

D.2.1.1 Mapping report

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

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Table of Content

INTRODUCTION.....	5
PURPOSE OF THE REPORT	5
CONTEXT OF THE BE READY PROJECT AND THE IMPORTANCE OF ADDRESSING UHI IN THE DANUBE REGION	6
MAPPING METHODOLOGY	7
DATA-COLLECTION WORKFLOW	7
OVERVIEW OF THE URBAN HEAT ISLAND (UHI) PROBLEM.....	8
DEFINITION AND IMPACTS	8
SPECIFIC CHALLENGES IN THE DANUBE REGION	9
POLICIES	12
WHY WE NEED TO TALK ABOUT POLICY.....	13
POLICIES IN PRACTICE – DANUBE-REGION CITIES THAT ALREADY THREAT THE URBAN HEAT ISLAND AS A POLICY TARGET	15
KEY OPPORTUNITIES & RECOMMENDATIONS FOR A DANUBE-REGION STRATEGIC FRAMEWORK	17
COMMUNITY ENGAGEMENT AND SOCIAL INNOVATION	19
GOOD PRACTICES IN THE DANUBE REGION	23
GOOD-PRACTICE INVENTORY – GROUPED BY COUNTRY	24
THE KEY GOOD PRACTICE TAKE-AWAYS FOR BE READY PROJECT PILOTS.....	28
FROM INSIGHTS TO ON-THE-GROUND COOLING: HOW TO PUT THE LESSONS TO WORK.....	33
WHERE TO EXPLORE FURTHER	34
ANNEXES	38
REFERENCES.....	39

List of tables

Table 1: Impact	9
Table 2: Table of Challenges	10
Table 3: Key policy conditions	13
Table 4: Gaps	14
Table 5: Good Practices – Country and Category	24
Table 6: Good practices - synthesis	27
Table 7: Good practices – Description, recommendation, why and lessons learned	29

List of figures

Figure 1_Be Ready Platform - MAP	34
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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-uhf-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.

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

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		Chişinău'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	Chişinău 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

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).	<i>URB for DAN</i> 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).	<i>AgriGo4Cities</i> 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	<i>TransGREEN</i> drafted legal templates for blue-green corridors that prioritise schools,

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 <i>URBforDAN</i>'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 <i>TransGREEN</i> 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. <i>Chapter 73 04 – Urban Cooling</i>). • Sofia's "Cool Streets" fund and Budapest's "Cool Roof" rebate show the accounting model; <i>AgriGo4Cities</i>	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
4 • Equity-linked incentives	“The hottest, poorest blocks get the least investment.”	proved that participatory micro-grants can top it up.	
		• 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); Chişinău 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).

- **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 A4-2 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 CO₂-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)
- **Chişinău (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-

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 (Chişinău’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 Chişinău (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. Chişinău'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.

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.

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	<i>CoolINN Green Oasis</i>	Mixed: Green/Blue + Social
	Vienna	<i>Climate Oases</i>	Mixed: Social+Green

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

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

Country	City	Case name	Category
	Ljubljana	<i>The UrbanOasis project</i>	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.

- **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.
Czech Republic	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
	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
Hungary	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
	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

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
	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
	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
Serbia	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 m ² 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

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.

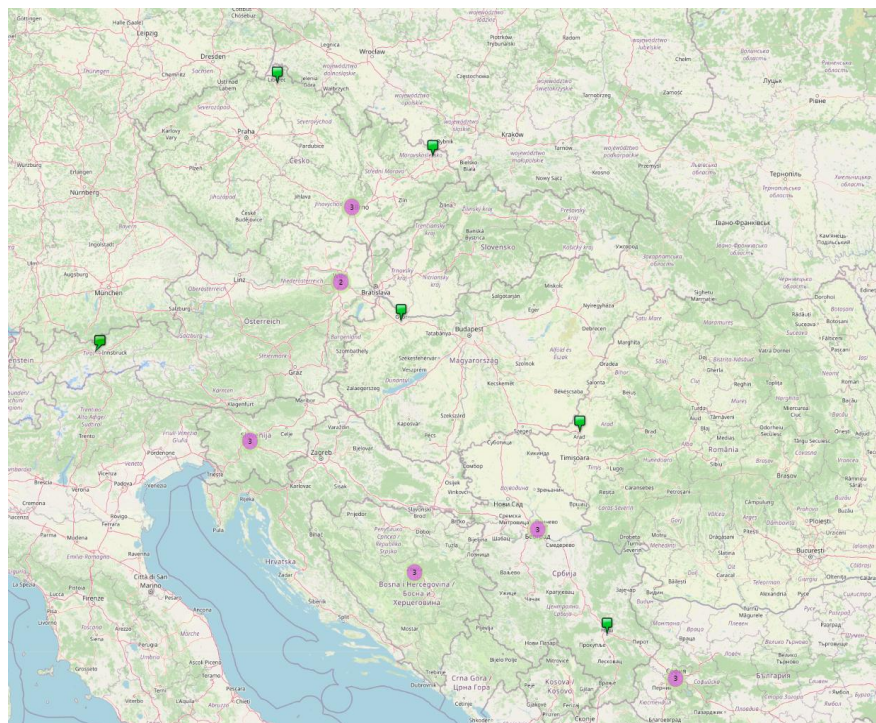
Although these recommendations are based on the best practices that we have gathered from across the Danube Region within the project partnership, we recognise that there are many more inspiring interventions beyond this sample. The examples presented here reflect the current insights of this phase of 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-uhiready.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-uhiready.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.

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.

References

- AgriGo4Cities Consortium. (2019). *Urban Agriculture for Urban Change: Governance Models for Better Institutional Capacity and Social Inclusion (AgriGo4Cities)*. Interreg Danube Transnational Programme. Retrieved from <https://interreg-danube.eu/approved-projects/agrigo4cities>
- Ballester, J., et al. (2023). Heat-related mortality in Europe during the summer of 2022. *Nature Medicine*, 29, 993–1002. <https://www.nature.com/articles/s41591-023-02419-z>
- Balkan Green Energy News. (2024, 8 November). Belgrade prepares draft Green Infrastructure Strategy. Retrieved from <https://balkangreenenergynews.com/belgrade-prepares-draft-green-infrastructure-strategy/>
- Bratislava City Council. (2017). *Action Plan – Bratislava Is Preparing for Climate Change II*. Retrieved from <https://klimatickyodolna.bratislava.sk/en/action-plan/>
- Brno UHI Report. (2024). *Urban Heat-Island Vulnerability & Risk Assessment – City of Brno*. Be Ready project.
- Budapest Climate Strategy. (2018). *Budapest Climate Strategy & SECAP 2030*. Municipality of Budapest. Retrieved from https://archiv.budapest.hu/sites/english/Documents/BP_klimastrategia_SECAP_EN_final.pdf
- Caritas Wien. (2024). *Klimaoase – Sommerfrische im Pfarrgarten*. Retrieved from <https://www.caritas-wien.at/hilfe-angebote/zusammenleben/pfarrcaritas-und-naechstenhilfe/aktiv-in-den-pfarren/klimaoase/>
- Chişinău UHI Report. (2025). *Urban Heat-Island Vulnerability & Risk Assessment – City of Chişinău*. Be Ready project.
- City of Belgrade. (2015). *Climate Change Adaptation Action Plan and Vulnerability Assessment* (Official Gazette of the City of Belgrade No. 65/15). Secretariat for Environmental Protection. Retrieved from https://mycovenant.eumayors.eu/storage/web/mc_covenant/documents/18/HLtp-dBNx2CfEzzJp_ZJlnEp_NHRtwW.pdf
- City of Brno. (2023). *Sustainable Energy and Climate Action Plan (SECAP) 2030 – Adaptation Part*. Retrieved from https://ekodotace.brno.cz/wp-content/uploads/2019/09/SECAP_Brno_zpr%C3%A1va_29.8.2019_fin%C3%A1ln%C3%AD.pdf
- City of Vienna. (2015). *Urban Heat-Islands Strategic Plan (UHI-STRAT)*. Municipal Department 22 – Environmental Protection. Retrieved from <https://www.wien.gv.at/umweltschutz/raum/uhi-strategieplan.html>
- City of Vienna. (2024). *Vienna Heat-Action Plan*. Climate Department. Retrieved from <https://www.wien.gv.at/english/environment/klip/heat-action-plan.html>
- Climate-ADAPT. (2024). Water uses to cope with heat waves in cities – Budapest Cooling Programme. Retrieved from <https://climate-adapt.eea.europa.eu/en/metadata/adaptation-options/water-uses-to-cope-with-heat-waves-in-cities>

Constanța UHI Report. (2025). *Urban Heat-Island Vulnerability & Risk Assessment – City of Constanța*. Be Ready project.

Csima, S., Bartholy, J., & Pongrácz, R. (2024). Future temperature and urban heat-island changes in Budapest – a comparative study. *Időjárás*, 128(2), 133–152.

EBRD Green City Action Plan Consortium. (2021). *Green City Action Plan for the City of Belgrade*. European Bank for Reconstruction and Development. Retrieved from <https://ebrdgreencities.com/assets/Uploads/PDF/Belgrade-GCAP.pdf>

ENTSO-E. (2024). *Summer Load Report – Central & South-East Europe*. Brussels: European Network of Transmission System Operators for Electricity.

European Commission – Joint Research Centre. (2024). *EU Cities and Heat Extremes: Tackling Heatwaves through Urban Planning & Cohesion Policy*. JRC Publications Repository. Retrieved from https://publications.jrc.ec.europa.eu/repository/bitstream/JRC137891/JRC137891_01.pdf

European Environment Agency. (2012). *Urban adaptation to climate change in Europe*. EEA Report No 2/2012. Retrieved from <https://www.eea.europa.eu/en/analysis/publications/urban-adaptation-to-climate-change/urban-adaptation-to-climate-change>

European Environment Agency. (2024a). Extreme weather: floods, droughts and heatwaves – indicator assessment 2024. Retrieved from <https://www.eea.europa.eu>

European Environment Agency. (2024b). *The impacts of heat on health: surveillance and preparedness in Europe*. Briefing, 27 November 2024.

Galați UHI Report. (2025). *Urban Heat-Island Vulnerability & Risk Assessment – City of Galați*. Be Ready project.

GCAP Consortium. (2019). *Green City Action Plan for the City of Chișinău*. EBRD Green Cities Programme. Retrieved from https://ebrdgreencities.com/assets/Uploads/PDF/GCAP_Chisinau-ENG.pdf

Garešnica UHI Report. (2024). *Urban Heat-Island Vulnerability & Risk Assessment – Town of Garešnica*. Be Ready project.

Győr UHI Report. (2025). *Urban Heat-Island Vulnerability & Risk Assessment – City of Győr*. Be Ready project.

Innsbruck UHI Report. (2024). *Urban Heat-Island Vulnerability & Risk Assessment – City of Innsbruck*. Be Ready project.

Interreg Central Europe. (2024, 6 September). Pilots in progress – Varaždin, Croatia. Retrieved from <https://www.interreg-central.eu/news/pilots-in-progress-varazdin-croatia/>

Municipal Water Alliance. (2023). *It's Getting Hot in Here: A Roadmap for Stakeholder Involvement in Urban Heat Island Mitigation*. Retrieved from https://www.mwalliance.org/sites/default/files/meea-research/its_getting_hot_in_here_a_roadmap_for_stakeholder_involvement_in_urban_heat_island_mitigation.pdf

Municipality of Budapest. (2018). *Budapest Climate Strategy and Sustainable Energy & Climate Action Plan* 2030. Retrieved from https://archiv.budapest.hu/sites/english/Documents/BP_klimastrategia_SECAP_EN_final.pdf

Municipality of Podgorica. (2011). *Action Plan for Sustainable Energy Use as a Resource in the Capital City of Podgorica (SEAP)*. Retrieved from https://starisajt.podgorica.me/db_files/Urbanizam/Dokumenta/seap_podgorica_eng.pdf

Nemry F. and Demirel H. (2012) *Impact of Climate Change on Transport: a focus on road and rail transport infrastructures*. JRC PESETA II Report, European Commission. Available at: <https://publications.jrc.ec.europa.eu/repository/bitstream/JRC72217/transport%20and%20climate%20change%20final%20report.pdf>

Niš UHI Report. (2025). *Urban Heat-Island Vulnerability & Risk Assessment – City of Niš*. Be Ready project.

Operandum GeoIKP. (2024). *Adopt a Tree – Bratislava*. Retrieved from <https://geoikp.operandum-project.eu/interface/App/Stories/Detail/37>

Pazilpark. (2024). *UrbanOaza*. Retrieved from <http://www.pazipark.si/portfolio/urbanoaza/>

Prague City Council. (2017). *Climate-Change Adaptation Strategy of Prague*. Retrieved from https://adaptacepraha.cz/wp-content/uploads/2020/08/adaptation_strategy_eng_web_compressed.pdf

Prague City Council. (2020). *Implementation Plan 2020–2024 for the Climate-Change Adaptation Strategy*. Retrieved from https://adaptacepraha.cz/wp-content/uploads/2020/12/Implementacni_plan_20_24_web_ENG.pdf

Prague City Council. (2023). *Prague Climate Plan 2030 – Adaptation & Resilience Chapter*. Retrieved from https://klima.praha.eu/data/Dokumenty/Dokumenty%202023/klimaplan_en_2301_18_online.pdf

Prague Morning. (2025). *Heat Rising: Prague Rolls Out Green Plan to Cool the City*. Retrieved from <https://praguemorning.cz/heat-rising-prague-rolls-out-green-plan-to-cool-the-city/>

Ratiboř UHI Report. (2025). *Urban Heat-Island Vulnerability & Risk Assessment – Municipality of Ratiboř*. Be Ready project.

Sector 2 Municipality (Bucharest). (2023). *Climate City Contract – Towards Net-Zero District 2*. Retrieved from https://netzerocities.app/_content/files/knowledge/4438/district_2_ccc_bucharest_.pdf

Schwaab, J., Meier, R., Mussetti, G., et al. (2021). The role of urban trees in reducing land surface temperatures in European cities. *Nature Communications*, 12, 6763. <https://doi.org/10.1038/s41467-021-26768-w>

Sofia UHI Report. (2025). *Urban Heat-Island Vulnerability & Risk Assessment – City of Sofia*. Be Ready project.

Tzvetoza Vincent Iolov. (2021, 22 June). *Budapest takes heat mitigation measures*. *TheMayor.EU*. Retrieved from <https://www.themayor.eu/en/a/view/budapest-takes-heat-mitigation-measures-8233>

TransGREEN Consortium. (2020). *Green and Grey Infrastructure in the Carpathians (TransGREEN)*. Interreg Danube Transnational Programme. Retrieved from <https://interreg-danube.eu/approved-projects/transgreen>

Ungasevič, M., & Tošić, I. (2024). Air temperature changes in Serbia and the Belgrade heat island. Publication 145. Serbian Academy of Sciences. Retrieved from https://www.researchgate.net/publication/277351062_Air_temperature_changes_in_Serbia_and_the_Belgrade_heat_island

U.S. Environmental Protection Agency. (2025). Benefits of trees and vegetation. Retrieved from <https://www.epa.gov/heatislands/benefits-trees-and-vegetation>

World Meteorological Organization & Copernicus Climate Change Service. (2025). European State of the Climate 2024: Extreme events in another record year. Press release, 30 April 2025. Retrieved from <https://wmo.int/news/media-centre/european-state-of-climate-extreme-events-warmest-year-record>

(Access all URLs on 15 May 2025)