalies close to +2 °C. Podgorica is logging 30 tropical nights each year, while Budapest is logging 35.
- **Morphology locks in heat**. Medieval street canyons, sparse tree cover (only 11–13% in Galați and Niš) and dark, heat-absorbing materials leave little opportunity for the city to cool itself.
- **Inequity is built in.** Surveys from Podgorica and Chișinău show that it is the elderly and those on low incomes who occupy the hottest blocks, yet they have the least access to private greenery or air conditioning.
- **Small towns are flying blind**. Ratiboř and Hévíz demonstrate how limited sensor networks obscure the true risk map, and without data, targeted action grinds to a halt.

Effective UHI action must therefore blend rapid technical solutions, such as blue-green-white measures, reflective surfaces and low-cost sensors, with policies and community initiatives that direct resources to the areas most affected and vulnerable. The following chapters present successful initiatives already implemented across the Danube Region. These proven examples provide Be Ready partner cities with a ready-made menu for shaping their own pilot schemes, and, equally importantly, serve as open inspiration for any municipality beyond the project's borders that faces similar heat challenges.

Policies

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WHY WE NEED TO TALK ABOUT POLICY

Urban Heat Islands are not merely a technical or design challenge but a **systemic governance issue** that sits at the nexus of public health, spatial planning, climate adaptation, energy management and social equity.

Without policy interventions, isolated cooling measures—be they green roofs, pocket parks or misting arches — will remain one-off pilots prone to budget cuts, lack of maintenance and uneven distribution. Effective policy provides the **legal mandates**, **dedicated financing** and **equity safeguards** needed to scale up, sustain and fairly target UHI mitigation. As the European Commission's Joint Research Centre notes in its 2024 policy brief, "tackling heat extremes in cities requires integrating UHI considerations into urban planning directives and cohesion funds, backed by clear budget lines and performance monitoring" (European Commission – Joint Research Centre 2024).

Introducing the key policy conditions

The table below outlines the three key elements that are essential for the successful implementation of cooling measures, drawing on evidence from Be Ready project partner cities and proven Interreg Danube templates. It demonstrates the indispensable nature of each component (legal trigger, ring-fenced budget and equity lens) in transforming demonstration projects into binding, city-wide programmes.

Table 3: Key policy conditions

What makes a measure stick?	Evidence from partner cities	DTP (Interreg Danube Transnational Programme) know-how to copy
1. **A legal trigger** – the measure is mandated by a by-law or zoning code.	Only 3 / 12 Be Ready cities (Vienna, Brno, Bratislava) currently impose UHI clauses in building permits (UHI reports – Be Ready).	*URB for DAN* introduced an "urban-forest statute" requiring ≥ 20 % tree canopy in brownfield redevelopments (URBforDAN Consortium, 2020).
2. **A ring-fenced budget line** – money is earmarked rather than scraped from annual maintenance.	Sofia and Budapest set up specific "cool streets" or "cool roof" budget codes; smaller towns still finance cooling ad-hoc (UHI reports – Be Ready).	*AgriGo4Cities* piloted participatory budgeting for green roofs in deprived districts, proving micro-grants can mobilise residents (AgriGo4Cities Consortium, 2019).
3. A social-equity lens – funds and staff are	Podgorica survey: 90 % residents in dense quarters demand more trees, but	*TransGREEN* drafted legal templates for blue-green corridors that prioritise schools,

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What makes a measure stick?	Evidence from partner cities	DTP (Interreg Danube Transnational Programme) know-how to copy
directed to the hottest, poorest blocks.	only one partner city links heat maps to social grants (UHI reports – Be Ready).	hospitals and low-income housing (TransGREEN Consortium, 2020).

Bottom line: No rule, no budget, no impact. Policies are the bridge between isolated demonstrations and city-wide cooling programmes.

What (partner) cities say they still need

Before we consider specific policy instruments, it is helpful to understand where the partner cities identify the gaps and how they intend to address them. Feedback from UHI assessment workshops and the twelve city reports highlights four recurring needs:

Table 4: Gaps

Self-diagnosed gap	What partners ask for	How it can be written into policy	Key sources
1 · Minimum vegetation coverage	"Historic centres drop below 15 % canopy; we need a floor."	• Add a canopy quota to zoning codes (≥ 20 % tree cover or green surface in any redevelopment over 500 m²). • Vienna's "§ 76a green-roof clause" and *URBforDAN*'s urban-forest statute offer ready wording.	Galați UHI Report (2024); Niš UHI Report (2025); URBforDAN Consortium (2020)
2 · Cooling corridors / ventilation lines	"Tall blocks block the breeze; we risk trapping heat."	• Map prevailing summer winds and declare them build-to-avoid zones in the land-use plan. • Brno already runs a "no-worsening UHI test"; the *TransGREEN* legal template for blue-green corridors can be copied.	Brno UHI Report (2024); TransGREEN Consortium (2020)
3 · Ring-fenced finance ('cooling lines')	"Small towns fund cooling ad-hoc; trees die for lack of O&M money."	• Create a dedicated budget code (e.g. *Chapter 73 04 – Urban Cooling*). • Sofia's "Cool Streets" fund and Budapest's "Cool Roof" rebate show the accounting model; *AgriGo4Cities*	Ratiboř UHI Report (2024); Sofia UHI Report (2024); AgriGo4Cities Consortium (2019)

Self-diagnosed gap	What partners ask for	How it can be written into policy	Key sources
		proved that participatory micro-grants can top it up.	
4 · Equity-linked incentives	"The hottest, poorest blocks get the least investment."	• Tie retrofit subsidies or tree-voucher schemes to heat-risk + income maps (Budapest's cooling cheques as prototype). • Require that 30 % of any cooling budget be spent in the two highest-risk districts.	Podgorica UHI Report (2024); Chișinău UHI Report (2025); Budapest Climate Strategy (2018)

These partner-identified priorities—minimum green quotas, protected cooling corridors, dedicated budget lines and explicit equity tools—form the yardstick against which the policy options in the next sections are assessed, showing exactly how Danube cities can turn lessons into **legally binding, financially backed action**.

POLICIES IN PRACTICE – DANUBE-REGION CITIES THAT ALREADY TREAT THE URBAN HEAT ISLAND AS A POLICY TARGET

Across the Danube Region, an increasing number of capital cities, regional hubs and smaller river towns have moved UHI mitigation from a 'nice-to-have project' to a legal requirement, budgetary priority or mandatory design test. While their approaches differ, together they form an emerging policy toolbox that any municipality in the macro-region can adopt or adapt.

Here are examples from individual countries and cities in the Danube Region. These cases represent only a selection of the many initiatives underway; we've chosen one standout intervention from each sub-region to illustrate the range and direction of policy action

1 · North-western EU members

- **Vienna (AT)**. The 2015 *Urban Heat-Islands Strategic Plan* made ventilation corridors and mandatory green / cool roofs on every flat surface larger than 100 m² (§ 76a Bauordnung) city law; in 2024 these rules were folded into a wider *Heat-Action Plan* and underwrite the high-profile "Cool Streets" programme of misting arches and reflective asphalt (City of Vienna, 2015)
- **Brno (CZ).** Since 2023 every new neighbourhood must pass a **"no-worsening UHI test"**: developers submit micro-climate modelling to prove summer night-time temperatures will not rise above baseline; failure blocks the permit (City of Brno 2023).

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- **Bratislava (SK).** The 2017 action plan *Bratislava Is Preparing for Climate Change II* links a UHI risk map to **quantitative canopy targets**: redevelopment inside the historic core must add trees and at least one blue element such as a micro-fountain (Bratislava City Council 2017).
- **Prague (CZ).** The *Prague Climate Plan 2030* (2023) turns UHI science into hard targets: every street-reconstruction project must plant **≥ 1 tree per 30 m of pavement** and the city will create **"cool routes"** that link metro exits to the nearest park or riverfront, giving priority to the most overheated districts (Prague City Council 2023).

2 · Central & south-eastern EU members

- **Budapest (HU).** Chapter Aá-2 of the *Budapest Climate Strategy & SECAP 2030* earmarks a dedicated budget line for "cooling cheques" issued to heat-vulnerable households, finances high-albedo coatings on tram tracks, and reserves wind-corridor strips in the zoning code (Municipality of Budapest 2018).
- **Burgas (BG).** The city's *Sustainable Energy Development Strategy 2011-2020* (SEAP) makes canopy and cooling legally measurable: **Measure BG-19** pledges the planting of **5 000 street trees per year**, while **Measure PA-26 "Urban Cooling Islands"** pilots misting frames and pocket water features on overheated squares—linking shade and evaporative cooling directly to CO_2-cut targets (Burgas Municipality 2011)
- **Bucharest – Sector 2 (RO).** The 2023 Climate City Contract funnels parking-fee revenue into a dedicated Cooling & Shade Fund and makes green or cool roofs obligatory on new or retrofitted flat roofs over 300 m² (Sector 2 Municipality 2023).

3 · Western-Balkan & Neighbourhood partners (IPA/ENI)

- **Belgrade (RS).** The 2015 Climate Change Adaptation Action Plan mandates that all new public-sector buildings ≥ 500 m² include either a green roof or a high-albedo ("cool") roof, and establishes a dedicated "Urban Cooling" budget line to fund retrofits of existing schools and hospitals (City of Belgrade 2015)
- **Podgorica (ME).** The 2011 Sustainable Energy Action Plan (SEAP) for the Capital City of Podgorica outlines several measures with clear relevance to UHI mitigation. In particular, it mandates the development of a GIS-based cadastre of public green areas and sets quantitative targets for increasing green space: greening of bus stops and public plazas with pergolas, planting drought-resistant species in neighbourhoods, and expanding tree avenues along streets. These structural actions aim to boost canopy cover (currently as low as 13 % in densest quarters) and introduce shade-providing elements—essential first steps to cool urban microclimates (Podgorica SEAP 2011)
- **Chișinău (MD):** The 2019 Green City Action Plan (GCAP) introduces a binding policy that any major street reconstruction must include either a green-roof or a sustainable urban drainage system (SUDS) component—such as permeable pavement or rain-gardens—under Municipal Decree No. 591/1999 on green spaces. This is paired with a new "Blue-

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Green Infrastructure" line in the city budget for pilot investments and operations and maintenance (GCAP Consortium 2019)

These real-world examples show that Danube-Region cities—large and small, EU members and IPA/ENI partners alike—are already embedding Urban Heat-Island mitigation into law, finance, and design. Three key lessons emerge:

1. **Legal triggers unlock scale.** Mandates such as green-roof quotas (§ 76a in Vienna), no-worsening UHI tests (Brno), and binding canopy targets (Bratislava, Burgas, Podgorica) transform pilots into city-wide standards.
2. **Ring-fenced budgets guarantee longevity.** From Budapest's cooling cheques to Sector 2's Shade Fund, dedicated lines prevent one-off projects from withering once initial grants expire.
3. **Integration with equity and operations and maintenance (O&M) builds resilience**. Targeted subsidies for vulnerable households (Budapest), tree-voucher schemes (Podgorica) and new operating-and-maintenance budgets (Chișinău's Blue-Green line) ensure that cooling measures reach those who need them most—and endure over time.

Together, these policy instruments form a transferable toolbox. By adapting legal clauses, budget codes and equity-focused mandates, any municipality along (or beyond) the Danube can accelerate its journey from diagnosis to effective, lasting heat-resilience.

KEY OPPORTUNITIES & RECOMMENDATIONS FOR A DANUBE-REGION STRATEGIC FRAMEWORK

- **Embed UHI clauses into binding regulations.** Legal triggers—mandatory green/cool-roof quotas (§ 76a Bauordnung in Vienna), "no-worsening UHI" modelling tests in Brno, and quantified canopy targets in Bratislava—show that hard rules rapidly scale interventions beyond pilots.
- **Ring-fence dedicated cooling budgets.** Dedicated lines—Budapest's "cooling cheques" fund in the 2018 SECAP and Sector 2 Bucharest's parking-fee-financed Shade Fund—guarantee both installation (CAPEX) and upkeep (OPEX) of cooling measures.
- **Integrate an equity lens into funding.** Schemes targeting vulnerable residents—Budapest's household vouchers and Podgorica's tree-voucher grants for low-income districts—demonstrate how to channel resources where heat impacts are worst.
- **Expand and standardise heat-monitoring networks.** Belgrade's GCAP deployment of micro-climate sensors and Prague's street-level temperature mapping underpin data-driven zoning and "cool route" design; a common Danube platform would share protocols and dashboards.

- **Assemble modular policy-toolbox packages.** Cities like Chișinău (requiring green roofs or SUDS) and Burgas (annual street-tree pledges + misting islands) illustrate that combining blue-green, white and tech measures into pre-approved bundles speeds uptake.
- **Leverage existing DTP templates for rapid adoption.** Legal and financial model clauses from URBforDAN (urban-forest statutes) and TransGREEN (blue-green corridor regulations) can be repackaged for new Danube cities to avoid drafting delays.
- **Secure multi-year Operations & Maintenance (O&M).** Embedding O&M obligations (e.g. Chișinău's Blue-Green Infrastructure budget line) ensures that planted trees survive beyond initial installation—make 5-year upkeep plans a mandatory part of every UHI policy.
- **Build adaptive management and periodic review.** Regularly scheduled policy reviews (e.g. Brno's annual UHI test updates) enable the framework to respond to new data, evolving heat patterns, and stakeholder feedback.

Conclusion and transition

This chapter has emphasised that **policy is the backbone of any sustainable response to the Urban Heat Island (UHI) effect**. Three interlocking **policy conditions** — legal triggers, ring-fenced budgets, and an equity lens — have emerged as non-negotiable if cooling interventions are to be scaled up from isolated pilots:

- **Legal triggers** embed UHI clauses in bylaws and zoning codes, converting one-off trials into city-wide standards.
- **Ring-fenced budgets** guarantee both capital investment and ongoing operations, ensuring that measures do not disappear when grant cycles end.
- **Equity lenses** ensure that the hottest and most vulnerable neighbourhoods are prioritised, thereby aligning climate justice with heat resilience.

Furthermore, partner cities have themselves identified four **critical policy gaps**: **minimum canopy quotas, protected cooling corridors, dedicated 'urban cooling' lines, and equity-linked incentives**. These gaps provide a clear roadmap for future regulations, such as § 76a green-roof mandates, 'no-worsening UHI' tests, and 'cooling cheque' schemes.

With this policy foundation in place, the next challenge is implementation, for which community engagement and social innovation are indispensable. The practices outlined in the following chapter demonstrate **how hands-on participation can generate the necessary data, public mandate and volunteer stewardship to bring these policy instruments to life.** By involving residents in the design process and as caretakers, Danube Region cities can bridge the gap between the requirements of the rules and what happens on the ground, ensuring that UHI mitigation is both effective and equitable.

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Community engagement and social innovation

Community engagement and social innovation are not standalone "nice-to-haves" but **critical enablers of UHI policy implementation**. The initiatives below demonstrate how hands-on participation—from parish oases to schoolyard greening—generates the data, public buy-in and stewardship frameworks that underpin effective regulations and budget lines. By converting residents into co-designers and caretakers, these models help translate policy targets (e.g. canopy quotas, cooling funds, equity grants) into sustained, on-the-ground action. 'It's Getting Hot in Here: A Roadmap for Stakeholder Involvement in Urban Heat Island Mitigation', stresses the importance of early and structured community participation in uncovering local heat hotspots and **building the political mandate and social networks needed to embed cooling clauses in zoning codes, ring-fenced budgets and maintenance plans.** The authors demonstrate how volunteer sensor campaigns and co-design workshops can underpin data-driven regulations and secure long-term operation and maintenance (O&M) funding (Municipal Water Alliance 2023).

Below each example you will find not only a description but also **an outline of how these community engagement and social innovation activities are linked to policy decisions and why they matter.** At the end of the chapter, a concise summary of these linkages is provided.

- **Cooling-shelter networks – "Climate Oases", Vienna (AU)** (Caritas Wien 2024)

  Since 2020, Caritas Wien has collaborated with 20–30 parishes each summer to establish Klimaoasen—shaded church gardens provisioned with cold beverages, volunteers, and conversation. In 2023, the network operated for 145 days, welcoming a total of 9,000 visitors, of whom 50% were elderly or low-income residents. The only "hardware" required for this initiative is minimal, consisting of chairs, trees and lemonade. The true innovation lies in the social reach of this initiative, which involves parishes that already enjoy the trust of the local community being transformed into temporary cooling hubs.

  Policy link: By logging 9,000 visits in 2023 and documenting the demographic breakdown (50% elderly/low income), the Klimaoasen network provided the hard evidence needed to justify Vienna's ongoing "cooling shelters" budget and extend the parish garden model to the city's official Heat Action Plan.

  Transferable nugget: Urban areas with amenities such as courtyards, libraries or community halls have the capacity to emulate the model within a matter of weeks and at a negligible cost.

- **Participatory mapping & climate walks – Prague (CZ)** (Adaptation of Prague to climate change at the Climate Walk 2025)

  The Climate Office of Prague organises complimentary "Climate Walks" through overheated neighbourhoods. During these walks, citizens carry handheld thermo-sensors and log shady shortcuts. They also co-design future "cool routes". The walks serve a dual purpose, functioning both as a data collection exercise for the city's Geographic Information System (GIS) and as a public educational initiative about heat stress.

  Policy link: The geotagged temperature readings and shade-gap maps collected during these walks are used to populate Prague's GIS. They also underpin the mandatory cool-route design standards set out in the Climate Plan 2030. This ensures that new street works, and tree planting projects meet data-driven cooling targets.

  Transferable nugget: Participation in a two-hour walk can yield both engagement and geotagged evidence, thereby substantiating the allocation of green budgets.

- **Civic stewardship – "Adopt-a-Tree", Bratislava (SK)** (Operandum GeoIKP 2024)

  The 10,000-Tree Initiative, spearheaded by the mayor, seeks to encourage residents to adopt street trees, thereby fostering a sense of community engagement with the environment. The initiative employs a mobile application to facilitate this adoption process, utilising a notification system to remind adopters of the importance of hydration during periods of extreme heat. The municipality covers the costs of planting and ongoing pruning, while residents contribute 15 litres of water per tree and per week. Preliminary trials have demonstrated that watering compliance has been achieved in 70% of cases, and tree mortality has been reduced by half in the initial two summers.

  Policy link: The app-based stewardship pilot achieved 70% watering compliance and a 50% reduction in mortality, giving the city council the confidence to codify minimum canopy quotas in the 2023 bylaws and allocate a permanent 'Tree Fund' in the annual budget.

  Transferable nugget: The utilisation of stewardship applications has been demonstrated to be an effective solution for addressing the challenge posed by constrained municipal maintenance budgets, while concurrently fostering a sense of community pride within the neighbourhood.

- **Heat-alert outreach – Budapest's "Cooling Programme" (HU)** (Tzvetozar Vincent Iolov 2021)

  Each June, the capital launches a media campaign, utilising various methods to raise awareness of the issue. These include the dissemination of maps indicating shaded squares, lists of 200 drinking fountains, and the establishment of temporary 'cooling islands'. Additionally, SMS alerts are sent out, and 'cooling cheques' are provided to heat-vulnerable households. The campaign has been marketed in a manner consistent with the promotion of a city festival rather than a disaster warning, a strategy that has been shown to increase click-through rates and foot traffic.

Policy link: The 25% increase in campaign engagement achieved through festival-style marketing was key evidence when drafting the "Cooling Cheques" reimbursement scheme in the 2018 SECAP, demonstrating that positive framing increases the uptake of targeted equity grants.

The transferable nugget: Identified in this study suggests that the framing of heat adaptation as a public-service benefit, as opposed to a climate scare, results in a wider audience reach.

- **Pop Up Urban Spaces – Varaždin (HR)** (Interreg Central Europe. 2024)

In summer 2024, Varaždin's Šenoina Street was transformed by the installation of five modular "green boxes" — mobile planters combining seating with young trees. What was once a concrete thoroughfare becoming a shaded pocket plaza where the tree canopies and seating lowered both air and surface temperatures. By providing immediate shade in the area of highest pavement density, the boxes directly mitigate the Urban Heat Island effect. The project employed a participatory model: local architects provided the designs, sponsors covered materials, and volunteers planted and maintain the units. Over two seasons, more than 3,000 residents visited the new green plaza, raising awareness of urban overheating and inspiring neighbouring streets to request similar installations.

Policy link: Following the pilot, Varaždin received over 3,000 visits and neighbourhood requests, which informed the city's 2025 urban greening ordinance. This now includes a streamlined fast-track permit for modular shading installations in high-heat corridors.

The transferable nugget: Modular green boxes can be rapidly deployed in space-constrained urban lanes, delivering instant cooling and social activation with minimal infrastructure changes.

- **The Urban Oasis Project – Ljubljana (SI)** (Pazi!park 2024)

The Urban Oasis project converted a former parking courtyard at Prežihov Voranc Primary School into a 30 m² mini–food forest and rain garden, de-sealing asphalt and installing permeable planting beds. Over two workshops in 2024–2025, more than 30 students and scouts co-designed and planted 125 seedlings (15 shrubs, 110 perennials) and helped refine the soil to boost water retention. The new green classroom and wooden platform lowered playground surface temperatures by up to 8 °C at midday, directly mitigating the Urban Heat Island effect. Engaging pupils, parents and teachers through hands-on climate-resilience workshops fostered environmental learning, built stewardship teams and generated positive community feedback.

Policy link: Measured surface reductions of 8 °C and documented student stewardship outcomes were incorporated into Ljubljana's 2023 Action Plan. This resulted in a mandate to de-seal school yards and allocate funding for educational greening across all municipal schools.

The transferable nugget: Pilot "de-sealing" schoolyards with student-led planting workshops can deliver measurable cooling within one semester, build climate literacy among youth, and establish long-term volunteer maintenance structures.

Conclusion and summary

This chapter has demonstrated that **community engagement and social innovation** are essential components of effective Urban Heat Island (UHI) policymaking. Each initiative delivers immediate cooling benefits and generates the **evidence, public mandate and stewardship structures** necessary to translate high-level policy goals into lasting action.

A specific summary of each of the example given:

- **Climate Oasis (Vienna)** showed that usage indicators (9,000 visits, 50% of which were by vulnerable users) could justify and sustain dedicated budgets for cooling shelters.
- **Climatic Walks (Prague)** produced geotagged heat maps to inform mandatory cool route standards in the city's climate plan.
- **The 'Adopt a Tree' project in Bratislava** demonstrated that app-driven tree management yields 70% compliance and a 50% reduction in mortality, enabling the codification of tree canopy quotas and a permanent tree stock.
- **The Cooling Programme in Budapest** showed that festival-style framing leads to 25% higher engagement and informs equality grant programmes, such as 'cooling cheques'.
- **The Pop Up Urban Spaces project in Varaždin** turned 3,000 visits into an accelerated sunshade permit clause in the city's green space ordinance.
- **UrbanOasis (Ljubljana)** provided measurements showing an 8°C drop in surface area, as well as management data that led to a mandate to declutter schoolyards with dedicated funds for green education.

Together, these models demonstrate **the entire policy cycle**, from **community-generated data and pilot budgets to regulation mandates and ring-fenced funding lines, and from volunteer stewardship to embedded operation and maintenance (O&M) obligations**.

By combining participatory pilots with clear policy links, Danube Region municipalities can ensure that urban heat island (UHI) mitigation moves swiftly from diagnosis to long-lasting, equitable and scalable solutions.

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Good practices in the Danube Region

This section builds on the policy foundations and citizen-driven pilots described in previous chapters, presenting good practices in the Danube Region to which **the Be Ready project partners have contributed**.

Each example meets, or is directed towards meeting, at least one of the aforementioned core policy criteria, such as enshrining the measure in law, securing its own budget line or allocating resources to the most vulnerable. Where applicable, the examples also demonstrate how community involvement and technical innovation can be combined to achieve tangible urban heat island (UHI) mitigation results. A full description of over 30 validated practices can be found in **Annex A**, and **a summary highlighting their diversity and transfer potential** is provided below.

What is in the basket?

The inventory is divided into five categories, each of which is designed to address urban heat islands through a distinct primary mechanism.

- **Green (vegetation-led cooling)**

This involves leveraging shade, evapotranspiration (the process by which plants absorb water through their roots and release it as vapor from their leaves, using heat from the air to evaporate water and thus cool the surrounding environment; U.S. EPA, 2025) and biodiversity to lower temperatures. Examples include tree-lined parks, pocket forests and living green roofs, which absorb solar radiation, cool the air through transpiration and support urban wildlife.

- **Blue (water elements)**

Harnessing evaporative cooling and the social appeal of water. Fountains, misting plazas, rain gardens and programmable water features absorb heat through evaporation and create inviting communal spaces.

- **White/reflective (albedo enhancement)**

High-reflectivity coatings are applied to roofs, pavements and facades. These surfaces keep buildings cooler by bouncing back more of the sun's rays, reducing heat absorption in pavements and cutting peak temperatures in confined urban canyons.

- **Technical/hybrid (sensors and novel materials)**

Integrating smart sensors, biotechnologies and innovative construction materials. These measures combine data-driven monitoring with cutting-edge solutions, ranging from real-time heat-mapping networks to photobioreactors and phase-change materials.

- **Social and governance (engagement, stewardship and equity)**

Crafting participatory models, stewardship platforms and equity-focused incentives. Initiatives such as cooling hub networks, adopt-a-tree apps and targeted grant schemes ensure communities co-design, maintain and benefit most from urban heat island (UHI) interventions.

One more hybrid category captures mixed solutions, where two or more approaches work together:

- **Mixed (integrated measures)**

This combines vegetation, water features, reflective surfaces and/or smart technologies in a single intervention. For instance, a pocket park might combine shade trees (green), a misting fountain (blue), reflective paving (white) and soil-moisture sensors (technical) to provide more effective and long-lasting cooling than any one element alone.

This **mixed** approach recognises that real-world sites rarely conform to a single tactic and that thoughtfully layered measures often deliver the greatest dividends in terms of climate resilience.

GOOD-PRACTICE INVENTORY – GROUPED BY COUNTRY

This overview provides a quick reference list of over 30 validated good practices, organized by country. It allows partners and external readers to easily find inspiration relevant to their own context and to appreciate the breadth and diversity of "city cooling" initiatives already underway in the Danube Region. The following entries summarize each project's title and key action by country—detailed documentation is available in Annex A.

Table 5: Good Practices – Country and Category

Country	City	Case name	Category
Austria	Innsbruck	*CoolINN Green Oasis*	Mixed: Green/Blue + Social
	Vienna	*Climate Oases*	Mixed: Social+Green

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Country	City	Case name	Category
	Vienna	*Urban Heat-Island Strategy (UHI-STRAT)*	Mixed: Policy+White/Blue/Green
Bosnia & Herzegovina	Zenica	*Plant Maze and Green Landscaping at Zenica City Library*	Mixed: Green/White
	Zenica	*Greening of Zenica Business Zone I*	Mixed: Green/White
	Zenica	*Japanese Urban Garden and Tree-Lined Streets Initiative*	Mixed Green/White + Social
Bulgaria	Sofia	*Green Tram Tracks*	Mixed: Green + Technical
	Sofia	*Cool Green Urban Space*	Mixed: Green/Blue/White
	Sofia	*Energy-Efficient "Muzeiko" Building*	Mixed: Green/White + Technical
Croatia	Varaždin	*PopUpUrbanSpaces – Greening Šenoina Street*	Mixed: Green + Social
	Koprivnica	*Reconstruction of the Central City Square*	Mixed: Green/Blue
	Garešnica	*Tehno Park – Green Business Incubator*	Mixed: Green + Technical
Czech Republic	Liberec	*Greenery in the City Centre*	Green
	Ostrava	*REPLACE – Greenery Instead of Concrete*	White
	Brno	*Open Gardens Education Centre*	Mixed: Green/Blue + Social
	Brno	*Loft House with Green Roof*	Mixed: Green/White
	Brno	*Moravian Square – Multifunctional Water Feature*	Mixed: Blue/Green + Social
Hungary	Győr	*Revitalisation of Rivers around Győr*	Green

Country	City	Case name	Category
	Győr	*Greening the city centre of Győr*	Mixed: Green/Blue
Montenegro	Podgorica	*Mikro 020 - Reviving abandoned urban pockets in Podgorica*	Mixed: Green + Social
Romania	Arad	*Tram Lines Greened with Sedum Carpets*	Green
	Galati	*Urban regeneration: Domneasca Street between Lahovary street and Eroilor street, including the plaza near the Greek church.*	Mixed: Green/Blue/White
	Constanta	*Constanta 365*	Mixed: Green/Blue/White
Serbia	Belgrade	*Urban Pocket on Dalmatinska/Ruzveltova/ V. Brana Streets*	Green
	Belgrade	*LIQUID 3 – "Liquid Tree"*	Green + Technical
	Belgrade	*Green Wall Renewal – "Djoka Vještica" Plateau*	Green
	Niš	*Green Roof on Vojvode Tankosića 14–16*	Green
	Selected cities in Serbia	*Rain gardens – Socially responsible project ''Grew Like Me'', Company A1 Serbia and local authorities in ten selected cities*	Green
Slovakia	Bratislava	*Climate-Resilient Bratislava – Pilot Projects on Decarbonisation, Energy Efficiency of Buildings and Sustainable Rainwater Management in the Urban Environment*	Mixed: Green/Blue/White
Slovenia	Ljubljana	*Ljubljana's Own Weather*	Blue
	Ljubljana	*Green BTC City*	Green
	Ljubljana	*Pervious Pedestrian Paths in "Zvezda" Park*	White

Country	City	Case name	Category
	Ljubljana	*The UrbanOasis project*	Mixed: Green/Blue + Social

Below is a concise **synthesis of how these good practice cases break down by categories** - primary cooling mechanism and **what this reveal** about Urban Heat Island (UHI) strategies across the Danube Region:

Table 6: Good practices - synthesis

Category	Count	Key Features & Patterns
Green (vegetation-led)	9	Tree-planting, pocket forests, sedum roofs and green corridors dominate—easy wins for shade & evapotranspiration.
Blue (water-based)	2	Misting features and small water plazas appear less often but deliver high per-unit cooling and social draw.
White/reflective	3	Light-coloured paving and high-albedo coatings are simple to apply, often paired with green in mixed schemes for extra effect.
Technical/hybrid	3	Novel materials, sensors or photobioreactors—still niche, but promising for data-driven and biotech solutions.
Social & governance	4	Cooling-shelter networks, adopt-a-tree apps, participatory mapping and targeted equity grants show community buy-in is pivotal.
Mixed (integrated measures)	15	The largest group: projects that layer green + blue + white +/– technical in a single site—demonstrating that "stacked" solutions work best.

What this tells us

- **Vegetation** remains the workhorse. Nearly one-third of interventions rely primarily on trees, green roofs or pocket forests.
- Layered (**mixed**) approaches prevail. By combining two or more tactics—most commonly green + white or green + blue—cities achieve synergistic cooling and co-benefits (biodiversity, recreation, visibility).
- **Social** innovation is on the rise. These examples show that stewardship platforms, participatory walks and targeted grants not only extend UHI measures but also underpin policies and secure O&M (operations and maintenance) funding.

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- **Tech** still experimental. Fewer than 10 % of cases hinge on sensors or biotech, signalling an opportunity to mainstream data-driven and smart-materials solutions as complements to nature-based ones.

Conclusion

This portfolio of good practices collected within the Be Ready project indicates that no single "silver bullet" exists for UHI mitigation. Instead, layering vegetation, water and reflective materials—underpinned by community engagement and policy levers—delivers the greatest impact.

For pilot teams and cities beyond Be Ready, the clear takeaway is to mix, and match start with fast-tracking green and white "low-hanging fruit," enrich with blue features where space allows, and embed social-governance tools to sustain and scale results.

THE KEY GOOD PRACTICE TAKE-AWAYS FOR BE READY PROJECT PILOTS

Building on the inventory of good practices from across the Danube Region, organised by country, **this section distils lessons** for the Be Ready pilot teams, as well as **providing inspiration** for any city or stakeholder seeking to take active steps beyond the project's boundaries.

While the previous chapter catalogued each case by country and city, here we extract the essential **'what to do'** and **'why it works'** from each intervention, enabling readers to learn from them, find further details and apply these proven measures in their own contexts. This quick-reference summary serves both internal pilot planning and external replication across the wider urban resilience community.

Below, you will find an **alphabetical summary table** organised by country and then by city.

Each row represents one standout practice, with six columns:

- **City**: location of the intervention
- **Description**: a one-line snapshot of the action
- **Recommendation**: the core takeaway
- **Why it works**: the practical mechanism
- **Lessons learned**: a key insight to help avoid pitfalls.
- **No.:** reference number pointing to the detailed case in **Annex A**.

Use this as a quick-reference playbook: scan by country or theme, note the example number, and then consult Annex A for full implementation details and contacts.

Table 7: Good practices – Description, recommendation, why and lessons learned

Country	City	Description	Recommendation	Why it works	Lesson learned	No.
Austria	Innsbruck	Restored an asphalt park into a raingarden + mist oasis	Transform underused paved areas into rain gardens with mist	Shade & evapotranspiration lower ambient and surface temperatures	Integrate maintenance into existing park operations	17
	Vienna	Parish-garden cooling shelters in summer	Leverage faith-based venues as temporary cooling hubs	Uses trusted community sites and minimal hardware to reach vulnerable groups	Simple setups (chairs, shade, cold drinks) maximize social reach	16
	Vienna	Binding UHI Strategy Plan with ventilation corridors & cool-roof code (§ 76a)	Embed UHI clauses into building/zoning regulations	Legal mandates ensure city-wide compliance and scale interventions	Early code revisions prevent isolated pilot projects	18
Bosnia & Herzegovina	Zenica	Ornamental maze + gravel paths at City Library	Design interactive plant mazes near schools & libraries	Playful layouts attract repeat visits and provide shade loops	Assign maintenance to public green teams early	24
	Zenica	Greening of business-park entry with trees & turf	Pilot gateway greening to set climatic precedent	Cuts pavement heat & improves biodiversity	Coordinate with utilities to avoid underground conflicts	23
	Zenica	Japanese garden + tree-lined streets near public institutions	Combine themed garden with street-tree corridors	Cultural draw + shade improves microclimate	Public procurement clarity speeds contracting	22
Croatia	Varaždin	Pop-up green boxes (planters + benches) on Šenoina Street	Use mobile planter benches for rapid shade in narrow lanes	Immediate comfort & fosters community co-design	Engage local sponsors to cover material costs	26

Country	City	Description	Recommendation	Why it works	Lesson learned	No.
	Koprivnica	Fountain + double tree row in central square	Pair water feature with tree edges	Blue-green synergy lowers surface T and enriches public realm	Align fountain O&M with street-cleaning schedules	27
	Garešnica	Green roofs & walls on business incubator	Showcase green tech in commercial hubs	Demonstrates ROI and micro-climate benefits to tenants	Partner with developers to co-fund installation	28
Czech Republic	Liberec	Pocket-park conversion of blocked car park	Fast-track asphalt-to-green transformations	Quick political wins build broader support	Pre-approved design templates speed permitting	10
	Ostrava	REPLACE green façade campaign on concrete streets	Incentivize green walls on buildings	Passive shade + biodiversity without ground space	Engage property owners early to secure buy-in	11
	Brno	Green-roof retrofit on industrial loft conversion	Require cool + green roofs on brownfield redevelopments	Demonstrates retrofit feasibility on heritage sites	Provide technical guidance to speed developer compliance	13
	Brno	Multifunctional fountain + winter event space	Design plazas for dual summer cooling & winter events	Micro-climate relief + social activation	Coordinate maintenance with event schedules	14
	Brno	Schoolyard de-sealing into food forest & rain garden	Pilot schoolyard “de-sealing” with student workshops	8 °C surface drop + builds climate literacy	Align interventions with school curricula	15
Hungary	Győr	Water-level control dam with kayak zones	Combine recreational waterways with microclimate regulation	Expanded water surface boosts evaporation cooling	Multi-agency coordination is essential	07

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Country	City	Description	Recommendation	Why it works	Lesson learned	No.
	Győr	Container trees + mist gates on main lanes	Deploy modular shade + mist systems in soil-restricted cores	Provides immediate shade & cooling	Line up maintenance partners before installation	08
	Budapest	"Cooling cheques" + high-albedo tram-track rebates	Tie rebates & social grants to heat-vulnerability data	Positive framing boosts uptake by 25%	Collaborate with social services for outreach	33
Montenegro	Podgorica	GIS-driven tree-avenue expansion + green cadastre	Tie tree-voucher grants to heat-risk maps	Directs resources where UHI impacts are worst	Early forest cadastre accelerates planting	06
Romania	Constanța	38 ha brownfield → 15-min green-blue district	Reimagine large sites as walkable, mixed-use green-blue hubs	Embeds cooling at scale & improves accessibility	Phase interventions to maintain continuous greenery	30
	Arad	Sedum carpets on 5.5 km of tram corridors	Mandate sedum greening on all flat tram surfaces	19 °C surface-T reduction with zero irrigation	Train tram crews in substrate care	31
	Galați	Domnească St. upgrade: trees, pale paving & fountain	Retrofit historic streets with green-blue-white mix	Controls solar gain + boosts canopy + adds social spaces	Use standardized tree-pit kits for rapid planting	32
Serbia	Multiple municipalities	Rain gardens in five districts	Roll out rain-garden networks via public–private NGOs	Captures runoff, boosts evapotranspiration, adds greenery	Small pilots build momentum for system-wide uptake	01
	Belgrade	242 m² pocket park with turf, 3 trees & green walls	Create micro-parks at busy corners	Shade + vertical greening lowers air & surface temperature	Citizen requests can drive municipal action	02

Country	City	Description	Recommendation	Why it works	Lesson learned	No.
	Belgrade	Refurbished 18 m “Djoka Vještica” green wall with new irrigation	Retrofit aging green walls with durable panels & systems	Provides shade, cooling & managed drainage	Define operations and maintenance roles at design stage	03
	Niš	200 m² intensive green roof with shrubs & edible beds	Incentivize green roofs on dense buildings	Insulates roofs and adds local plant-evaporation cooling	Partner with developers for quicker adoption	04
	Belgrade	“Liquid Tree” algae photobioreactor bench	Deploy bioreactor benches in hard-scape areas	Algae fix CO_2 & release O_2 far faster than trees	Provide public outreach to explain novel tech	05
Slovakia	Bratislava	“Adopt-a-Tree” stewardship app + 10 000-Tree Initiative	Launch mobile stewardship platforms	Achieved 70 % watering compliance & 50 % lower mortality	Automated reminders sustain volunteer engagement	25
Slovenia	Ljubljana	Pervious pale pedestrian paths in heritage park	Replace sealed paths with porous, reflective paving	Cuts heat absorption & runoff while respecting historic character	Pilot small sections before full-park rollout	20
	Ljubljana	“Own Weather” interactive mist sprayer	Install visible mist features as public art	Engages the public while delivering localized cooling	Secure water connections in advance	21
	Ljubljana	Schoolyard de-sealing into mini food forest & rain garden	De-seal & plant schoolyards with youth workshops	8 °C midday surface drop + youth stewardship	Integrate into school programs	29
	Ljubljana	BTC City: parks, green roofs, walls & tree network	Integrate multi-scale green layers across commercial districts	Creates a cooling network at ground, roof & façade levels	Ongoing stakeholder forums sustain momentum	34

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FROM INSIGHTS TO ON-THE-GROUND COOLING: HOW TO PUT THE LESSONS TO WORK

Drawing on these Danube-Region case studies, we can sketch a **clear roadmap for transforming these lessons into real-world actions**:

1. **Start with a Site Screening**
    - Identify "hot spots" via simple citizen walks or existing sensor networks.
    - Map constraints (heritage areas, underground utilities) to choose the right measure (e.g., mobile planters where in-ground planting isn't possible).
2. **Layer Your Interventions**
    - Green + Blue + White synergy: combine shade-trees or green roofs with water elements (rain gardens, fountains) and reflective surfaces to multiply cooling effects.
    - Modular hardware (e.g., deploy pop-up planters, mist benches or algae "liquid trees" in compact cores, reserve larger raingarden or park conversions for open spaces)
3. **Embed a Policy Hook**
    - Legal triggers: pilot in areas covered by existing cool-roof or tree-cover regulations (Vienna's § 76a, Brno's UHI test).
    - Budget lines: align pilots with dedicated funds (Budapest's cooling-cheque budget, Sector 2's Shade Fund) to guarantee follow-through.
4. **Engage Communities Upfront**
    - Co-design workshops: involve schools, parishes or local NGOs to build ownership (Ljubljana's UrbanOasis, Vienna's Climate Oases).
    - Digital stewardship: use apps or SMS alerts to recruit and remind volunteers (Bratislava's Adopt-a-Tree).
5. **Measure Early, Share Often**
    - Quick sensors: install soil-moisture or temperature loggers before and after (rain gardens in Serbia, green roofs in Niš).
    - Open data: publish results on public maps to generate political buy-in and inspire neighbouring districts.
6. **Plan for Long-Term Care**
    - O&M (operations and maintenance) partnerships: forge public–private agreements for routine pruning, irrigation and cleaning (Kupolvoda, Bratislava).
    - Stewardship programs: codify volunteer roles into municipal maintenance plans to secure multi-year care.
7. **Scale by Replication**

- Policy toolkits: adapt proven legal clauses (TransGREEN's cooling corridors, URBforDAN's canopy statutes) to local bylaws.
- Template projects: spin up identical pilots in similar contexts—brownfield squares, schoolyards, major intersections—to build a chain of demonstrators.

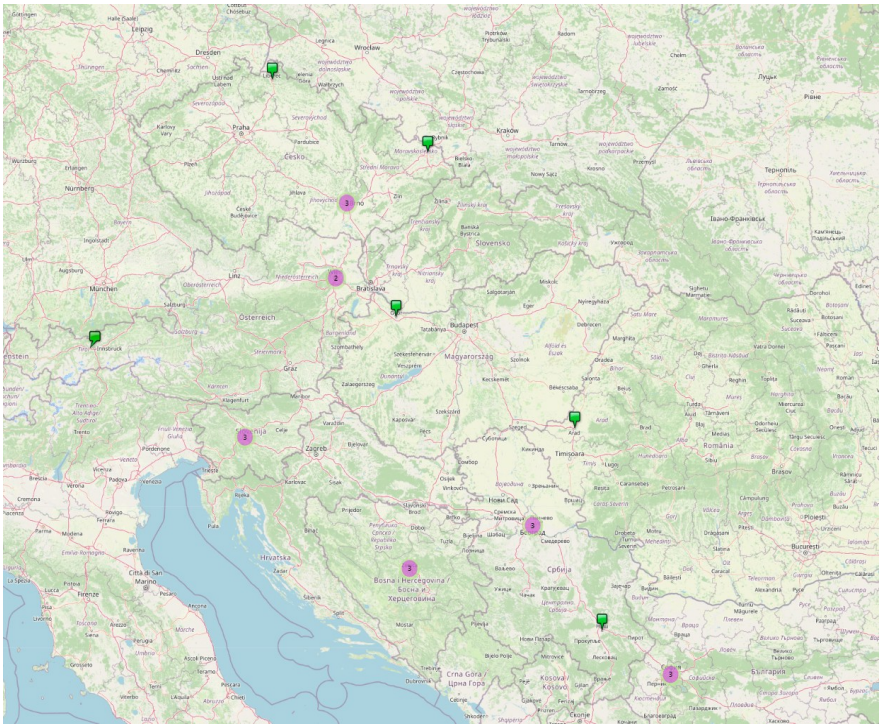
Although these recommendations are based on the best practices that we have gathered from across the Danube Region within the project partnership, we recognise that there are many more inspiring interventions beyond this sample. The examples presented here reflect the current insights of this phase of the Be Ready project and are by no means exhaustive. All practices, and any new submissions, are catalogued on the publicly accessible Be Ready platform (https://be-uhi-ready.net/good-practices-map-visualization/), where cities and stakeholders can continue to share, learn, and adapt together.

These distilled lessons are intended to guide the pilot actions in the Be Ready consortium consortium and to inform the project's broader milestones — such as the development of action plans and strategic frameworks. By building on what works and continuously updating our collective knowledge, we can progress towards truly resilient, cool and equitable urban landscapes.

WHERE TO EXPLORE FURTHER

All practices are geolocated on the public, crowd-extendable the Be Ready project platform map: https://be-uhi-ready.net/good-practices-map-visualization/

Figure 1_Be Ready Platform - MAP



Conclusion

The threat of urban heat is no longer abstract for Danube cities; it is a lived reality. There are multiple lines of evidence that confirm this. For example, temperature logs in Podgorica show around 30 tropical nights in 2024 (Podgorica UHI Report, 2024), while climate modelling in Kranj projects up to 60 additional tropical nights by 2100 (Kranj UHI Report, 2025). There were also spikes in electricity demand of up to 25% during the July 2024 heatwaves (ENTSO-E, 2024), and public health data estimates that there were 61,000 excess deaths across Europe in the summer of 2022 (Ballester et al. 2023) — confirm that summers are intensifying and that dense urban areas suffer the most.

Nevertheless, this mapping report has compiled a comprehensive portfolio of over 30 proven interventions, including green roofs, rain gardens, mist benches, community watering apps, and cool-roof mandates, which are ready for scaling up. However, pilots alone cannot drive systemic change. **Routine adoption requires a high-quality strategic framework** with supporting implementation tools so that cooling becomes a permanent urban function, not just a one-off demo.

To embed these successes in everyday practice, cities require a robust strategic framework based on:

- **Clear objectives** (e.g. ≥ 20 % canopy cover)
  - Evidence: Galați UHI Report (11.2 % canopy) and Niš UHI Report (12.8 %) both fall below the 20 % comfort threshold, while Vienna's § 76a and Bratislava's quantified canopy targets set binding goals.

- **Aligned regulations** (cool-roof codes, "no-worsening" UHI tests)
  - Evidence: Vienna's UHI-STRAT (§ 76a Bauordnung) and Brno's mandatory "no-worsening" modelling test turned pilots into permit requirements.

- **Dedicated financing** (ring-fenced budgets, equity-linked grants)
  - Evidence: Budapest's "cooling cheques" line in SECAP 2030 and Sofia's Cool Streets fund safeguard ongoing O&M funding.

- **Performance metrics** (standardized monitoring protocols)
  - Evidence: Serbia's rain-garden sensor campaigns and Niš's green-roof temperature logs highlight the need for two sensors/site, common KPIs and public dashboards.

Based on our findings, four core policy gaps must be closed:

1. **Heat-equity funding**

   Gap: Only a handful of cities (e.g., Budapest's cooling cheques) target grants to the most vulnerable neighbourhoods.

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Action: Make subsidies and "cooling cheques" conditional on overlaying heat-risk and income maps (Podgorica UHI Report 2024; Municipality of Budapest 2018).

2. **Long-term maintenance budgets**

   Gap: Many rain gardens, green roofs or mist benches flourish for a season then wither when pilot funds end.
   Action: Establish dedicated O&M lines in municipal budgets (e.g. Chapter 73-04 "Urban Cooling"; Ratiboř UHI Report 2024; AgriGo4Cities 2019).

3. **Mandatory cooling corridors**

   Gap: Only a few cities currently offer grants for the most vulnerable neighbourhoods.

   Action: Adopt "no-worsening" UHI tests or blue-green corridor clauses in all land-use codes (City of Vienna 2015; City of Brno 2023).

4. **Shared monitoring standards**

   Gap: Each city reinvents its own sensor network and heat maps.
   Action: Agree on a simple Danube-wide protocol—two sensors per site, basic KPIs, public dashboards—for transparent, real-time feedback (Be Ready UHI Reports).

These gaps directly reflect the drivers and lessons documented earlier in this report, and closing them will transform scattered pilots into binding, city-wide programmes.

Organisation is the linchpin linking good practices to good policies. Cities can build a coherent cooling strategy by:

- **Screening** sites for quick wins (Innsbruck raingardens; Zenica library maze).
- **Layering** green-blue-white measures (Galați street retrofit; Niš reflective roofs).
- **Anchoring** pilots in existing regulations (§ 76a cool-roof code in Vienna; Brno's UHI test).
- **Engaging** communities from day one (Prague Climate Walks; Bratislava Adopt-a-Tree).
- **Measuring** outcomes transparently (Ljubljana schoolyard sensors; Győr kayak dam flows).
- **Maintaining** via ring-fenced operations and maintenance budgets and stewardship apps.
- **Sharing** (e.g. through the Be Ready online platform)

What Comes Next

As we close this Mapping Report, the Be Ready partnership transitions into the pivotal **next phase**: **putting our shared insights into action** across the Danube Region.

The tasks ahead fall into three interlinked streams:

1. **Pilot testing and peer validation**
   - Pilots: **Roll out the co-designed micro-interventions**—in each partner city, accompanied by targeted public awareness campaigns.

- Peer Evaluation: **Convene cross-city review visits to observe installations in situ**, gather real-time feedback, and validate performance.

2. **Strategic and local action planning**
   - **Joint Strategic Framework**: Draft, consult on, and adopt a Danube-wide roadmap for UHI resilience
   - **City Action Plans (CAP):** Each of the 12 partner cities will **formalize its own UHI CAP**, detailing prioritized pilot sites, policy adjustments, financing pathways, community engagement tactics, and maintenance schedules.
   - **Policy Recommendations**: Build on pilot evidence to propose region-wide policy measures
3. **Dissemination of findings**
   - Field reports
   - Workshops
   - Be Ready Platform updates
   - Stakeholder outreach: Share key findings via newsletters, social media campaigns and presentations to national authorities, Interreg networks and other urban-resilience platforms.
   - Final conference

By systematically testing, validating and disseminating our pilots and findings—then embedding them in a robust strategic framework and city-level action plans—we'll ensure that UHI mitigation moves beyond isolated demos to become a permanent, scalable function of urban governance. This integrated approach sets the stage for cooler, healthier and more liveable Danube cities, both within Be Ready and far beyond.

Annexes

Annex A – Detailed good practice case cards

All 36 of the good-practice summaries presented in **"Chapter Good practices in the Danube Region"** are described in full here, with technical details, community engagement approaches, policy links and contacts. When you see a practice **numbered No. X** in the body of the report, you can turn to Annex A, **case card X** for the complete documentation.

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Annex A - Table of Contents

1. Good practice - Rain gardens – Socially responsible project "Grew Like Me" – Serbia

1. General Information

- **City name**

10 selected cities in Serbia

- **Practice title**

Socially responsible project "Grew Like Me" ("Niklo kao ja") of the Company A1 Serbia, implemented in cooperation with the European organization Propulsion,
Faculty of Forestry University of Belgrade and cities of Bečejj, Beograd, Čačak, Kragujevac, Nia, Novi Pazar, Novi Sad, Smederevo, Sombor and Subotica.

- **Category**

☒ Green (vegetation-based)
☐ Blue (water-based)
☐White (material-based)
☐ Mixed

- **Practice contributor:**

Company A1 Serbia; European organization Propulsion; Faculty of Forestry University of Belgrade; local governments in ten selected cities – Bečej, Beograd, Čačak, Kragujevac, Nia, Novi Pazar, Novi Sad, Smederevo, Sombor and Subotica

2. Description of the Practice

- **Summary**

With the aim of contributing to environmental protection, the company A1 Serbia has

successfully completed the planting of 10 rain gardens in 10 cities across Serbia, as the first phase of the socially responsible project "Grow like me" ("Niklo kao ja"), with
the aim of reducing the negative consequences of climate change in urban areas. Through its ESG strategy, A1 Serbia continuously invests in achieving long-term goals in the field of sustainability. This approach does not only include projects of action on climate risks and protection of biodiversity such as "Grow like me", but also includes long-term decarbonization plans, increasing the share of sustainable energy from own production, increasing energy efficiency in business operations and respecting the principles of circular economy.
Although their primary purpose of implementation of rain gardens was to treat stormwater runoff and reduce flooding, they are also constructed with the aim of improving biodiversity, reducing the heat island effect, and increasing the usable and
design potential of micro-urban spaces.
Local government units in selected cities provided locations for rain gardens, and volunteers participated in their construction.

The local citizens had the opportunity to work together with professional gardeners and project promoters on the same task: creating and arranging a rain garden, in accordance with the needs of each individual city.

- **Key Actions**

Construction of ten rain gardens in ten selected cities.
Rain gardens were built in different locations in each of the cities.
They are shown in Table 1.

City	Location of Rain Garden
Bečej	The 'Sever Djurkić' neighborhood. Green space between multifamily housing buildings was transformed into a garden for recreation and plant cultivation.
Beograd	The former industrial part of the city. Transformed into residential buildings, restaurants and galleries. Garden now provides vegetables for restaurants in the district.
Čačak	A youth park in the city center. Open to all ages, it is a favorite place for recreation, relaxation and art. The skate park and the 'Uzlet' festival attract young people. Due to frequent floods, the park was not always fully used, so a rain garden was added.

Kragujevac	Former Lyceum, the first high school in Serbia. The concrete parking lot is transformed into a green oasis, reducing heat islands and pollution in the area.
Niš	The 'Rentgenova Street' neighborhood. Unused green space between multifamily housing buildings was transformed into a garden for recreation and plant cultivation.
Novi Pazar	The courtyard of the Center for Social Work. Transformed into a green sanctuary actively maintained by the community.
Novi Sad	Near the multimedia installation by Yoko Ono ('One Day...') at the Petrovaradin Fortress. Chosen due to cultural and tourist significance in cooperation with EXIT Foundation.
Smederevo	Central city location near school and tourist organization. Flood-prone area transformed into a green oasis improving air quality and quality of life.
Sombor	Park with sports fields near elementary school. Transformed into a recreational space for all age groups.
Subotica	'Prozivka' city park, the only green oasis in the city. Includes picnic benches to make the park more attractive and functional.

- **Technical aspects**

  To create the rain garden, authentic seedlings and materials characteristic of the selected cities and this area were used.

- **Community engagement**

In addition to the project leader, Company A1 Serbia, and the local self-government
units, other local stakeholders and community representatives were involved in the
implementation of the project, as well as engaged in the maintenance of the rain gardens. They are shown in Table 2.

Table 2. Key involved community actors.

City	**Community Actor and Activities**
Bečej	Neighborhood community 'Neighbors for Neighbors' takes care of landscaping green areas.

Beograd	Volunteers from 'Gastroaor' helped green the garden, which now provides vegetables for local restaurants.
Čačak	Volunteers from the Youth Office and Green Wave contributed to transforming unused green space into a rain garden.
Kragujevac	Volunteers from 'Ekomar' and 'ECOlogica Urbo' helped create a healthier urban environment.
Niš	The 'Jedi Movement' is a key partner in the realization of this project.
Novi Pazar	Volunteers from the Center for Social Work were actively involved.
Novi Sad	EXIT Foundation cooperated in project implementation.
Smederevo	Tourist Organization of Smederevo contributed to the transformation of a flood-prone area into a rain garden.
Sombor	Sombor Education Center raised awareness on biodiversity preservation through joint planting by volunteers.
Subotica	Students of the Agricultural School from Bačka Topola played a key role in garden creation.

One of the planned activities aimed at citizen participation was the residents' vote for the most beautiful rain garden. During the vote, almost 22,000 valid votes were received through the website www.svetkakavzelis.rs, which are the result of the joint efforts, enthusiasm and commitment of the community in the fight for a cleaner and healthier environment.
Thanks to the community vote, Bečej is the winning city with the most votes, and the first rain garden in this city was voted the most beautiful.

- **Results**

  Stormwater management, improving the use and design potential of micro-urban space, improving ecological comfort on micro urban scale, as well as reducing negative effects of urban heat islands (UHI).

  However, detailed measurements related to UHI, and other outcomes have not been carried out.

3. Supporting Details

- **Duration**

2023

- **Challenges/Lessons Learned**

Make the importance of green-blue measures and the issues of UHI as "visible" as possible to the wider and professional public through various forms of private-public partnerships. In certain circumstances, limited funding and institutional gaps can be overcome through public-private partnerships. However, for systemic implementation, an institutional shift towards an innovative approach and a change in the traditional institutional framework is necessary.

- **Recommendations to other cities**

  Start with promotional activities in the form of small pilot projects to demonstrate the possibilities and effectiveness of nature-based solutions in addressing UHI issues.

- **Website**

  https://svetkakavzelis.rs/

  www.A1.group

Upload a photo

2. Good practice – Urban pocket, Ruzveltova Street, Belgrade

1. General Information

- **City name**

  City of Belgrade, City Municipality of Palilula

- **Practice title**

  Urban pocket on the corner of Dalmatinska, Ruzveltova and Vojvoda Brana Streets

- **Category**

  ☐ Green (vegetation-based)
  ☐ Blue (water-based)
  ☐White (material-based)
  ☒ Mixed

- **Practice contributor:**

Public Utility Company "Zelenilo-Beograd", Belgrade

2. Description of the Practice

- **Summary**

  The Public Utility Company "Zelenilo Beograd" has landscaped a 242m² square located between very busy streets. In addition to serving as a pedestrian connection between streets and a short break for passers-by, this green corner improves the microclimatic conditions at this location.

  The construction was carried out entirely by Public Utility Company "Zelenilo Beograd", from the printed concrete to the installation of the irrigation system that ensures the survival of plants in difficult urban conditions.

The entire area is especially enriched by double-sided oriented green walls, placed in such a way as to protect passers-by from the negative effects of busy roads - exhaust gases and noise.

The first green wall is placed at the corner of Vojvode Brane and Ruzveltova streets, while the second is placed at the corner of Vojvode Brane and Dalmatinska streets. In addition to its visual function, it also has the function of "masking" the existing traffic and containers. The existing vegetation, consisting of tall deciduous trees, was retained, and three more trees of the deciduous species of catalpa (Catalpa bignonioides) were planted, as well as a deciduous shrub - red pear tree (Symphoricarpus orbiculatus) with red fruits and Spiraea x vanhouttei with snow-white flowers. Also, all grassy areas were restored by laying grass turf on an area of 112 m². In cooperation with the company "Telekom Srbija", chargers for mobile phones were also installed, as well as free internet was provided. The construction of urban pocket costs about 4.5 million dinars (approx. 400 000 Euro). Funds were provided from the city budget. This is the 11th urban pocket that has been developed in the 2015 and 2016 (besides it, urban pockets were built in Žička Street, Novopazarska Street, in front of "Beogradjanka", in front of the Faculty of Law, etc.).

- **Key Actions**

Designing green walls, forming lawns, planting trees and paving.

- **Technical aspects**
  - Green walls are implemented in the form of panels.

- **Community engagement**

Although the project was implemented by the Public Utility Company "Zelenilo - Beograd", according to available data it was initiated by citizens who approached the City Council and the municipality of Palilula and, indirectly, the city manager.

- **Results**

Improving the use and design potential of micro-urban space, as well as ecological comfort. However, detailed measurements regarding to UHI and other outcomes have not been carried out.

3. Supporting Details

- **Duration**

  2016

- **Challenges/Lessons Learned**

Institutionally and systemically supported, dispersed implementation of small-scale green measures can produce cumulative positive effects on the ecological comfort of a wider city area and reduce the negative effects of UHI.

- **Recommendations to other cities**

  Start with small-scale pilot projects to demonstrate possibilities and effectiveness of nature-based solutions in solving UHI effects.

- **Website**

  https://www.zelenilo.rs/novosti/skriveni-zeleni-kutak-u-dalmatinskoj-ulici

  Upload a photo

3. Good practice - Good practice – Green Wall on the “Djoka Vještica” plateau, Belgrade

1. General Information

- **City name**

  City of Belgrade, City Municipality of Stari Grad, Serbia

- **Practice title**

  Renovation of the green wall on the "Djoka Vjeatica" platou, Belgrade

- **Category**

  ☒ Green (vegetation-based)
  ☐ Blue (water-based)
  ☐White (material-based)
  ☐ Mixed

- **Practice contributor:**

Public Utility Company "Zelenilo-Beograd", Belgrade.

2. Description of the Practice

- **Summary**

  Green wall on the "Djoka Vjeatica" platou is the first green wall installed in Belgrade in 2014 as a pilot project, which became over the time a recognizable part of the urban space in front of one of the symbols of Belgrade. However, the passage of time has taken its toll, so the green wall needed to be repaired during the reconstruction of the plateau.

  By applying innovative solutions and more modern materials, the "green wall" on the "Djoka Vjeatica" plateau has undergone a complete reconstruction, with the appearance of the plateau being improved both aesthetically and functionally.

The new panels have built-in lighting and a sustainable solution for draining excess

rainwater. By planting new plants that form a composition of colors and textures, a kind of natural artistic "green painting" has been created.

- **Key Actions**

Renovation of the green wall by replacing the existing panels in length of 18m.

- **Technical aspects**

The reason for the renovation is the frequent failures of the irrigation system, as well as the wear and tear of the materials from which the wall is made. When forming the wall, the plant panels were made of geotextile, but over the years, due to the action of mineral substances that nourish the plants, the geotextile has lost its original technical properties. The new technologies that "Zelenilo-Beograd" has adopted and successfully applied in the construction of other green walls in the city in recent years have proven to be a better, higher quality and more durable solution.

- **Community engagement**
  - N/A

- **Results**

Improving the use and design potential of micro-urban space in the central part of the city. However, detailed measurements related to UHI and other outcomes have not been carried out.

3. Supporting Details

- **Duration**

2021

- **Challenges/Lessons Learned**

Explicitly expressing the responsibilities of all actors involved in the process of maintaining green measures is key to their maintenance and quality.

- **Recommendations to other cities**

  Maintain implemented projects to support their efficiency and aesthetic values.

- **Website**

  https://www.zelenilo.rs/novosti/obnavlja-se-zeleni-zid-na-platou-djoke-vjestice

  https://www.zelenilo.rs/novosti/2014-05-27-10-18-56

- **Upload a photo**

4. Good practice - Green roof, Vojvode Tankosića Street, Niš

1. General Information

- **City name**

  City of Niš, City Municipality of Medijana, Serbia

- **Practice title**

  Green roof on residential-commercial building

  in Vojvode Tankosi a Street, 14-16, Niš

- **Category**

  ☒ Green (vegetation-based)
  ☐ Blue (water-based)
  ☐White (material-based)
  ☐ Mixed

- **Practice contributor:**

  Private developer Predrag Den i . PR Agencija za projektovanje in~enjering I gradjevinsku delatnost A.DE.PE. Niš

2. Description of the Practice

- **Summary**

  The residential-commercial building (GF+6) is located in a residential block and city
  area which is highly densely populated.
  The building was designed in an
  uninterrupted sequence with a front facade facing Vojvode Tankosi a Street.
  44 residential units, two business units and an underground garage were built. A

green roof was built on top of the building.

- **Key Actions**
  - Construction of an intensive green roof on a surface area of 200m2.

- **Technical aspects**

  The roof is privately owned and its surface area is 200m2. In addition to the lawn, small trees and large shrubs of Photinia, as well as Hedera helix are planted. One part of the garden is intended for growing vegetables.

- **Community engagement**
  - N/A

- **Results**

  Improving micro-/climate conditions at the small spatial level. However, detailed
  measurements related to UHI and other outcomes have not been planned.

3. Supporting Details

- **Duration**

  2019

- **Challenges/Lessons Learned**

Partial, individually guided micro-interventions can, to a certain extent, overcome the
institutional and planning gap and influence the improvement of ecological comfort.

- **Recommendations to other cities**

  Encourage private developers to be eco-friendly and socially responsible.

- **Website**

https://www.linkedin.com/in/predrag-den%C4%8Di%C4%87-81a29317

- **Upload a photo**

5. Good practice - "Liquid tree", Makedonska Street, Belgrade

1. General Information

- **City name**

  City of Belgrade, City Municipality of Stari Grad, Serbia

- **Practice title**

  LIQIUD 3 – "Liquid tree" ("te no drvo")

- **Category**

  ☐ Green (vegetation-based)
  ☐ Blue (water-based)
  ☐White (material-based)
  ☒ Mixed

- **Practice contributor:**

UNDP Serbia; Department for Social Activities and Development Projects in the Administration of the City Municipality of Stari Grad

2. Description of the Practice

- **Summary**

  The first urban photo-bioreactor in Serbia, LIQUID 3 was installed in front of the Stari Grad Municipality in Makedonska Street in Belgrade. This "liquid tree", as it is called at the Institute for Multidisciplinary Research of the University of Belgrade where it was designed, represents a new biotechnological solution for air purification and reduction of carbon dioxide (CO2) emissions in urban areas, where concentrations are the highest. The project is designed to be multifunctional, it is designed as a bench, has chargers for mobile phones, as well as a solar panel thanks to which the bench has lighting during the night. The Municipality of Stari Grad

has decided to support a project that, through smart and innovative solutions, directly contributes to improving the quality of life of fellow citizens, public health and a cleaner environment. LIQUID 3 was awarded as one of the 11 best innovative and climate-smart solutions within the project "Local Development Resilient to Climate Change", which is implemented by the United Nations Development Program (UNDP) in partnership with the Ministry of Environmental Protection of Serbia, with the financial support of the Global Environment Facility (GEF). The municipality of Stari Grad, as a partner in the implementation of the project, provided the location and permits for the installation of the system.

- **Key Actions**

Installation of multifunctional photo-bioreactor – LIQUID 3 ("liquid tree").

- **Technical aspects**

The photo-bioreactor works by having algae in a 600l aquarium that binds carbon dioxide and produce pure oxygen through photosynthesis in a direct process. In addition to purifying the air from CO2, the system uses solar energy for lighting. The Institute for Multidisciplinary Research used unicellular freshwater algae, which exist in ponds and lakes in Serbia, can grow in tap water, and are resistant to high and low temperatures. The LIQUID 3 system enables photosynthesis and fixes carbon dioxide at the same way at trees and grass. The advantage of microalgae is that they are 10 to 50 times more efficient than wood. The goal is not to replace forests, but to use this system to fill those urban pockets where there is no space for planting trees. In some conditions of high pollution, the tree cannot even survive, while the algae are not bothered by the pollution.

- **Community engagement**
  - N/A

- **Results**

As trees and green areas represent natural air purifiers in urban areas, where free

areas for greening are often lacking, LIQUID 3 is seen as an effective and innovative
solution for reducing harmful gas emissions and improving air quality.
It replaces two 10-year-old trees or 200m2 of lawn.

3. Supporting Details

- **Duration**

  2021

- **Challenges/Lessons Learned**
  - Rely on local knowledge and resources in implementing innovative measures.

- **Recommendations to other cities**

  If there are no opportunities for the use of greenery (for example, densely built-up areas of cities), apply alternative and innovative measures.

- **Website**

  https://www.starigrad.org.rs/

- **Upload a photo**

6. Good practice – Micro 020

1. General Information

- **City name**

Podgorica, Montenegro

- **Practice title**

Mikro 020 - Reviving abandoned urban pockets in Podgorica

- **Category**

☐ Green (vegetation-based)
☐ Blue (water-based)
☐White (material-based)
☒ Mixed

- **Practice contributors:**

Capital City Podgorica: Albina Međedović (project manager), Stefan Đukić (architect), Teodora Kusovac (project manager)

2. Description of the Practice

- **Summary**

Project Mikro 020 (Micro 020 in English, with 020 being the area phone code for Podgorica) was launched in 2019 with an idea by the local government to engage the citizens and professionals (Union of Architects of Montenegro) in identification and transformation (breathing new life9) into neglected urban pockets in Podgorica. The pockets are abandoned micro locations recognised as having potential for becoming green urban gathering places for the local communities, thus building links which would help the inhabitants feel they own these public spaces and are responsible for keeping them in good condition. The micro locations were mapped by the citizens who were invited to join the project with their proposals. In the second phase, the local government collected the funds for the interventions to be implemented upon designs made by professionals willing to revive the pockets with their creative solutions. In the crucial third phase the citizens enlivened the Micro 020 locations by starting

to use the spaces that, no long ago, were uncared for. The selected locations are mostly in the vicinity of public schools or other public buildings.

- **Key Actions**

The selected locations are discussed with the local architects and solutions for their revitalisations are proposed, designed and implemented as small-scale investments throughout the city. Local businesses are invited to contribute with the funding for the implementation of the designs. The action was launched in 2019 and continues to this day through a variety of solutions adapted to specific requirements of the selected micro locations – neglected urban pocket with a potential for reviving.

- **Technical aspects**

Depending of the specifics of the selected micro locations, different technical solutions are chosen for every single micro location transformed through the Mikro 020 project. Some pockets need greening, or additional greening, with unsealing of surfaces. In some cases removal of illegal dumping is necessary. Where suitable, and in line with the planned repurposing, street furniture is installed and/or playgrounds for children are built. In one case mounting of white, sun reflective canopies helped make the place suitable for public gatherings and outdoor expositions. In two locations monuments are placed. One location has been revived with pictures in vivid colours created by local young artists.

- **Community engagement**

Citizens of Podgorica are invited to participate in identification of neglected urban pockets to be revamped through the initiative Mikro 020. It is upon their proposals that the intervention sites are selected, transformed from derelict or unmaintained micro locations into revived public spaces, and eventually, as such, returned back to the citizens.

- **Results**

Revitalisation of the sites of Mikro 020 intervention has resulted in public use of the locations citizens previously stayed cleared of for being derelict and unmaintained. From the start of the project 15 locations across the city have been transformed.

3. Supporting Details

- **Duration**

2019 to this day

- **Challenges/Lessons Learned**

Limited public funds for revival of neglected urban pockets in Podgorica are overcome through collaboration of interested citizens and the local architects organization providing free-of charge technical designs for the interventions. Under this approach, the participants are demonstrating a high level of commitment to the improvement of public space through collaboration.

- **Recommendations to other cities**

Led by Podgorica example in implementation of Mikro 020, the coastal municipality of Ulcinj in southern Montenegro adopted the idea and launched Mikro 030 (030 being the local area phone code). Podgorica remains at disposal for other municipalities to share its experiences with Miko 020 preparation and implementation.

- **Website**

https://starisajt.podgorica.me/en/mikro-020
https://www.sacg.me/ostalo/mikro-020/
https://www.facebook.com/pgmikro020/?locale=sr_RS
https://www.undp.org/montenegro/mikro-020-reviving-abandoned-urban-pocketspodgorica

- **Photos**

7. Good practice - Revitalisation of rivers, Győr, Hungary

1. General Information

- **City name**

  Győr, Hungary

- **Practice title**

  Revitalisation of rivers around Győr

- **Category**

  ☐ Green (vegetation-based)
  ☐ Blue (water-based)
  ☐White (material-based)
  ☒ Mixed

- **Practice contributor:**

  KVA, projekt@kva.hu

2. Description of the Practice

- **Summary**

  The city of Győr is crossed by several rivers and canals, which flow into the nearby Danube. Due to the changing climate and conditions, average water levels have been below normal. To address this, the General Directorate of Water Management, the city of Győr and the Hungarian State have cooperated to build a water level control dam at the mouth of the Mosoni-Danube and Danube rivers near Győr. The aim was to raise the water level of the surrounding rivers by damming them, which would allow the water flowing through the city to be abundant in summer.

- **Key Actions**
    - The process was to determine the water level to be reached, which was eventually set at the 1950s average.
    - The next step was to determine the appropriate water level for each season, which involved biologists, anglers, hunters and all other stakeholders.
    - And during the test operation period, the operation was refined to achieve the best possible conditions.

- **Technical aspects**
    - N/A

- **Community engagement**
    - N/A

- **Results**
    - During the hot summer months, the city's microclimate is significantly improved due to the abundant water cover in the city. The higher water level has also resulted in higher groundwater levels, allowing vegetation to better withstand the heat, and improved irrigation opportunities, which has improved the microclimate of the area through shade and evaporation.
    - The dam was built in such a way that it does not impede fish migration or watercraft, benefiting not only the local climate, but also water sports and ultimately nature.
    - In addition, the dam also plays a huge role in flood management

3. Supporting Details

- **Duration**

  2022 to present

- **Challenges/Lessons Learned**

- This was an investment on a huge scale, the most difficult part of which was financing the project.
- The project was preceded by a lengthy technical debate, at the end of which the interests of all stakeholders prevailed

- **Recommendations to other cities**

  Climate change is forcing us to make such large-scale and costly investments. To achieve this, we need to start preparing for their implementation in advance. Public awareness must be raised, because all stakeholders must be involved.

- **Website**

  Website of the General Directorate of Water Management

- **Upload a photo**

8. Good practice - Greening the city centre, Győr, Hungary

1. General Information

- **City name**

  Győr, Hungary

- **Practice title**

  Greening the city centre of Győr

- **Category**

  ☐ Green (vegetation-based)
  ☐ Blue (water-based)
  ☐White (material-based)
  ☒ Mixed

- **Practice contributor:**

  KVA, projekt@kva.hu

2. Description of the Practice

- **Summary**

  The city center of Győr reached its current form in the 19th century, which means the surface area of the streets and squares does not offer many opportunities for planting trees and other vegetation. Additionally, the protected status of the area does not allow for planting directly into the ground in the city center. To mitigate the unbearable heat caused by increasingly hot summers, the city uses containerized tree planting year after year. The goal is to provide as much shade as possible in the areas of the city center that are most exposed to sunlight. Additionally, during the summer months, water spray gates are also set up in more frequented areas to improve the microclimate through evaporation.

- **Key Actions**

  Once the most affected areas were identified, the task was to select the right plants that could withstand the heat, direct sunlight and grow suitable foliage. The main role in the implementation was played by the city's gardeners, who not only managed the project but also supervised the care of the plants.
  For the placement of the water spray gates, the main tasks were identifying the more frequented areas and ensuring adequate water supply.

- **Technical aspects**
  - N/A

- **Community engagement**
  - N/A

- **Results**

  As a result, the streets and squares of the city center are much greener, shadier, and more bearable. Visibly, more people are out in the city even during the summer heatwaves. Lastly, the vegetation makes the city more beautiful, not just during the summer season, but every day of the year.

3. Supporting Details

- **Duration**

  Every year

- **Challenges/Lessons Learned**

  choosing the right plants and "keeping them alive" was a challenge in the beginning

- **Recommendations to other cities**

Such greening can now be seen in many cities. Perhaps getting the public involved might be a good idea, to make them feel the importance of the plants and their benefits.

- **Website**

https://gyor.hu/viragladak-kihelyezese-a-belvarosban/

https://gyor.hu/uj-viragladak-a-kiraly-utcaban/

https://www.gyorszol.hu/kilombosodtak-a-gombkorisek/

9. Good practice - Cool Green Urban Space, Sofia, Bulgaria

1. General Information

- **City name**

  Sofia, Bulgaria

- **Practice title**

  Cool Green Urban Space

- **Category**

  ☐ Green (vegetation-based)
  ☐ Blue (water-based)
  ☐White (material-based)
  ☒ Mixed

  Select one.

- **Practice contributor:**

2. Description of the Practice

- **Summary**

Sofia Municipality designed a shared "cooled" space in Vazrazhdane Park, named "Amphitheater" and located in a densely built-up urban environment, by applying shading nature-based solutions, allowing the maintenance of climbing and other heat and drought resistant plants, installation of sprinkler systems (foggers), construction of rock corners (alpineums) with appropriate vegetation, replacement of the existing pavement with a light-colored pavement made of natural materials with low thermal capacity and installation of a portable screen and multimedia.

The good practice was implemented as a pilot investment in the framework of the project "Implementation of innovative measures for mitigation and adaptation to climate change in the municipalities of the Republic of Bulgaria", financed within the Program "Environmental Protection and Climate Change" of the European Economic Area (EEA).

- **Key Actions**

The key steps included:

- selecting the investment location based on needs and opportunities;
- amphitheatre design and technical guidelines;
- consultations with experts and citizens;
- implementation by Sofia municipality and its relevant municipal enterprises – construction, instalment of watering system, planting, equipment;
- official opening.

- **Technical aspects**

The practice uses blue and green acupuncture. It includes: implementation of shading methods through nature-based solutions allowing the maintenance of heat and drought resistant vegetation, construction of dewatering systems (misters), construction of rockery with suitable sustainable vegetation, replacement of existing pavement with light-coloured pavement made of natural materials with low thermal capacity.

- **Community engagement**

The selection of the investment pilot and the design of the cooling place were developed in several stages using the Delphi method. The plans were presented in-situ and discussed with the citizens, who had the opportunity to propose ideas

and comments on “must have”, “could have”, won’t have” features and thus co-designed the space.

- **Results**

The Amphitheatre is considerably cooler – at the average by 5°C in the summer, thus reducing heat stress and making it attractive for visitors to the park.

There is an increased use of the space for different purposes, including educational activities for children and other park visitors from the area, thus contributing to the citizens wellbeing.

The selected greenery supports local biodiversity, too.

3. Supporting Details

- **Duration**

The good practice is completed in 2023.

- **Challenges/Lessons Learned**

Vegetation-based measures usually take time to reach their full potential.

To reduce vulnerability to heat, green infrastructure should not be the only solution. A combination with blue and white measures makes the cooling facility much more effective.

- **Recommendations to other cities**

Design cooling spaces that are appealing and “instagramable”.

Select the location well so the intervention could affect positively maximum vulnerable citizens.

- **Website**

https://adaptation.ecofund-bg.org/en/partner/sofia/

- **Upload a photo**

10. Good practice - Greenery in a city centre, Liberec, Czech Republic

1. General Information

- **City name**

  Liberec

- **Practice title**

  Greenery in the city centre

- **Category**
  - **Green (vegetation-based)**
  - ~~Blue (water-based)~~
  - ~~White (material-based)~~
  - ~~Mixed~~

- **Practice contributor:** DEX IC – Helena Jurašková, helena.juraskova@dex-ic.com

2. Description of the Practice

- **Summary** (max. 100 words)

  In 2023, the city of Liberec transformed a large asphalt parking lot in the city centre into a green space with newly planted trees along Janských and Moskevská streets. This initiative aimed to reduce the urban heat island effect, improve air quality, and enhance the aesthetic appeal of the city centre.

- **Key Actions** (max. 100 words)
  - Identified the problematic area with excessive heat absorption – the asphalt parking lot.

- Removed the existing asphalt surface from the parking lot.
- Prepared the soil for tree planting, ensuring proper drainage and nutrient content.
- Selected tree species adapted to urban conditions and providing shade.
- Planted trees along the streets, creating a green corridor.

- **Results** (max. 100 words)
  - The newly planted trees provide shade, reducing surface temperatures and mitigating the urban heat island effect.
  - The trees improve air quality by absorbing pollutants and releasing oxygen.
  - The green space enhances the aesthetic appeal of the city centre, creating a more pleasant environment for residents and visitors.

Unfortunately, the provided information does not offer specific, quantitative data on the impact of the tree planting initiative in Liberec.

3. Supporting Details

- **Duration**

  2023

- **Challenges/Lessons Learned (**Max. 100 words)
  - The project required careful planning to ensure that the trees would thrive in an urban environment.
  - Coordination with utility companies was necessary to avoid underground infrastructure.
  - Changes to the urban landscape can sometimes be resisted by local residents. The City of Liberec may have engaged in public outreach and communication to gain support for the project and address any concerns.
  - Ongoing maintenance is essential to ensure the long-term health and survival of the trees. This includes watering, pruning and protecting

the trees from pests and diseases. The project may have developed a maintenance plan and allocated resources to implement it.

- **Recommendations to other cities**
  - Consider converting unused asphalt areas into green spaces to mitigate the urban heat island effect.
  - Select tree species that are well adapted to the local climate and urban conditions.

- **Website**
  - https://www.liberec.cz/cz/obcan/urad/odbory-magistratu/odbor-ekologie-verejneho-prostoru/aktuality/do-ulice-janska-moskevske-se-vysadi-nove-stromy.html

- **Upload a photo**

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11. Good practice – REPLACE, Ostrava

1. General Information

- **City name**

  Ostrava – Jih, Czech Republic

- **Practice title**

  REPLACE - Greenery instead of concrete

- **Category**

  ☐ Green (vegetation-based)
  ☐ Blue (water-based)
  ☒White (material-based)
  ☐ Mixed

  Select one.

- **Practice contributor:**

2. Description of the Practice

- **Summary**

  The REPLACE – Replace Concrete with Greenery project is an innovative initiative in Ostrava – Jih that transforms mundane concrete surfaces into sustainable, attractive green spaces. The project not only aims to enhance the urban microclimate and mitigate the urban heat island effect but also improves the overall quality of city life. Funding is secured through a combination of municipal budgets, public-private partnerships, and potential EU funds.

- **Key Actions**

- Identify concrete surfaces suitable for revitalization.
- Design and plan the transformation, including the implementation of greenery elements such as vertical gardens and green roofs.

- Execute the planting using modern techniques, including automated irrigation systems.
- Continuously monitor and maintain the newly established green areas.

- **Technical aspects**

  The project utilizes advanced technologies such as automated irrigation systems, vertical gardens, and green roofs that also serve as thermal insulation. All modifications are conducted in compliance with municipal regulations and have obtained the necessary permits.

- **Community engagement**

  Local residents, community groups, and other stakeholders play a pivotal role. Through public consultations, workshops, and volunteer initiatives, they actively participate in the planning and execution phases, thereby fostering a strong sense of community ownership and long-term sustainability.

- **Results**

  As a result of the project, green spaces have expanded considerably, leading to an improved microclimate with local temperature reductions alongside a notable uplift in the urban aesthetic.

3. Supporting Details

- **Duration**

  2020-2023

- **Challenges/Lessons Learned**

  The project faced challenges such as limited funding and the complexity of coordinating multiple stakeholders. These hurdles were overcome through the formation of strategic partnerships between the municipality, private investors, and community organizations.

- **Recommendations to other cities**

  Start with pilot projects to clearly demonstrate the effectiveness of the measures. Invest in robust communication with local communities and ensure continuous collaboration with experts

- **Website**

  https://fajnova.cz/projekt/replace-zelen-misto-betonu/

- **Upload a photo**

12. Good practice – Muzeiko, Sofia

1. General Information

- **City name**

  Sofia, Bulgaria

- **Practice title**

Energy-efficient building of "Muzeiko" with green and passive cooling elements.

- **Category**

  ☐ Green (vegetation-based)

  ☐ Blue (water-based)

  ☐White (material-based)

  ☒ Mixed

  Select one.

- **Practice contributor:**
  Science and Education Children's Center "Muzeiko"

2. Description of the Practice

- **Summary**

  The building of "Muzeiko" is designed with high standards for energy efficiency and environmental protection, in compliance with international "green building" standards. The project holds a USGBC-LEED-Gold certification. The main goal is to reduce energy costs and optimize the microclimate through a combination of passive cooling measures, green elements, and intelligent façade systems.

- **Key Actions**

  - Construction of an aluminum curtain wall with a steel substructure and a thermal break.
  - Installation of triple-glazed windows with a high solar protection factor.

- Installation of internal solar protection blinds with electric operation, connected to the building management system.
- Implementation of extensive green roofing with the "NOPHA DRAIN" system.

- **Technical aspects**

  The north wing of the building is equipped with an aluminum façade with triple glazing (U < 0.9W/m²K, solar factor < 0.35), which reduces thermal load. The internal electric blinds are connected to a control system that regulates sunlight access based on conditions. The roof features green landscaping with a drainage composite and a special moisture-retaining substrate, helping to mitigate the urban heat island effect.

- **Community engagement**

  The project raises visitors' awareness of the importance of energy efficiency and urban cooling through architectural solutions. As an educational center, "Muzeiko" actively engages children and adults in demonstrations of sustainable practices.

- **Results**

  Reduction of indoor temperature by 2-3°C through intelligent solar protection solutions.
  Optimization of air conditioning costs through passive cooling measures.
  Enhancement of building comfort by controlling thermal load.

3. Supporting Details

- **Duration**

  2015 – present

- **Challenges/Lessons Learned**

  One of the main challenges was integrating high-tech façade solutions within the project's budget. This was overcome by combining various energy-saving measures and using materials with long-term efficiency.

- **Recommendations to other cities**

  Incorporating passive cooling measures during the design phase.

  Integrating façade technologies for intelligent microclimate management.

  Implementing green roofing to mitigate the urban heat island effect.

- **Website**

  https://www.muzeiko.bg

- **Upload a photo**

13. Good practice – Loft House, Brno

1. General Information

- **City name**

  Brno, Czech Republic

- **Practice title**

  Loft house with green roof

- **Category**

  ☐ Green (vegetation-based)
  ☐ Blue (water-based)
  ☐White (material-based)
  ☒ Mixed

- **Practice contributor:**

Marie Indráková, JINAG, marie.indrakova@jinag.eu

2. Description of the Practice

- **Summary**

  DADA Distrikt represents the revitalization of a former textile factory from the 1920s into a multifunctional complex including loft living, studios, open space offices and a green roof garden. The project focused on sustainable technology, preserving industrial character and community living.

- **Key Actions**

  - Reconstruction of an industrial building with minimal intervention into the exterior.
  - Creation of a green roof garden promoting biodiversity.

- Installation of a root water purifier to recycle grey water.
- Retention of factory windows with modern insulation properties.

- **Technical aspects**

  - Conversion of a former factory building into loft housing.
  - Green roof used as a shared community space. The roof is divided into two parts. The community area is a place for sitting or practicing yoga, having flower beds with a wild mix of vegetation. In the second part of the roof – the growing area – each apartment unit has its own raised bed for the production of herbs, small vegetables and fruit.
  - Water runoff, which the green roof cannot retain, drains together with the gray water from the sinks in the bathrooms into a retention tank in the back garden.

- **Community engagement**

  - The basic principle of the building is community sharing, specifically of the rooftop spaces.
  - The location of the building itself is also of great importance, as it is located near an excluded locality, which is gradually being transformed into a pleasant place to live, thanks to these projects.

- **Results**

  - Transforming an abandoned industrial building into a vibrant community part of the city.
  - Reducing the energy consumption of the building.
  - Improving the quality of life of residents through green and blue features.
  - Project awarded the Ministry of Industry and Trade Award for Sustainable Conversion of Industrial Areas (2021).
  - It contributes to the transformation of an excluded locality (the area around Cejl Street) into a place friendly to life. The newly built Nová Zbrojovka complex is located in the immediate vicinity.

3. Supporting Details

- **Duration**

  2019-2020

- **Challenges/Lessons Learned**

  - Transformation of an industrial building into a modern residential and cultural space with an emphasis on preserving its historic character.
  - Involving the community in the revitalization process and creating a space that promotes social interaction.
  - Implementation of sustainable technologies in the renovation of the historic building.

- **Recommendations to other cities**

  - Using abandoned industrial buildings for modern life.
  - Integrating green and blue elements into the urban environment.
  - Promoting community projects and resident participation.

- **Website**

  https://www.dadadistrikt.cz/

- **Upload a photo**

  Will be added

14. Good practice – Moravian Square, Brno

1. General Information

- **City name**

  Brno, Czech Republic

- **Practice title**

  Renovation of Moravian Square - Multifunctional water feature

- **Category**

  ☐ Green (vegetation-based)
  ☐ Blue (water-based)
  ☐White (material-based)
  ☒ Mixed

- **Practice contributor:**

  Marie Indráková, JINAG, marie.indrakova@jinag.eu

2. Description of the Practice

- **Summary**

  In 2022, Moravian Square in Brno was revitalized. In 2023, the square was declared the Park of the Year 2023. Moravské náměstí is located in the heart of Brno, it is a place for relaxation and meeting. A key element of the revitalisation is the water surface, which is used to cool down in the summer months and then drained in the winter, creating a space for various events.

- **Key Actions**
  - Renovation of important and historical place in Brno City center In line with modern standards and citizens' needs
  - Preservation of original mature trees
- **Technical aspects**
  - Vegetation adjustments: Opening the park to the surrounding environment. The park has separate areas that citizens can enter and areas that are intended purely for vegetation (perennials, low trees, etc.)
  - Rehabilitation of existing trees.
  - Rainwater management: The entire park is newly designed so that rainwater falling on its surface is completely retained in the given area and is gradually absorbed into the subsoil.

- **Community engagement**
  - Renovation of the Moravian Square was motivated by the citizens' need to create a place for relaxation and entertainment in the city center. The park aims to be an inclusive place. The link to this idea is an elongated bench that, divided into several parts, circles around the central paddling pool/fountain, which encourages freedom of movement for residents of all ages.

- **Results**
  - The newly planted trees provide shade, reducing surface temperatures and mitigating the urban heat island effect.
  - The multifunctional water feature ensures pleasant cooling in the summer months and in the winter the area is used for organizing events.
  - The renovation of the square has positively contributed to the cooling of the surrounding area, as can be seen in the heat map images before and after the reconstruction.

- A new meeting place has been created where the citizens of Brno can come to relax, have fun and feel safe. As can be seen in the attached photos, the place is widely used even in March as in July.

3. Supporting Details

- **Duration**

  2019-2020

- **Challenges/Lessons Learned**
  - Transformation of a space that originally served only as a passageway into a place for leisure.
  - To add greenery, flower planting, a water feature, and a café area in the shade of the trees to what was originally a mostly paved space. The greenery is irrigated with rainwater.
  - Moravské náměstí has historically been a place where many events have been held, so it was necessary to design the space so that it could be transformed into an open space at the same time. This is done by a water surface that is not bounded in any way and can be drained at any time. It can be used as a stage for summer concerts or as a place to build an ice rink, which is available to residents from November to February.

- **Recommendations to other cities**
  - Develop a high-quality architectural competition to transform a city center location into a place where people want to meet and spend their free time.
  - Utilize existing mature trees and add more greenery.
  - Create a multifunctional space that can be adapted to host a variety of events if needed.

- **Website**

https://www.earch.cz/architektura/clanek/nejlepsi-park-je-na-namesti-v-brne-ma-fontanu-ve-ktere-se-da-koupat-a-taky-spoustu-stromu-a-keru

https://urbancentrum.brno.cz/wp-content/uploads/2020/04/Zpravodaj-Brno-st%C5%99ed_duben-2020.pdf

- **Upload a photo**

15. Good practice – Brno

1. General Information

- **City name**

  Brno, CZ

- **Practice title**

  Open Garden

- **Category**

  ☐ Green (vegetation-based)
  ☐ Blue (water-based)
  ☐White (material-based)
  ☒ Mixed

- **Practice contributor:**

Marie Indráková, JINAG, marie.indrakova@jinag.eu

2. Description of the Practice

- **Summary**

Transformation of an unused space of an office building and old apartment building with adjacent gardens at the foot of the Špilberk Hill grounds into a community open space. (The origin of the place dates back to the 19th century, the space served as a so-called burgher garden with fruit orchards.) The goal of the entire facility is to operate in a carbon neutral way, using renewable energy sources, reducing the consumption of energy, water and other resources, educate about this way of operating and about sustainability

- **Key Actions**
  - Renovation of a neglected building surrounded by an unmaintained garden adjacent to the park of Brno's Špilberk Castle.
  - Creating a community space for people to meet in different areas from business events to religious meetings to casual leisure time with children.
  - By combining technologies, the complex is trying to combat the rising temperatures in the city, the so-called urban heat island effect.
  - The construction of a passive standard education centre with a green roof.

- **Technical aspects**
  - Combining various technologies, using renewable sources of energy and lowering the consumption of energy, water and other sources
    - Zero carbon area.
    - Eco-friendly renovation of a city administration building.
    - Using rainwater.
    - Measuring data (e. g. weather station)
  - Garden landscaping and creating community garden

- **Community engagement**
  - The open garden principle works at the community level. It is a community center and it is open for all citizens. They can enjoy thematic courses, programs for schools, but also their own corporate event, conference, wedding or celebration

- **Results**
  - They strive for environmentally friendly operations throughout the Open Garden. Electricity is generated in a small photovoltaic power plant with a capacity of 19,725 kilowatts.
  - Rainwater retention thanks to three green roofs, the accumulation and use of rainwater from other roofs for watering and flushing.
  - The outdoor space with green and blue elements, educational objects, a relaxation zone, community garden, etc. invites many experiences, including school excursions and corporate events.

3. Supporting Details

- **Duration**

  9/2011 – 3/2013

- **Challenges/Lessons Learned**
  - From an urban planning point of view, the biggest problem was the narrow shape of the land on the slope, which did not allow to place the centre's programme in the built-up part of the yard. The winning design dealt with this by breaking the building line, plunging the building into the slope and compensating by building a green roof, which today you can walk directly from Špilberk Hill to the educational centre building.
  - At first, the Department of Historic Preservation did not want to allow the installation of photovoltaics on the roof of one of the buildings because the building is located in the protection zone of a national cultural monument. Eventually, through negotiations with the National Monuments Office, the installation was allowed.
  - Building a modern open space in the centre of Brno in an area that had long been neglected, where homeless people congregated, and which locals avoided.

- **Recommendations to other cities**
  - Develop a high-quality architectural competition to transform a city center location into a place where people want to meet and spend their free time.
  - Utilize existing mature trees and add more greenery.
  - Create a multifunctional space that can be adapted to host a variety of events if needed.

- **Website**

https://www.otevrenazahrada.cz/

https://www.lifetreecheck.eu/en/databaze/2019/areal-otevrena-zahrada-v-brne

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16. Good practice - Climate Oases

1. General Information

- **Location(s)**

27 locations in Vienna and Lower Austria, Austria

- **Practice title**

Climate Oases

- **Category**

☐ Green (vegetation-based)
☐ Blue (water-based)
☐White (material-based)
☒ Mixed

- **Practice contributor:**
Sandra Nicolics, sandra.nicolics@boku.ac.at

2. Description of the Practice

- **Summary**

The “Klima Oasen” (English: “Climate Oases”) is an initiative aimed at providing cool retreats for vulnerable groups during hot summer days. Launched by Caritas Austria, a catholic social aid organisation, it addresses the challenges posed by climate change, particularly the increasing frequency and intensity of heatwaves. The project is a collaboration between Caritas and various parishes in Vienna and Lower Austria.
The primary goal of the Climate Oases is to offer a respite from the heat for vulnerable individuals, including the elderly, children, economically disadvantaged people, and those without access to adequate cooling at home. The basic concept of these oases is to provide a cool environment with refreshments and a place to relax.
The Climate Oases are set up in parish gardens and other suitable locations, offering shade, cool drinks, and light snacks. Volunteers and Caritas staff manage these oases, ensuring a welcoming and supportive environment for visitors. The initiative also aims to foster a sense of community and social interaction among

visitors. The opening times and -dates do range depending on the capacities of the particular location, from location to location. In general, the initiative is active in the months June-September

In general, the following social groups are targeted:

- People from the parish area who want to cool off and chat
- Refugees
- People who live in overheated apartments and want to cool off with a lemonade, regardless of origin, religion, or emergency situation
- In urban areas: homeless people or people in great financial need
- Beyond that, people who, for example, want to escape loneliness, want to use the catering offer, or are looking for conversation

- **Key Actions**

- A garden, a green space etc. that invites to linger
- Catering: cool drinks (lemonades, iced teas, water); snacks, fruit, rolls, finger food, sometimes more
- Volunteer companions who have an open ear for the guests

- **Technical aspects**

Not applicable

- **Community engagement**

This is the central dimension targeted by the Climate Oases Initiative by:

- Many volunteers dedicate their time to support the initiative. They help manage the oases, distribute refreshments, and engage with visitors, ensuring a welcoming and supportive environment.
- Community Engagement and participation: The initiative fosters a sense of community by encouraging social interaction among visitors. This not only provides immediate relief from the heat but also helps build social cohesion and support networks, especially among vulnerable groups. Local parishes and community organizations actively participate by offering their spaces as oases. This collaboration is essential for the initiative's success, as it provides accessible and familiar locations for people to seek respite from the heat.
- Awareness and Education: The initiative raises awareness about the impacts of climate change and the importance of community support during extreme weather events. By engaging with the public, it also educates

visitors about heat stress and the measures they can take to protect themselves.
- Feedback and Improvement: The initiative values feedback from visitors and volunteers to continuously improve the services provided. This participatory approach ensures that the oases meet the evolving needs of the community.

- **Results**

The Climate Oases have become popular, with thousands of visitors each summer. They provide not only physical relief from the heat but also a social space where people can connect and find support. The initiative has been well-received, with many visitors appreciating the free refreshments and the opportunity to escape the heat.
The exact number of locations can vary each year, but in 2023 there were 27 Climate Oases opened for a total of 145 days and over 9000 visitors of which 52% were women and 48% were men. One Climate Oasis was specifically opened for Women.

3. Supporting Details

- **Duration**

The project was initiated for the first time in 2020 and has been repeated each summer since.

- **Challenges/Lessons Learned**

- The success of the Klimaoasen project relies heavily on volunteer support and community involvement. Engaging volunteers and maintaining their commitment is crucial for the sustainability of the project
- The project has evolved from winter "Wärmestuben" (warm rooms provided in the cold season) to the summer months demonstrating adaptability to seasonal needs. However, scaling the project to meet growing demand and ensuring long-term sustainability remain challenges
- Providing refreshments and maintaining the spaces require resources. Ensuring adequate funding and material support is essential for the project's continuity.

- **Recommendations to other cities**

- Raising awareness about the availability of these spaces and ensuring they are accessible to those in need is important. The project aims to make these spaces welcoming and easily accessible to the target population. However, this also means to specifically communicate to those in need of such facilities.
- Ensuring that the spaces are welcoming and accessible to all, particularly vulnerable populations such as the elderly, homeless, and those living in poorly insulated homes, is vital. The ultimate ambition should be to create inclusive spaces where everyone feels welcome and supported
- Partnering with local parishes and community organizations has been instrumental in the project's success. These collaborations provide the necessary infrastructure and support to establish and maintain the Climate Oases

- **Website**

https://www.caritas-wien.at/hilfe-angebote/zusammenleben/pfarrcaritas-und-naechstenhilfe/aktiv-in-den-pfarren/klimaoase (Information in German!)

- **Upload a photo**

17. Good practice - Green Oasis Innsbruck

1. General Information

- **City name**

  Innsbruck, Austria

- **Practice title**

CoolINN Green Oasis

- **Category**

  ☐ Green (vegetation-based)
  ☐ Blue (water-based)
  ☐White (material-based)
  ☒ Mixed

  Select one.

- **Practice contributor:**
  Sandra Nicolics, sandra.nicolics@boku.ac.at
  Bernhard Pucher, bernhard.pucher@boku.ac.at

Notes:
Categories should be selected according to the main focus of the practice. If the practice combines several approaches, select the "mixed" category.

2. Description of the Practice

- **Summary**

Innsbruck is a city nestled in the Alps. Due to its geographical location, it is a densely built up city that, apart from the rivers Inn and Sill, has had little blue and green infrastructure to counteract the effects of climate change. For urban heat island mitigation, the City of Innsbruck launched the "cool-INN" project in the summer of 2020 together with Innsbruck's municipal IKB, the University of Innsbruck, and the University of Natural Resources and Life Sciences, Vienna

(BOKU). The aim was to improve the quality of stay in an existing park, the exhibition park on Ing.-Etzel-Straße. Prior to the project the triangular park included a kiosk building, nine large trees, a central asphalt area with benches surrounded by green space and was only little-used. With a new design and expansion of the park area, a central water landscape was established to cool the area, making it more comfortable for visitors, especially during hot days. The new design of the park not only promotes social interaction, but pedestrian and cyclist use while reducing car traffic. This project is also an example for how to adapt or transform existing urban spaces and infrastructure to better address the challenges of climate change, such as increasing temperatures and extreme weather events.

- **Key Actions**

- Expansion of green infrastructure:
  - almost doubling of green area allowing rainwater to seep in the ground and also increasing evaporation (and associated cooling) to take place
  - expansion of the tree population by 18 trees and by that increasing their shading and evapotranspiration function
- Establishment of blue infrastructure (see “Technical aspects”)
- Public participation campaign (see “Community engagement”) in order to integrate and cater for park user needs and increase acceptance
- The walking and cycling surfaces were made of water-permeable drainage concrete and for the seating areas water-bound paving was used. Both allowing for local infiltration and evaporation.
- Changes to the surrounding street layout, prioritizing pedestrian and cyclist access. A formerly car-dominated street was converted into a pedestrian and cyclist-only zone, enhancing safety and encouraging active transportation

  Briefly list the main steps taken, e.g., “Identify a bus stop; design green walls and roof; install insulation, etc.”

- **Technical aspects**
- By use of red, grey and beige tones, reflection instead of storage of heat was favoured
- Installation of a central water feature, drinking fountain and ground nozzles and a spray mist for provision of evaporative cooling as well as a small grindle

- Installation of nine leatherwood trees in a sponge city system with adjacent rain garden drainage basins
- Hilly design allowing for a variety of seating and lounging options, as well as play areas for children. Elevated seating is particularly appreciated by parents, as it offers a better view of children playing.
- Diverse seating options around the water areas with wooden surfaces with air slits to facilitate air circulation in the seating and backrest areas
- Provision of a small event area and other park's furnishings, including two picnic tables, to provide spaces for socializing or relaxing

  Explain the technological solutions applied, such as double skin facades, shading structures, thermal insulation, etc., and mention required city permits, if any.

- **Community engagement**

A public participation campaign was organised parallel to the implementation activities, including:

- Surveys of residents and passerbys and observations on hot summer days and an online survey with tenants to better understand user behaviour and needs
- Discussions/Exchange meetings with official stakeholders owning neighbouring buildings/areas
- A 5-day workshop with children
- The opening of the park was celebrated with a festive event attended by local officials and project partners. The park hosted a series of events called "Klimasalon" until the end of August to encourage residents to enjoy the new space.

- **Results**

- Micro- and Bioclimatic Monitoring:
  - The cooling effects within the park are noticeable and measurable, but they are localized and do not extend beyond the park's boundaries.
  - Integrating such cooling concepts into urban planning can have broader impacts on the city level.
  - Individual "cooling oases" are socially important, providing retreats for people without access to private outdoor spaces or whose homes overheat in summer.
- Social Monitoring:

    - Water installations and "experienceable water" significantly enhance the quality of stay and recreational value of urban parks.
    - This psychological cooling effect encourages people to spend more time outdoors, improving urban living quality.
    - The project effectively informed and engaged the public about climate change, its impacts, and adaptation measures, notably through the "Klimasalon" initiative.
- Operational Monitoring:
    - Graphical representation of operational data is crucial for monitoring and identifying issues, aiding operational staff in maintaining oversight.
    - Simple and cost-effective sensors, like level and conductivity sensors, provide valuable information when graphically presented.
- Microbiological Monitoring:
    - Surface runoff water collected in sediment traps shows significant microbiological contamination, with elevated levels of fecal indicators (E. coli and enterococci), suggesting potential pathogen presence.
    - Direct reuse of collected water is not recommended due to exceeding bathing hygiene regulations.
    - Treatment with sand filters and UV systems proved effective, meeting hygiene standards, though continuous monitoring is essential to prevent issues like the growth of P. mendocina.
- Project Impact:
    - The project has garnered significant attention, including local media coverage, recognition in sustainability programs, and international interest (e.g., visits from the Technical University of Munich).
    - It has fostered collaboration among different city departments and led to a follow-up project, COOLYMP

3. Supporting Details

- **Duration**

  2020-2022

- **Challenges/Lessons Learned**

An important lesson learned and with that also recommendation for other projects, was the importance of integrating sustainable water management

practices into planning of Blue-Green-Infrastructure and urban planning in general, to ensure resilience against climate challenges:

- Encouraging the use of rainwater for irrigating public and private green spaces, combined with infiltration to replenish groundwater, mimicking the natural water balance of unbuilt areas. Storage solutions can include rain barrels, cisterns, underground tanks, ponds, or integrated water landscapes to maximize utility.
- Green urban measures require significant water, necessitating strategic rainwater management for sustainable irrigation. During prolonged dry periods, alternative urban water resources (e.g., drainage water, underground streams, greywater) should be explored to reduce reliance on drinking water.
- Water features like fountains use less water than irrigation, requiring city-wide planning to balance available water resources with the needs of blue-green infrastructure. A usage-oriented approach to urban water resources, prioritizing high-quality drinking water for human consumption, is essential for sustainable water management.

- **Recommendations to other cities**

Besides an emphasis on the need to take into consideration sustainable water management for blue- and green infrastructure, pne key-recommendation formulated in the project was that cities must consider climate-adapted building in every urban and spatial planning project, starting with the municipality and possibly its subsidiaries. The city would thus serve as a role model for the population. Consequently, climate-adapted building could also be considered in private construction projects as a second step (possibly mandatory in the building code).

- **Website**

https://www.uibk.ac.at/en/umwelttechnik/research/urban-water-management/cool-inn-cool-urban-living-spaces-for-a-resilient-society/

18. Good practice – UHI STRAT Vienna

1. General Information

- City Vienna
- Practice title: **Urban Heat Island Strategy UHI STRAT Vienna**
- Category

  ☐ Green (vegetation-based)

  ☐ Blue (water-based)

  ☐White (material-based)

  ☒ Mixed

- Practice contributor:
  Sandra Nicolics. BOKU University, sandra.nicolics@boku.ac.at
  Bernhard Pucher BOKU University bernhard.pucher@boku.ac.at

2. Description of the Practice

Summary

The Vienna UHI-STRAT (Urban Heat Islands Strategic Plan), published in 2015, is a strategic document aimed at initiating initiatives at various city levels to counteract the Urban Heat Island (UHI) effect but also at providing a comprehensive framework for these various sub-initiatives and -projects. UHI STRAT Vienna was developed under the leadership of the Vienna Environmental Protection Department (MA 22) in collaboration with scientific experts and numerous specialized departments of the City of Vienna. Its development was part of the Central European Urban Heat Islands Project, a collaboration project between the European cities of Bologna, Budapest, Freiburg, Karlsruhe, Ljubljana, Modena, Padua, Prague, Stuttgart, Warsaw and Venice, as well as Vienna.

The "UHI Strategic Plan Vienna" describes options for cooling urban heat islands and also contains information about the expected effectiveness of individual

measures on the urban climate and at the neighbourhood level. Additionally, the strategic plan provides information on the benefits and potential challenges of implementing these measures, as well as the expected costs for their establishment and maintenance.

Since actions to improve the urban climate take place at a range of levels (climate, nature conservation, landscape planning, urban planning, architecture, etc.), responsibility for implementation is shared by various departments and partners of the City of Vienna.

Main contents of the UHI STRAT are

- The description of the UHI Effect in the Context of Vienna's Urban Climate. That information is based on the results of the research projects "FOCUS-I" and "Urban Fabric Types and Microclimate Response".
- Urban Heat Islands and Urban and Nature Conservation Planning: describing areas of action, control levels, and options for action as well as the legal and strategic integration of climate-sensitive urban planning
- Strategic Measures for Climate-Sensitive Urban Planning
- Measures in Planning and Project Development
- Areas of action and examples
- Climate Function Map of Vienna
- Evaluation Map for Climate/Air in Vienna

Key Actions:
What is particular about the UHI STRAT is its comprehensive approach to urban heat mitigation – meaning it not only describes singular measures, but serves as framework for individual (sub-)initiatives and projects by:

- Taking a **strategic approach** emphasizing the importance of considering urban climate aspects at various levels of action and decision-making. It aims to implement measures that are relevant to the city as a whole, as well as to individual lots or buildings, promoting a strategic and integrated approach to urban planning
- It specifically highlights the importance of **public awareness and collaboration**: The strategy involves raising public awareness and making various municipal departments and agencies sensitive to the challenges of tackling the UHI effect. This collaborative approach ensures that different stakeholders are involved in the implementation of measures
- It also includes description of detailed measures for cooling urban heat islands and provides detailed information on the potential effectiveness of

these measures. It also outlines the advantages, potential hurdles, and expected efforts required for implementation and maintenance
- **It includes descriptions of exemplary pilot actions and their implementation** to verify the feasibility of measures within the urban planning and development framework of Vienna but also make the information more tangible for various stakeholders. This should help in identifying practical solutions and ensuring their sustainable implementation

Technical aspects:
As stated above, the UHI STRAT is a strategic document. However, with regards to technical aspects, these are some of the most important features it foresees:

- at the strategic level of Climate-Sensitive Urban Planning: measures for maintaining urban ventilation and linking open spaces, the adaptation of city structure and settlement patterns, use of lighter building and surface materials and permeability or the protecting and expanding of green and open spaces or the conservation and expansion of the stock of (street) trees
- at the level of urban master planning, at the level of land use and zoning planning as well at the building level: it describes measures for increasing the quantity of green in streets and open spaces, greening and cooling of buildings, retaining of more water in the city, shading open spaces and paths or for cooling public transport including implementation possibilities

Community engagement:
While the direct involvement of general public representatives in the development process is not explicitly detailed in the available information, the strategy emphasized public awareness and engagement as crucial components for actual role-out of the strategy. This suggests that while experts and city administration representatives were primarily involved in the development, public participation was explicitly targeted in the implementation and awareness-building phases.

Results:
According to the City's Environmental Protection Department (MA 22), who has led the development of the UHI STRAT, no evaluation specifically looking at the impact of the UHI STRAT has been carried out so far. However, since its publication in 2015, a whole range of initiatives related to urban heat mitigation have been implemented both on policy- and program level as well as in form of actual implementation projects throughout the city. In general, the City of Vienna shows commitment to addressing urban heat island mitigation through a combination of

strategic planning, public engagement, and the implementation of sustainable urban design principles and the UHI STRAT can be considered as "starting shot" for systematically addressing the issue.

Some of the major UHI related initiatives launched since:

- Vienna Climate Roadmap ("Wiener Klimafahrplan") and its regular monitoring
- Vienna Smart City Strategy and with it, the INKA Programme ("Infrastructure Adaptation to Climate Change"), launched in 2018, the program focuses on implementing measures to adapt the city's infrastructure to better withstand the impacts of climate change, such as increased heatwaves, heavy rainfall, and droughts.
- Vienna Heat Action plan: a living document focusing on preparing health facilities, care, and nursing institutions for heat-related emergencies and protecting the population from the negative health effects of heat.
- Vienna Climate Law: expected to be officially enacted in spring 2025 and with it serves as binding instrument not only for climate protection and circular economy, but also climate adaptation in Vienna

3. Supporting Details

Duration

The development of the Vienna UHI STRAT took place from 2011 to 2014. The publicly available version was published early 2015.

Challenges/Lessons Learned

Looking at the implementation of measures foreseen in the UHI STRAT, among the most challenging realm are:

- the more comprehensive role-out of green roofing and facades especially for the existing building mass. Among other, structural limitations but also cost considerations (focusing on the initial investments only vs. taking into account potential savings on the long-run) as well as the perceived maintenance needs are among the inhibiting factors
- the more comprehensive integration of sustainable water management as part or in combination with urban heat mitigation. Here among the inhibiting factors is the required entanglement of public and private land or objects for implementation which is not foreseen (yet) in relevant technical norms and legal processes

Recommendations to other cities

Both the development and implementation of the UHI STRAT were comprehensive and time-consuming processes and as stated above, encompassed a whole range of individual processes and initiatives at different levels. Therefore, it is challenging to distill the recommendations into a few essential points. Hence, the following are some overarching, very generally formulated recommendations:

- Early and Continuous Expert Involvement: engage scientific, administrative, practical, and political experts from the outset and throughout the process to ensure well-informed decision-making and effective strategy development.
- Stakeholder Inclusion for Greater Acceptance: Involve both public and private sector actors to enhance support and acceptance of measures, ensuring that different perspectives and needs are considered.
- Interdepartmental and Interdisciplinary Collaboration: Foster cooperation between government departments and encourage interdisciplinary teamwork across fields such as urban planning, architecture, climatology, building physics, and green infrastructure to create comprehensive and effective solutions.
- Public Awareness and Engagement: educate citizens about the effects of climate change and urban densification on their quality of life to increase public support and participation in adaptation measures.
- Coordinated and Adaptive Planning Process: align the sequence of planning steps, decision-making levels, and implementation tools in a structured and flexible manner to ensure the smooth execution heat mitigation measures.
- The provision/establishment of binding instruments (like the Climate Law in Vienna) is key to actually enforce implementation

Website

Urban Heat Island Strategy in English: https://www.digital.wienbibliothek.at/wbrup/download/pdf/3559581?originalFilename=true

19. Good practice – Green Tram Tracks

1. General Information

- **City name**

  Sofia, Bulgaria

- **Practice title**

  Green Tram Tracks

- **Category**

  ☒ Green (vegetation-based)
  ☐ Blue (water-based)
  ☐White (material-based)
  ☐ Mixed

  Select one.

- **Practice contributor:**

  Sofia Municipality, press@sofia.bg

2. Description of the Practice

- **Summary**

  The Green Tram Tracks are tram lines where the space between and around the tracks is covered with grass. This concept combines public transport with green spaces. In Sofia, the first green rails project was implemented in 2015. It was a pilot project implemented together with the replacement of pavements in the area.

- **Key Actions**

  - Identifying areas of concern and areas of possibility in terms of completing a project like this in Sofia.

- Research on traffic intensity, engineering specifications and cost effectiveness of putting the green tram tracks in the chosen places.
- Choosing a contractor.
- Implementation.

- **Technical aspects**

  - Use of a sub-roof drainage substrate layer for storm water runoff.
  - Using Sempergreen Sedum-mix - a combination of different Sedum species (a perennial plant that does not require mowing)

- **Community engagement**

  The idea for green tram tracks in Sofia actually came from a civic initiative - "Green Rails in Sofia", created by citizens of Sofia. It gathered thousands of followers in the social network Facebook in just a few months. Another few months later, Sofia Municipality implemented the green tram tracks in the project for the reconstruction of the "Russian Monument" square

- **Results**

  - **Reduction of noise and vibration pollution**

  Green tracks reduce noise and vibration caused by trams. A tramway produces on average 60-70 decibels of noise, while a green tramway reduces this noise by 10%.

  - **A solution against flooding**

  Ballast base or asphalt is still often chosen for laying between the tracks. Mainly the latter makes the soil hard so that rainwater cannot drain away properly. When green ground cover is applied, a suitable system structure is selected. The undercover drainage substrate layer ensures that rainwater can run off more easily. Thus, the green tram/train route contributes to the reduction of flooding in the city.

  - **Cooling**

  Plants have a cooling effect. Vegetation between the rails lowers the temperature by up to 50%, reducing the risk of track buckling and the need

for inspections. Green tram tracks also have a positive impact on the temperature in the surrounding area and contribute to reducing the urban heat island effect.

- **Absorption of CO2 and particles**

Sedums absorb CO2 and particulate matter, storing an average of 1.23 kg CO2 per square meter per year. This means that an 813 square metre Sedum railway absorbs one tonne of CO2 per year. 1 tonne of CO2 is equivalent to driving almost 10,000 km in a petrol-powered car.

- **Biodiversity**

Sempergreen Sedum-mix covers consist of different Sedum species and are therefore extremely diverse in colour and flowering period. The ecological value of this evergreen plant is therefore much higher than that of grass. Choose Sedum and welcome flora and fauna back to the city.

- **Low maintenance**

Succulent Sedum is a perennial and requires little care. Unlike grass, Sedum never needs mowing, saving on maintenance costs. Only periodic checks, watering during prolonged dry periods and fertilizing are needed.

3. Supporting Details

- **Duration**

  2015 – present day

- **Challenges/Lessons Learned**

  Briefly outline one or two key challenges and how they were addressed, e.g., “Limited funding was overcome through public-private partnerships”.

- **Recommendations to other cities**

  - Cities with heavy traffic and a well-developed tram network are ideal candidates for green tracks.
  - Climatic conditions should allow for sustainable growth of green cover.

- In areas of heavy rainfall, an effective drainage system should definitely be provided and well planned to avoid flooding.

Website

https://www.sofia.bg/

20. Good practice – Zvezda Park, Ljubljana

1. General Information

- **City name**

  Ljubljana

- **Practice title**

  “Pervious pedestrian paths in “Zvezda” park”

- **Category**

  ☐ Green (vegetation-based)
  ☐ Blue (water-based)
  ☒White (material-based)
  ☐ Mixed

  Select one.

- **Practice contributor:**
  Barbara Mušič, barbara.music@uirs.si

2. Description of the Practice

- **Summary**

The City of Ljubljana undertook the renovation of the star-shaped pedestrian paths in the Zvezda park, situated right in the heart of the city. Due to heigh frequency of people daily, the city decided to use paving materials that are more suitable for the park's trees and vegetation, ensuring usability in all weather conditions while preserving the appearance of the sandy paths. The primary goal of the renovation was to enhance the conditions of the green areas, which are particularly prone to trampling during bad weather or rainfall. The solution contributes also to reducing overheating of paved surfaces on pedestrian level in hot summer days.

- **Key Actions**

- Choosing a more friendly material for pavement with permeable characteristics, allowing rainwater to pass through and preventing it from settling after hardening.
- The implementation of the idea of sandy paths, originally envisioned by the renowned Slovenian architect Jože Plečnik.
- Finding a solution respecting conditions of cultural heritage protection and nature conservation since the park Zvezda is located in the historic city center.

- **Technical aspects**
  - The use of white polyurethane for paving surfaces which are water permeable and UV-resistant.
  - A certificate from the manufacturer for material characteristics.
  - An approval for implementation of the projects from sectors responsible for cultural heritage protection and nature conservation.

- **Community engagement**
  - No information about citizens and stakeholder involvement.
  - Positive feedback from citizens on renovated pedestrian paths.

- **Results**
- Successful preservation of green areas with trees and vegetation enabling better conditions for growing which can consequently reduce the heat especially due to the large, paved square nearby.

3. Supporting Details

- **Duration**

2019

- **Challenges/Lessons Learned**
- Poor conditions of existing trees required different solutions as planned before the renovation process.
- Finding the most appropriate material for paving.

- **Recommendations to other cities**

  Share practical advice for other cities (e.g.,"Start with pilot projects to demonstrate effectiveness").
- Involve sectors, like cultural heritage, natural conservation, and other important stakeholders straight at the beginning of the process.
- Finding the material with great characteristics is crucial for long term use of the area.
- Demonstrate to wider audience benefits of using the right colour and materials with permeable characteristics for open public spaces exposed especially to hot summer days.

- **Website**
- https://www.ljubljana.si/sl/aktualno/prenovili-smo-pespoti-v-parku-zvezda/
- https://siol.net/novice/slovenija/sprememba-v-srediscu-mesta-video-foto-514213

- **Upload a photo**

21. Good practice – Own Weather - Ljubljana

1. General Information

- **City name**

  Ljubljana

- **Practice title**

  “Own weather”

- **Category**

  ☐ Green (vegetation-based)
  ☒ Blue (water-based)
  ☐White (material-based)
  ☐ Mixed

  Select one.

- **Practice contributor:**
  Barbara Mušič, barbara.music@uirs.si

2. Description of the Practice

- **Summary**

The project "Ljubljana's Own Weather" is implemented in the Prešern´s square, straight in the most frequented area of the old city center. In the middle of the square is a sprinkler system installed that creates an artificial rain. This interactive artwork by painter Zmago Modic was originally created in 2008 but became a regular seasonal installation during the summer from 2015 onwards, primarily due to increasing number of tourists and raising temperatures in summertime. The installation helps to reduce heat, especially in hot summer days where the city is occupied by many tourists.

Key Actions

- Integration of the installation on the site.

- Support of the local authority for implementing the idea.

- **Technical aspects**

  - Installation of a 40-metre plastic pipe with a spray nozzle at a height of 20 metres.

- **Community engagement**

  - No information about citizens and stakeholder involvement.
  - Positive feedback from citizens and visitors.

- **Results**
- Lower temperatures provide residents and visitors better conditions to move around the old city center.
- One of the biggest attractions in the city.

3. Supporting Details

- **Duration**

  2005 -

- **Challenges/Lessons Learned**
- Small interventions as acupuncture solutions can stimulate other initiatives in the city or other cities in Slovenia and abroad.
- Small interventions can have multiple effects on the city (reduce the heat, attract tourists).
- **Recommendations to other cities**

- Developing small efficient installations can have a wider impact (environmental, social interactions, tourists, lowering the temperature of the open areas in cities, etc.).

- Easy and cost-effective solutions can be replicable to other places or cities.

- Invite also stakeholders like artist in the process of developing small interventions and upgrade them from the aspect of multiple effects.

- **Website**

  https://www.atlasobscura.com/places/the-area-of-ljubljanas-own-weather

  https://www.visitljubljana.com/sl/obiskovalci/aktualno/pisma-iz-ljubljane/avgust-2015/poletje-v-znamenju-rekordnega-stevila-vrocih-dni-in-hkrati-podrocja-z-lastnim-vremenom-v-ljubljani-3/

- **Upload a photo**

22. Good practice - Japanese Urban Garden and Tree-Lined Streets Initiative, Zenica

1. General Information

- **City name**

  City of Zenica

- **Practice title**

  Japanese Urban Garden and Tree-Lined Streets Initiative

- **Category**

  ☐ Green (vegetation-based)

  ☐ Blue (water-based)

  ☐White (material-based)

  ☒ Mixed

  Select one.

- **Practice contributor:**

Ahmed Brkić, ahmed.brkic@zenica.ba

2. Description of the Practice

- **Summary**

  Describe the practice, its owner and goals, and the financial resources needed.

  The City of Zenica has undertaken a series of green infrastructure measures focused on urban forestation and landscape enhancement. One standout project involved the creation of a Japanese-style urban dry garden near the Radakovo roundabout along the Babina River. Though not primarily designed to combat the Urban Heat Island (UHI) effect, these measures indirectly contribute to cooling the environment and improving urban resilience. The Japanese garden was planted with various species of decorative plants, trees, and ivy, with a total investment of 14,020.11 KM. Additionally, the city is restoring old tree-lined streets and planting new ones, contributing to long-term urban greening.

- **Key Actions**

  Site selection at Radakovo roundabout and M17 area

  Landscaping and soil preparation

  Installation of an irrigation system

  Planting of 40 dwarf trees, 50 tulips, 50 Siberian dogwoods, ivy, shrubs, and ornamental plants

  Decorative elements: gravel sections and rocks typical of Japanese dry gardens

  Ivy planted along the regulated Babina riverbed to green the adjacent wall

  Implementation of tree restoration and new planting across various city locations

- **Technical aspects**

  Technological solutions include the installation of a fully automated irrigation system to support plant survival and minimize water waste. Gravel was used as a weed-suppressing and decorative element, while decorative stones enhance aesthetics and reduce soil erosion. No special city permits were required beyond standard landscaping regulations.

- **Community engagement**

  .
  While the initiative was led by city authorities, it gained strong local support due to its aesthetic and ecological benefits. The public was involved informally through neighbourhood feedback and engagement during planting events. Local appreciation has boosted awareness of urban greening and environmental well-being.

- **Results**

Transformation of an underutilized space into a visually and environmentally beneficial area

Reduction in surface temperatures due to added vegetation (estimated microclimate improvement, though not yet measured)

Enhanced biodiversity and habitat creation within the urban core

Improved aesthetic and mental health benefits for residents

Strengthened ecological corridor along the Babina River

3. Supporting Details

- **Duration**

  2020

- **Challenges/Lessons Learned**

  One challenge was ensuring long-term maintenance. This was addressed by installing an automated irrigation system and selecting low-maintenance plant species.

- **Recommendations to other cities**

  N/A

- **Website**

  https://zenicainfo.ba/2020/10/01/zenicu-uskoro-ukrasava-japanski-suhi-vrt-uz-dekoracije/

- **Upload a photo**

23. Good practice - Greening of Zenica Business Zone I

1. General Information

- **City name**

  City of Zenica

- **Practice title**

  Greening of Zenica Business Zone I

- **Category**

  ☐ Green (vegetation-based)
  ☐ Blue (water-based)
  ☐White (material-based)
  ☒ Mixed

  Select one.

- **Practice contributor:**

Ahmed Brkić, ahmed.brkic@zenica.ba

2. Description of the Practice

- **Summary**

  As part of Zenica's broader urban greening strategy, the City entered into an agreement to implement horticultural landscaping at the entrance to Business Zone I. The initiative, worth 23,382.45 KM, involved construction work to remove asphalt and underlying layers, followed by soil delivery, levelling, and landscaping. This green intervention aimed to improve the aesthetic, environmental, and microclimatic conditions of a primarily industrial and business-oriented area, demonstrating how greening even hardscape-dominated zones can contribute to the mitigation of urban heat and improve public spaces.

- **Key Actions**

Contracting landscaping works

Removal of asphalt and old base layers

Soil delivery and land preparation

Planting of 16 purple-leaf cherry plum trees (Prunus cerasifera)

Planting of 3 silver spruces and 8 catalpas

Sowing of grass across 600 m²

Planting of a rose garden with polyantha roses and a boxwood (Buxus) border near the Zenica Development Agency building

- **Technical aspects**

  The project included standard urban landscaping works involving removal of impervious surfaces to restore soil permeability and allow plant growth. The selection of hardy, visually appealing tree and plant species supports biodiversity and shade generation. The introduction of grass surfaces improves stormwater infiltration and reduces local surface temperatures.

- **Community engagement**

  While this project was not heavily reliant on community participation, its location in a highly visible and frequented area has helped raise awareness among business stakeholders and visitors. The rose garden near the Zenica Development Agency has become a small landmark, encouraging similar greening initiatives.

- **Results**

  Conversion of a previously paved, heat-retaining area into a green zone

  Planting of 27 trees and over 600 m² of green surface

  Creation of an aesthetically pleasing and environmentally functional entrance to the business zone

Enhanced microclimate and improved biodiversity

Encouraged integration of green infrastructure within industrial and business zones

3. Supporting Details

- **Duration**

  2020-2021

- **Challenges/Lessons Learned**

  The main challenge was transforming an asphalt-heavy industrial space into a green area. Careful selection of soil preparation methods and robust plant species helped ensure long-term success. Another lesson was the importance of visually impactful landscaping in high-traffic areas—it can influence wider adoption across the city.

- **Recommendations to other cities**

  Even small-scale green interventions in industrial or commercial zones can bring significant visual and environmental benefits. Prioritize locations with high visibility to build public and stakeholder support.

- **Website**

  https://zenica.ba/hortikulturno-uredjenje-poslovne-zone-zenica-1/

- **Upload a photo**

24. Good practice – Library Zenica

1. General Information

- **City name**

  City of Zenica

- **Practice title**

  Plant Maze and Green Landscaping at Zenica City Library

- **Category**

  ☐ Green (vegetation-based)

  ☐ Blue (water-based)

  ☐White (material-based)

  ☒ Mixed

  Select one.

- **Practice contributor:**
  Ahmed Brkić, ahmed.brkic@zenica.ba

2. Description of the Practice

- **Summary**

At the initiative of the Department for Ecology and Communal Affairs, the City of Zenica carried out the development of a new horticultural feature in front of the City Library. Following a public procurement process, the company "ALBA ZENICA" d.o.o. Zenica was selected as the most favourable contractor. The project transformed this frequently visited location—surrounded by educational institutions and adjacent to the city park—into an attractive and multifunctional green space. A plant maze with evergreen shrub borders and gravel walkways was created, combining aesthetic appeal with recreational and playful value, especially for children.

- **Key Actions**

  Launch of a public procurement process and selection of contractor

  Site preparation and lawn area development

Design and construction of a plant maze

Planting of evergreen ornamental shrubs forming the maze borders

Installation of gravel walkways within the maze

Delegation of regular maintenance to the public green area maintenance company

- **Technical aspects**

  The project introduced a structured maze design using low-maintenance evergreen ornamental shrubs, combined with gravel pathways to reduce maintenance and ensure usability in various weather conditions. The design encourages exploration while maintaining visibility and safety. No complex infrastructure was needed, allowing for efficient implementation.

- **Community engagement**

  While the maze was developed without direct citizen involvement in design, the location and functionality aim to serve the community, particularly school-aged children. Its proximity to schools and the city park makes it easily accessible and naturally integrated into daily public life. The feature has quickly become a point of interaction and recreation.

- **Results**

  Creation of the first plant maze in Zenica

  Introduction of an innovative, interactive green space near key public institutions

  Enhanced recreational and educational value for children and families

  Improved aesthetics and biodiversity in an urban environment

  Raised awareness about multifunctional urban green spaces

3. Supporting Details

- **Duration**

2022

- **Challenges/Lessons Learned**

  Introducing new types of urban green elements such as a maze required precise planning to balance design, safety, and maintenance needs. Assigning maintenance to the responsible public company early on ensured long-term sustainability.

- **Recommendations to other cities**

  Think creatively with green spaces—interactive designs like plant mazes can turn passive areas into active learning and recreation zones. Start near schools or libraries for maximum engagement and educational benefit.

- **Website**

  https://zenica.ba/pocelo-uredjenje-travnjaka-kod-gradske-biblioteke-zenica/

- **Upload a photo**

25. Good practice - Climate-Resilient Bratislava

1. General Information

- **City name**

  Bratislava.

- **Practice title**

  Climate-Resilient Bratislava – Pilot Projects on Decarbonisation, Energy Efficiency of Buildings and Sustainable Rainwater Management in the Urban Environment

- **Category**

  ☐ Green (vegetation-based)

  ☐ Blue (water-based)

  ☐White (material-based)

  ☒ Mixed

  Select one.

- **Practice contributor:**
  The EEA Grant – Iceland, Liechtenstein and Norway
  https://klimatickyodolna.bratislava.sk/en/about-project/
  https://klimatickyodolna.bratislava.sk/en/green-bratislava/

2. Description of the Practice

- **Summary**

  The owner of the implemented measures is Bratislava, the capital of the Slovak Republic.

  The measures were implemented within the framework "Climate Change Mitigation and Adaptation" (SK-Climate) program co-financed by the European Economic Area Financial Mechanism 2014-2021 in the amount of €1,170,600 and the State Budget of the Slovak Republic in the amount of €206,546.

- **Key Actions**
  - Comprehensive renovation of 4 public buildings in terms of energy efficiency, e.g. implementation of 4 vegetation roofs, modification of building facades - install insulation
  - Implementation of a pilot project to tackle problematic flooding
  - Implementation of 29 qualified mitigation and adaptation measures (grey/energy efficiency – 12, blue and green – 12, soft – 5) – revitalization of the public areas in the city – planting greenery

- **Technical aspects**
  - thermal insulation of buildings
  - new greenery in the city
  - drinking fountains

- **Community engagement**

  The project supported a wide range of "non-investment" activities, such as counselling the public in terms of sustainable rainwater management on private property, establishment of a small grant scheme for citizens with the goal of supporting the elements of rainwater retention on plots of land, and informative activities on the topic in hand.

- **Results**
  - Reducing greenhouse gas emissions by at least 1 785 t CO_2 eq.
  - Reducing urban heat islands effect in the city

3. Supporting Details

- **Duration**

  2014–2021

- **Challenges/Lessons Learned**

  Limited funding was overcome through public partnerships.

- **Recommendations to other cities**

  Start with pilot projects to demonstrate effectiveness.

- **Website**

  More information about the practice can be found at https://klimatickyodolna.bratislava.sk/en/about-project/

- **Upload a photo**

26. Good practice - GPopUpUrbanSpaces – Greening Šenoina Street, Croatia

1. General Information

- **City name**

  Varaždin, Croatia

- **Practice title**

  GPopUpUrbanSpaces – Greening Šenoina Street

- **Category**

  ☒ Green (vegetation-based)
  ☐ Blue (water-based)
  ☐White (material-based)
  ☐ Mixed

  Select one.

- **Practice contributor:**
  Development Agency North DAN

2. Description of the Practice

- **Summary**

  As part of the EU project PopUpUrbanSpaces, Šenoina Street in Varaždin was transformed into a pedestrian zone to improve urban mobility and the quality of public space. Five mobile tree lines in corten steel planters were installed, including integrated weather-resistant wooden benches.

- **Key Actions**
  - Reconstruction of the street into a pedestrian zone
  - Installation of mobile tree lines with benches
  - Community involvement through participatory workshops
- **Technical aspects**

  Modular elements were used to enable flexibility and space adaptation. The mobile trees allow for seasonal adjustments and easy maintenance.
- **Community engagement**

  Citizens participated in planning and designing the space through workshops and public discussions.
- **Results**

  Increased use of public space, improved microclimate, and greater pedestrian and cyclist safety.

3. Supporting Details

- **Duration**

  2022-2023
- **Challenges/Lessons Learned**

Maintaining mobile tree lines requires regular care, especially during the summer.

- **Recommendations to other cities**

  Pilot projects can serve as a model for fast and effective urban interventions.

- **Website**

https://evarazdin.hr/drustvo/foto-senoina-ulica-u-varazdinu-bogatija-za-pet-mobilnih-drvoreda-411878/

- **Upload a photo**

27. Good practice - Reconstruction of the Central City Square, Croatia

1. **General Information**
   - **City name**
   - Koprivnica, Croatia
2. **Practice title**

   Reconstruction of the Central City Square

3. **Category**
   - ☐ Green (vegetation-based)
   - ☐ Blue (water-based)
   - ☐White (material-based)
   - ☒ Mixed
   - Select one.

4. **Practice contributor:**
   City of Koprivnica

5. **Description of the Practice**

   - **Summary**
   - The central square in Koprivnica was reconstructed to create a more pleasant and functional public space. Water elements such as a fountain and tree lines along the square's edges were added to provide shade and improve the microclimate.

   - **Key Actions**
     - Removal of outdated urban elements
     - Construction of a central fountain
     - Planting of tree lines along the square's edges

- **Technical aspects**

    - The fountain is designed with a recirculating system for minimal water consumption. Trees were selected for their urban resilience and shading capability.

- **Community engagement**

    - The project was presented to the public through exhibitions and presentations, allowing feedback.

- **Results**

    - The square became a more attractive gathering place with enhanced aesthetics and functionality. Green and blue elements reduce the urban heat island effect.

6. Supporting Details

- **Duration**

2021–2023

- **Challenges/Lessons Learned**

Fountain maintenance requires constant technical support.

- **Recommendations to other cities**

Combining blue and green elements can significantly improve urban public spaces.

- **Website**

https://nfo.hr/portfolio/recontruction-of-central-squares-in-koprivnica/

28. Good practice – Tehno Park Garešnica, Croatia

1. General Information

- **City name**

Garešnica, Croatia

- **Practice title**

Tehno Park Garešnica – Green Business Incubator

- **Category**

☐ Green (vegetation-based)

☐ Blue (water-based)

☐White (material-based)

☒ Mixed

Select one.

- **Practice contributor:**

City of Garešnica

2. Description of the Practice

- **Summary**

Tehno Park Garešnica is a business incubator that integrates green technologies such as a green roof and façade to reduce energy needs and improve the microclimate of the economic zone.

- **Key Actions**

  - Construction of a business incubator with integrated green solutions
  - Installation of a green roof and vertical green façade

- Development of green areas along access roads and parking lots

- **Technical aspects**

The green roof reduces building cooling needs, while the green façade improves insulation and aesthetics. Local plant materials adapted to the climate was used.

- **Community engagement**

The project was presented to local entrepreneurs and the community through workshops and presentations.

- **Results**

Reduced energy consumption for heating and cooling, improved air quality, and demonstration of sustainable construction.

3. Supporting Details

- **Duration**

- 2019-2021

Challenges/Lessons Learned

- Green infrastructure maintenance requires additional resources, but the long-term benefits outweigh the initial costs.

- **Recommendations to other cities**

- Integrating green infrastructure into business buildings provides both ecological and economic benefits.

- **Website**

https://nfo.hr/porvolio/recontruction-of-central-squares-in-koprivnica/

29. Good practice - "The UrbanOasis project", Ljubljana

1. General Information

- **City name**

  Ljubljana

- **Practice title**

  "The UrbanOasis project"

- **Category**

  ☐ Green (vegetation-based)
  ☐ Blue (water-based)
  ☐White (material-based)
  ☒ Mixed

  Select one.

- **Practice contributor:**
  Tim Gerdin, timge@uirs.si

2. Description of the Practice

- **Summary**

The UrbanOasis project is a practical example of a nature-based solution of an urban space, integrated at the courtyard of the Prežihov Voranc Primary School in the City of Ljubljana. The area of the intervention was previously used for parking space and through the project, it was transformed into the green space.

In collaboration with students, parents, and teachers the first design was co-developed according to nature-based principles that promote biodiversity and enhance the microclimate followed by the implementation of the solution. Green areas will serve as spaces for outdoor classes, providing a pleasant environment for relaxation, socializing, and play. By engaging directly with nature, students will gain a deeper understanding of natural processes, adding a strong educational dimension to the project.

Key Actions

- Land de-sealing of a part previously used for parking areas.
- Implementation of permeable and green areas.
- Actively involvement of children in learning process about climate change and the role of nature in adapting to it through workshops and activities, fostering both environmental awareness and practical skills.

- **Technical aspects**

  - The use of gravel and plant beds improve water retention and help establishing a better microclimate condition.
  - Following the de-sealing of the surface, enhancements were made to the soil's structure, texture, and composition to ensure it provided optimal conditions for plant growth.

- **Community engagement**

  - Two planting workshops with more than 30 students and scouts were implemented.
  - Positive feedback from parents and school was provided.

- **Results**

- Successful land de-sealing and planting workshops with schoolchildren from the primary school that reclaimed land previously used for parking.
- Planting of 125 seedlings across 30 m², including 15 shrubs and 110 perennials.
- Construction of wooden platform on the playground and installation of urban furniture refabricated from old concrete pipes and wooden sitting surfaces.

3. Supporting Details

- **Duration**

  2024 – 2025

- **Challenges/Lessons Learned**

- The initially chosen location for the de-sealed land had to be reconsidered due to complications arising from underground sewage and electrical systems.

- Choosing resilient plant species that thrive in shaded areas, are safe for children, can endure urban conditions, and effectively attract pollinators.

- **Recommendations to other cities**

- Involve actors from the cultural heritage sector, natural conservation, and other important stakeholders straight at the beginning of the process.

- Start small projects in the vicinity of communities such as primary schools, hospitals and homes for the elderly.

- When planning interventions at schools or kindergartens, consider conducting a survey among parents to gather support for incorporating outdoor planting and nature-based activities into the students' daily routines, fostering a stronger connection with nature in their school environment.

- **Website**

  http://www.pazipark.si/portfolio/urbanoaza/

- **Upload a photo**

30. Good practices - Constanta 365

1. General Information

- **City name**

  Constanta, Romania.

- **Practice title**

  Constanta 365.

- **Category**

  ☐ Green (vegetation-based)
  ☐ Blue (water-based)
  ☐White (material-based)
  ☒ Mixed

  Select one.

- **Practice contributor:**
  Iulius Company.

2. Description of the Practice

- **Summary**

  The project is based on the principles of the mixed-use concept and integrates a variety of functions, including office buildings, a retail area, an extensive network of green spaces, a botanical garden, pedestrian alleys, bicycle paths and buildings with public functions. Through this integrated approach, the development will support the increase in the quality of life in the city, transforming Constanța into an active destination all year round..
  38 hectares of land behind the Constanta Train Station will be transformed into the largest urban reconversion project in Romania. Botanical garden, 6 parks, squares, outdoor amphitheater and performance hall, restaurant

and café areas, shopping areas and office spaces. The investment is estimated at 800 million euros.

- **Key Actions**

  The essential point from which this project starts, and without which the investment will not be viable, refers to connecting the area with the rest of the city. This involves moving the current train station to a new location identified 2 kilometers from the current site, dismantling several railway routes / railway lines and moving others underground so as to largely undercut the entire area. Road crossings, new streets and parking lots with thousands of spaces will also be built, but most importantly, the entire area will be focused on pedestrian and bicycle access.

- **Technical aspects**

  The project is:

  - A multifunctional concept, transforming 38 contaminated and unused hectares into a pole of economic, social, tourist and business development.

  - A mixed-use, non-residential ensemble: park, botanical garden, cultural, educational and public functions, entertainment and edutainment, event centers, premium offices, services, brands and concept restaurants.

  - An area with green areas of over 10 hectares. Nursery with over 600 mature trees in acclimatization.

  - A decontamination approach, for a healthy environment.

- **Community engagement**
  The project is a vision based on the city's needs and the community's expectations, on concrete studies and analyses, on urban and sustainability strategies, and on consultation with residents.

- **Results**

  The modern "15-minute city" concept integrated into the new development will enable immediate access to all centers of interest, attractions and multiple services in the project, generating a relaxed and easy lifestyle.

The project prioritizes environmental care, integrating green corridors, remediating land contaminated with petroleum hydrocarbons, and developing sustainable infrastructure harmoniously integrated into the existing urban landscape, eliminating barriers that hinder development.

3. Supporting Details

- **Duration**

  2024- The project is ongoing.

- **Challenges/Lessons Learned**

  Briefly outline one or two key challenges and how they were addressed, e.g., "Limited funding was overcome through public-private partnerships".

- **Recommendations to other cities**

  -

- **Website**

  https://atacdeconstanta.com/iulius-va-construi-o-noua-ancora-economica-pentru-constanta-prin-revitalizarea-a-38-de-hectare-de-teren/#:~:text=Proiectul%20este%20realizat%20pe%20baza%20principiilor%20conceptului%20de,piste%20de%20biciclete%20%C8%99i%20cl%C4%83diri%20cu%20func%C8%9Biuni%20publice.

- https://www.constantadeazi.ro/foto-cum-va-arata-proiectul-iulius-la-constanta-o-noua-gara-piatete-gradina-botanica-si-parcuri/
- https://www.constanta365.ro

- **Upload a photo**

31. Good practice – Tram - Arad

1. General Information

- **City name**

  Arad, Romania.

- **Practice title**

  Tram lines greened with sedum carpets.

- **Category**

  ☒ Green (vegetation-based)
  ☐ Blue (water-based)
  ☐White (material-based)
  ☐ Mixed

  Select one.

- **Practice contributor:**
  ECOSTRATOs project.

2. Description of the Practice

- **Summary**

  Arad is the first city in the country where a significant green space was created thanks to the greening of tram lines, the installation being carried out in the summer and autumn of 2023. The successful project is considered pioneering in Romania and it is expected that other cities will join the initiative in the near future. The landscaping was carried out without irrigation systems over a length of 5.5 km. The greening of the tram lines was achieved by arranging Sedum rolls between the tram tracks and outside them, along the entire length of the site.

- **Key Actions**

  The first step was to clean the area to be treated. The displaced stones were repositioned and the entire surface was leveled. This was followed by the installation of a filtering geotextile that will not allow fine leachable particles from the special multi-component substrate mixture (ground volcanic slag, compost, other materials) to mix with the foundation stones of the runway, and a special drainage and water retention element was placed, which will be able to absorb an amount of over 20 l/m2. Before installing the Sedum rolls, a 3-10 cm layer of substrate and additives to increase the water retention capacity was installed

- **Technical aspects**

  The development was carried out without irrigation systems, on Revoluției Boulevard and Calea Aurel Vlaicu, over a length of 5.5 km, thus achieving the greening of the area and the corridor formed by the existing tram lines, over an area of 3 ha.

- **Community engagement**

- **Results**

  Thermoscan measurements revealed temperature differences between the built and vegetated surfaces. The favorable effects became measurable immediately after installation, as thermoscan measurements show a significant temperature difference between the vegetated surface and the paved areas (with differences of up to 19oC).Arad City Hall announces that it managed to save over 27 million liters of water in a year, after greening the tram lines with Sedum instead of lawn. The plants survived temperatures of over 40 degrees in the shade, only changing their color to shades of red.

3. Supporting Details

- **Duration**

  2023

- **Challenges/Lessons Learned**

  Briefly outline one or two key challenges and how they were addressed, e.g., “Limited funding was overcome through public-private partnerships”.

- **Recommendations to other cities**

  Cities with heavy traffic and a well-developed tram network are ideal candidates for green tracks
  The trend of greening tram lines with sedum is a smart, sustainable and aesthetic solution that can bring significant benefits to the urban environment and the local community.

- **Website**

  https://www.actualitati-arad.ro/proiect-pilot-in-arad-spatiul-adiacent-sinelor-de-tramvai-acoperit-cu-covor-vegetal/

  https://www.spatiulconstruit.ro/lucrare/inverzirea-liniilor-de-tramvai-in-romania-proiect-ecostratos/316

- **Upload a photo**

32. Good practice – Urban regeneration - Galati

1. General Information

- **City name**

  Galati, Romania.

- **Practice title**

  Urban regeneration: Domneasca Street between Lahovary street and Eroilor street, including the plaza near the Greek church.

- **Category**

  ☐ Green (vegetation-based)

  ☐ Blue (water-based)

  ☐White (material-based)

  ☒ Mixed

  Select one.

- **Practice contributor:**
  SC ARHIDESKVISION SRL, Arch. TUDORANCEA ADI arhidesk@gmail.com.

2. Description of the Practice

- **Summary**

  The Municipality of Galați is currently implementing an extensive urban regeneration project. The aim of the investment is to improve the quality of living. The planned investments include: Rehabilitation of sidewalks and streets; Expansion of green areas; Increase in tree canopy coverage; Mitigation of the urban heat island effect.

- **Key Actions**

For the section Domneasca Street between Lahovary street and Eroilor street the project mainly provides for modernization and rehabilitation works of the roadway and sidewalks, reconfiguration and modernization of green spaces, automated irrigation systems, bicycle paths, benches and trash cans, LED public lighting, the materials of the sidewalks, which are light in color and rough, have been changed. At Greek Church Square the green space raised from 383.87 sqm to 568.58 sqm and the number of trees raised from 20 to 70

- **Technical aspects**

At Greek Church Square it was proposed to increase the green space area so that solar radiation is neither reflected nor re-radiated, and to enhance the diversity of tree, shrub, and plant species. Vegetation absorbs solar radiation during photosynthesis and, through the process of evapotranspiration, contributes to cooling the surrounding area. The placement of trees facilitates air circulation in the corridor area.

The vegetation types were carefully selected to include both evergreen and deciduous trees—allowing sunlight to pass through during winter and offering shade in summer. Trees and shrubs of various heights were also used to create a controlled microclimate in the area.

One of the roles of the fountain is to take advantage of the presence of water, which absorbs a significant amount of solar radiation. At the same time, the evaporative effect helps cool the atmosphere during the day and slightly warm it during the night.

Material selection was based on thermal storage capacity and reflectivity. Thus, the largest surface area is made of light-colored, rough-textured materials, which provide minimal reflectivity and low heat absorption.

- **Community engagement**

The regeneration of Domneasca Street between Lahovary street and Eroilor street, including the plaza near the Greek church was motivated by the

citizens' need to create place for relaxation and entertainment in the city center.

- **Results**

  New sidewalks and streets build with light in color and rough materials which results in minimal reflectivity and minimal heat absorption.

  Expansion of green areas.

3. Supporting Details

- **Duration**

  2023-2025

- **Challenges/Lessons Learned**

  Briefly outline one or two key challenges and how they were addressed, e.g., “Limited funding was overcome through public-private partnerships”.

- **Recommendations to other cities**

  Start with pilot projects to demonstrate effectiveness

- **Website**

  https://www.expressdedunare.ro/strada-domneasca-din-centru-pana-pe-garii-va-fi-modernizata-afla-aici-transformarile-pregatite-de-autoritati/.

- **Upload a photo**

33. Good practice – Mobile Cooling Islands - Budapest

1. General Information

- **City name**

  Budapest, Hungary

- **Practice title**

  „Mobile Cooling Islands”

- **Category**

  ☐ Green (vegetation-based)
  ☐ Blue (water-based)
  ☐White (material-based)
  ☒ Mixed

  Select one.

- **Practice contributor:**

KVA, projekt@kva.hu

2. Description of the Practice

- **Summary**

To mitigate the effects of urban heat islands during the summer, the Municipality of Budapest is implementing mobile cooling islands in areas where heat is particularly challenging to manage. These cooling islands offer a respite from the heat, serving as both a cooling shelter and a community space for residents to relax and gather. Additionally, visitors can access refreshing drinking water and learn about the phenomenon of urban heat islands and potential solutions through educational resources provided at these sites."

- **Key Actions**

Not all urban heat islands can be eliminated, and some may not be worth the effort due to infrequent large gatherings. To address this, the municipality annually installs cooling islands in such areas. These cooling islands feature a pergola-like design that promotes air circulation and provides shade with plants and a built-in evaporator, offering relief to those seeking respite on their benches. Visitors can also access drinking water and learn about the urban heat island phenomenon at these cooling islands.

- **Technical aspects**

  N/A

- **Community engagement**

  N/A

- **Results**

  The mobile cooling islands offer a targeted, 'acupuncture-style' relief from urban heat islands, providing visitors with a refreshing sense of respite. These islands can also function as community spaces or serve educational purposes. Additionally, they have a decorative appeal and can be easily reconfigured or completely dismantled according to seasonal needs.

3. Supporting Details

- **Duration**

  every year since 2020

- **Challenges/Lessons Learned**

  Maintaining a larger number of cooling islands requires efficient logistics. During the cooler months, the focus is on proper storage and seasonal decorations. In the summer, the primary tasks involve selecting suitable locations and ensuring the maintenance of vegetation and water supply.

- **Recommendations to other cities**

Initially, it would be beneficial to develop a single cooling island as a pilot project. This approach allows for testing and refining maintenance strategies before expanding the initiative.

- **Website**

  https://budapest.hu/hirek/2024/08/01/husito-kisokos

  https://budapest.hu/hirek/2024/06/21/husito-szigetek-epultek-ket-forgalmas-csomopontban

34. Good practice – BTC City, Ljubljana

1. General Information

- **City name**
  Ljubljana, Slovenia

- **Practice title**

  BTC City

- **Category**

  ☐ Green (vegetation-based)
  ☐ Blue (water-based)
  ☐White (material-based)
  ☒ Mixed

- **Practice contributor:**

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2. Description of the Practice

- **Summary**

  The BTC city is a former degraded warehouse area which was transformed first into the largest shopping area BTC city and later into the largest shopping and entertainment area with more than 500 shops and a wide range of services and activities (sport, business, culture, etc.). The extensive urban planning project continuously improves its environmental conditions, as it is recognized as a large urban heat island in the City of Ljubljana. The mission of the BTC City is to bring nature back into its urban landscape, aiming to become a greener and more climate-resilient business district. To achieve this goal, the focus has been on green interventions such as parks, green roofs, green walls, and tree planting to support biodiversity, enhance

the microclimate, and improve the comfort and well-being of visitors, employees, and business partners.

- **Key Actions**

  High level of awareness of owners about high environmental standards for improving the quality of the area.

  Involving experts from different backgrounds (urban heat island, architects, landscape architects, urban planners, universities, etc.) from the planning to implementation phase.

  Establishing different communities with different target groups to foster engagement, collaboration and raising awareness among different stakeholders about the importance of implementing sustainable development solutions in the area.

- **Technical aspects**

  • Implementing green roofs on the main business building of the BTC city, the large warehouse of the INTERSPAR, bus stations, etc.
  • Implementing green walls along shopping buildings.
  • Planting trees that are best suited to the local climate conditions.
  • Implementing a large park in the middle of the area.
  • Other small green acupuncture solutions.

- **Community engagement**

  The Urban Development Concept adopted by the City Council in 2002 emphasized community engagement through public workshops, exhibitions, and discussions.

  Various stakeholders, including experts from different backgrounds such as urban heat island specialists, architects, landscape architects, urban planners, and universities, have been involved during the transformation process of the area.

Within the Desire project - Designing the Irresistible Circular Society project (a New European Bauhaus lighthouse demonstrator), the BTC city organised several events and activities in 2023 and 2024:

o A co-creation workshop was organised in Ljubljana gathering stakeholders from various sectors (academia, creative industry, NGOs) to envision a sustainable future for the BTC City area in 2050. The main aim of the workshop was to foster innovation, sustainability and community engagement in reimagining the BTC area as a vibrant and environmentally friendly urban space.

o A separate workshop for business partners was organised with the focus on energy efficiency, mobility, buildings and renewable energy.

o A greening campaign was launched, and they planted 72 trees, heat-resistant plants and vertical gardens for creating green acupuncture interventions to mitigate high summer temperatures and stormwater runoff.

o A conference on urban decarbonisation was organised to stimulate collective action to achieve decarbonisation goals.

o A Hackathon for the BTC City 2050 was organised for young people to create ideas for the shared sustainable vision of the BTC City 2050. All together 6 groups of 30 young people created ideas for building and open spaces of the area and to find innovative solutions based on sustainable development principles.

o An exhibition was organised with the main aim to raise awareness of citizens about the decarbonisation benefits of the city and to get feedback, gather ideas and suggestions for improving the quality of life in the City of Ljubljana.

o Based on developed ideas, feedback from visitors, local and foreign mentors, several development concepts were created. All solutions were presented, and at the end, a jury of experts awarded prizes for the three best ideas.

- **Results**

  • A common vision for BTC City 2050 was created.
  • Stakeholders' involvement in the co-creation process was improved.
  • Implementing green interventions improved biodiversity and microclimate conditions in the area.
  • A park with a size of 12,000 square metres was implemented where around 270 trees and various shrubs from 20 different species were planted.

3. Supporting Details

- **Duration**

  1990 -

- **Challenges/Lessons Learned**

  • BTC City Ljubljana is recognised as a great testing area for implementing new and innovative solutions that can demonstrate how to improve the quality of living and reduce the impact of cities on climate change.
  • Managing the green transformation process of the BTC City area can become an example of good sustainable practice in the city and region, also through international cooperation.
  • Different workshops with various stakeholders served as important tools for the co-creation process.
  • The involvement of various stakeholders and interdisciplinary collaboration is crucial in designing sustainable greening strategies.
  • Stakeholder mapping for identification and engagement of key stakeholders can support the successful implementation of development goals.
  • Environmentally friendly practices and collaborative partnerships are key success factors to address climate change challenges like the urban heat island.
  • Empowerment of employees as "green agents" is a successful factor to efficiently integrate sustainable practices into different areas of the BTC City.

- **Recommendations to other cities**

  • Involvement of different stakeholder groups is crucial for the successful implementation of desired goals.
  • Using different participative tools (workshops, exhibitions, expert meetings, round table discussions, etc.) is are useful tool to engage different target groups in the process.
  • Good management of the process and monitoring can improve the effectiveness of the whole process from the beginning to the implementation phase.
  • Empower key stakeholders to become “ambassadors” of solutions jointly developed by different target groups.

- **Website**
- https://www.delo.si/gospodarstvo/novice/smo-testno-obmocje-za-resitve-urbanega-ozelenjevanja
- https://www.btc.si/novice/2021/09/z-ozelenitvijo-treh-avtobusnih-nadstresnic-se-btc-pridruzuje-projektu-mestne-obcine-ljubljana/
- https://novi.btc-city.com/sl/novice/intervju-dr-joze-bavcon-in-dr-blanka-ravnjak-botanika-ki-ozelenjujeta-mesto
- https://www.irresistiblecircularsociety.eu/news/btc-city-picking-up-great-ideas-to-support-the-sustainable-future-of-the-btc-city-area-in-ljubljana
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