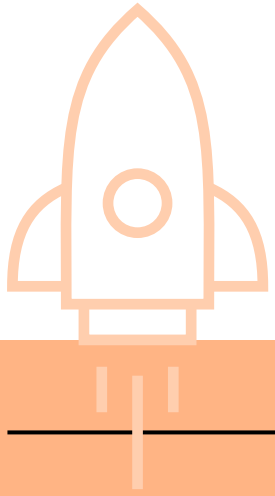

Interreg CENTRAL EUROPE

Co-funded by the European Union

MISSION CE CLIMATE

IGNITING COMMUNITY-LED CLIMATE INITIATIVES

MANUAL

- ✓ CLIMATE CITIZEN-LED INITIATIVES AT A GLANCE
- ✓ INITIATING COMMUNITY-LED CLIMATE INITIATIVES
- ✓ JOINT IMPLEMENTATION OF PILOT PROJECTS & CATALOGUE OF BEST PRACTICES
- ✓ TRAININGS FOR PARTICIPANTS OF CITIZEN-LED INITIATIVES

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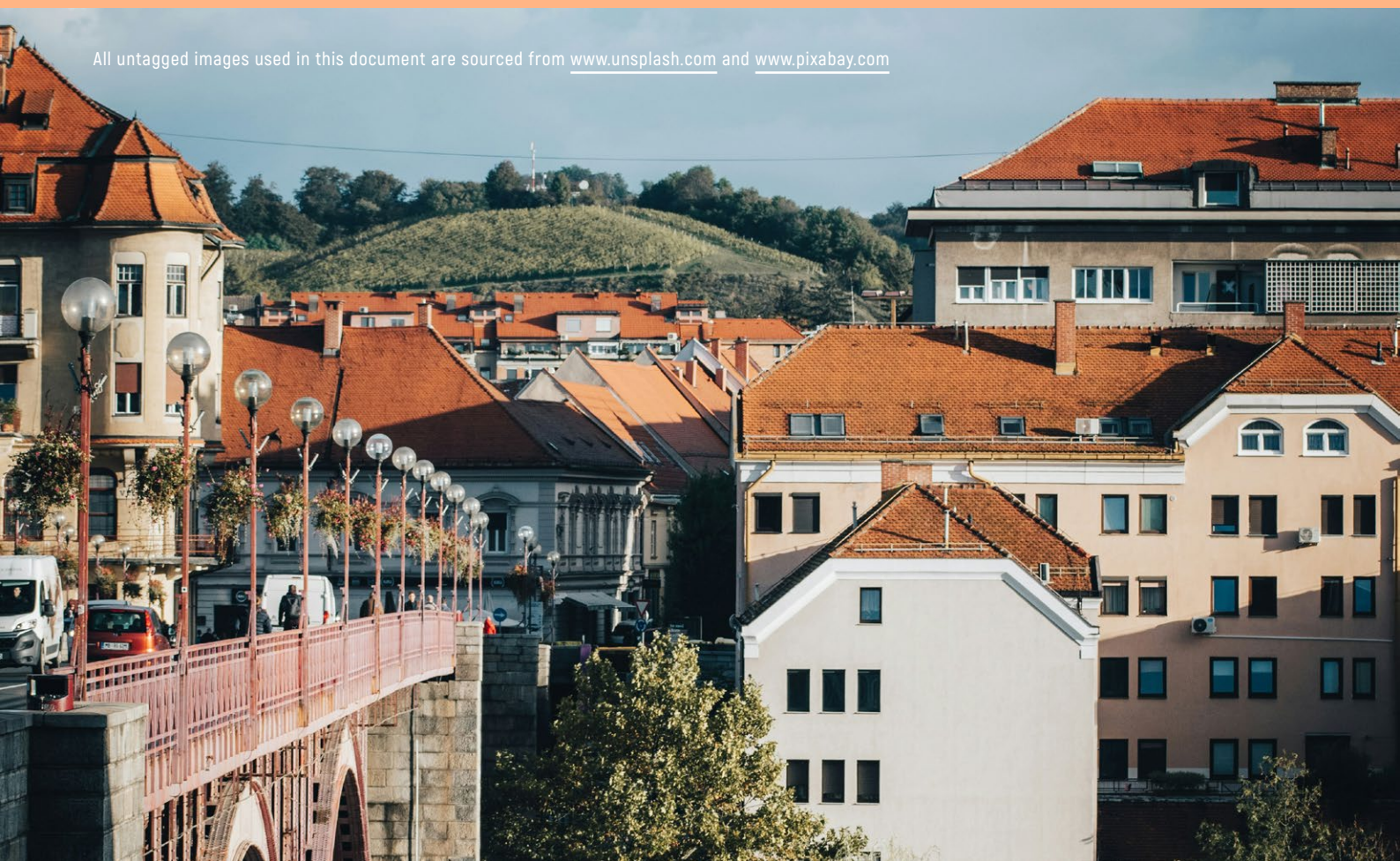


Introduction

Igniting Community-Led Climate Initiatives is a practical guide designed to support citizens, communities NGOs and civil associations in their climate mitigation efforts. It is aimed at showcase how together with their local governments, business and other organizations, launching and scaling climate action from the ground up is not only feasible, but oftentimes able to yield results faster and more effectively than separate top-down approaches.

Community-led climate initiatives are locally rooted efforts driven by citizens, municipalities, and stakeholders to adapt to and mitigate the effects of climate change through inclusive, participatory, and place-based solutions. These actions are essential for building long-term resilience and enabling a just green transition that responds to real local needs.

This manual presents a collection of experiences, actions, and insights drawn from the Interreg Central Europe project MISSION CE CLIMATE. Over the course of the project, co-creation processes were carried out across six Central European countries (Slovenia, Slovakia, Austria, Germany, Croatia and Italy), fostering collaboration between local governments, sectoral agencies, citizens, academia, businesses, non-governmental institutions and experts. This manual reflects the practical outcomes of these efforts–from targeted trainings and awareness-raising campaigns to the co-development and co-implementation of pilot projects–highlighting diverse pathways for increasing climate resilience at both local and regional levels, adapted to local context.

Each section combines lessons learned from the practical implementation of pilot projects within the established living labs in the cities of Maribor (Slovenia), Košice (Slovakia), Dornbirn (Austria), Pforzheim (Germany), Brač (Croatia) and Lignano Sabbiadoro (Italy).

Climate Citizen-Led Initiatives at a Glance

Citizen-led initiatives (CLIs) refer to grassroots actions and community-driven projects that aim to address social or environmental challenges outside of traditional governmental frameworks. In the realm of climate governance, CLIs encompass a diverse array of efforts, such as local energy cooperatives, urban gardening, transition towns, climate assemblies, and direct climate action. These initiatives are often characterized by decentralized decision-making, participatory governance, and a focus on local resilience (Seyfang & Smith, 2007). Unlike top-down policy instruments, CLIs emerge from bottom-up mobilization, driven by citizens who perceive gaps in institutional responses to climate change. They may operate independently or in collaboration with local authorities, NGOs, or international networks. Their core attributes typically include collective ownership, localized knowledge, experimentation, and a commitment to social innovation (Avelino et al., 2019). Community-Led approaches are those that are led not by an organization or other outsiders but by a collective, community process[1]. Community-led approaches are distinguished by their bottom-up structure, where residents of a geographically defined area lead the visioning, decision-making, and action process to address community challenges.

Citizen-led initiatives are natural partners to NGOs. They can amplify local voices, offer capacity support, and help scale successful models to other communities. CLIs are a way to build stronger, more connected places while addressing real climate risks. They help communities become not just more sustainable–but also more self-determined.

The future of climate governance can be shaped as much by local communities and civil society as by government decisions. CLIs are moving in promising directions:

Collaborating with Local Authorities - Increasingly, communities are partnering with local governments–through climate roundtables, participatory budgeting, or co-designed policies–to push for climate-friendly outcomes (Ostrom, 2010).

Leading Local Transitions - From food systems to clean energy, CLIs are experimenting with new ways of living and working that reduce emissions and build resilience.

Promoting Climate Justice - Citizen-led groups are often at the forefront of ensuring that the transition to a green future is fair–especially for marginalized communities (Scoones et al., 2015).

Creating Space for Dialogue - Tools like climate assemblies and citizens' juries give people a chance to deliberate and shape local climate responses, rather than being left out of the conversation.

Building Lasting Institutions - As they mature, some initiatives are moving beyond "projects" to become long-term community institutions–such as energy co-ops, eco-villages, and learning hubs.

Depending on their establishment and management, there are various types of community-led initiatives and categorization. One way to define different CLIs approaches is to analyse who holds the decision power. CLIs fully controlled by the community are oftentimes referred to as community-owned CLIs. Community-driven CLIs include collaborative planning between organizations and the community. Community-shaped CLIs are led by organization(s) and the community has strong inputs in the efforts led by organization(s). Community-shaped CLIs informs and consults the public, but the decision-making power remains within the organization(s) in charge.

Whether directed towards an individual looking to get involved, an NGO seeking impact, or a community network trying to build resilience, CLIs give tools, allies, and a voice in climate governance.

While citizen-led initiatives are not themselves a substitute for strong climate policy–they are a necessary part of the climate solution. They make climate governance more inclusive, resilient, and grounded in real people's lives. As the climate crisis deepens, our ability to support, scale, and sustain these initiatives will shape the future–community by community.

[1] Wessells, 2018, cited in Attygalle, 2020, p. 3

Quick Start

How to Initiate an Informal Community or Citizen-Led Initiative

An informal citizen-led initiative (CLI) does not need a legal structure to begin. Start small, build trust, and focus on one visible, local outcome.

Step 1 **Identify a shared local issue (1–2 days):** pick one concrete problem people already feel (heat at bus stops, flooding hotspots, schoolyard overheating, water loss, lack of shade, poor data access).

Step 2 **Form a core team (3–5 people):** include at least one organiser, one communicator, and one person connected to a local institution (school, NGO, municipality, utility, club).

Step 3 **Define a "first win" (1 week):** choose a low-cost action that proves momentum (a mapping walk, a survey, a workshop, a pilot micro-site, a public talk, or a small demonstration).

Step 4 **Invite allies (week 1–2):** reach out to local NGOs, municipal departments, schools, businesses, and citizen groups. Use a clear invitation: "We are testing one local solution and need your input."

Step 5 **Run a simple co-design session (week 2):** gather ideas, agree on one action, assign roles, and set a date.

Step 6 **Communicate and document (ongoing):** share what you are doing, why it matters, and how people can join. Keep notes, photos, and feedback.

Step 7 **Connect to long-term structures (after the first win):** either (a) remain informal and repeat small actions, or (b) connect your CLI to a CCRM / municipality process for scaling and funding.

Minimum outputs:

- ▶ **ONE AGREED GOAL**
- ▶ **ONE ACTION PLAN** (WHAT / WHO / WHEN)
- ▶ **ONE PUBLIC EVENT FOR SPREADING THE WORD**
- ▶ **ONE SHORT SUMMARY OF RESULTS AND NEXT STEPS**

Initiating Community-Led Climate Initiatives

The Concept, Establishment and Operating of CCRMs

Community Climate Resilience Missions - Missions or CCRMs for short, are local community-led and community-shaped initiatives that emerged within the MISSION CE CLIMATE project that bring together a wide range of community actors to build long-term resilience to climate change. Rather than functioning as temporary initiatives or isolated campaigns, the missions are well-established living labs for participatory planning, collaborative governance, and implementation of adaptation strategies at the community level in the project implementing countries.

PICTURE 1

Community Climate Resilience Missions map

Each climate resilience mission is designed around the specific context, needs and specifics of its region. They promote locally driven action by engaging key stakeholders: citizens, NGOs, civil society organizations, local governments, academic institutions, and private sector actors–in co-creating solutions and shaping sustainable futures. As part of developing creative, community-led climate resilience initiatives, the Quintuple Helix Model was chosen to guide collaboration across diverse sectors. This model brings together academia (knowledge and learning), industry (tools and innovation), government (support and policy), civil society (local voices and cultural expression), and the natural environment (the ecological foundation of our work). By involving these five dimensions, it is ensured that the initiatives are not only community-driven and imaginative, but also grounded in evidence, supported by policy, and aligned with environmental sustainability. The model supports co-creation processes where local creativity and climate action meet through inclusive, cross-sectoral cooperation (Carayannis & Campbell, 2010).

CCRMs are fundamentally inclusive and encourage participation of different stakeholders across society, reflecting the principles of the Quintuple Helix innovation model. Participants typically include:

Citizens and local communities (individuals, activists, students), who contribute insights on daily climate challenges and help shape responses that are grounded in lived experience;

Non-governmental organizations (NGOs) and **civil society groups,** which often bring expertise in climate change, social equity, advocacy, and local development;

Local and regional authorities, responsible for integrating resilience strategies into policy and urban planning;

Utilities and **infrastructure providers,** who manage essential systems such as water, energy, and mobility–each central to climate adaptation;

Sectoral agencies and **public service bodies**;

Research and **academic institutions,** which offer scientific knowledge, technical tools, and support for evidence-based decision-making;

Businesses, especially those involved in sustainability and innovation, who contribute technological solutions, investment potential, and business-driven resilience models.

The establishment of each mission followed a carefully designed process, rooted in collaboration and local knowledge. It began with stakeholder mapping in each pilot region, identifying key actors who could contribute meaningfully to the mission. Initial engagement took place through bilateral meetings, local workshops, and informal discussions. These early interactions helped in building trust and aligning goals. To formalize participation, a Memorandum of Understanding (MoU) was signed for the establishment of each of the Missions, stating the joint endeavours of its members to promote and mainstream climate governance processes in the local context. Once a core network was in place, each mission moved into co-design activities. Initial activities included public events for launching the missions and raising awareness, thematic discussions, joint preparation of risk and vulnerability assessments, and the joint formulation of priorities for each of the established CCRMs. The process ensured that local knowledge and lived experience informed the mission's trajectory from the outset.

The overarching aim of each community climate resilience mission is to improve the adaptive capacity of its community in the face of climate change. This involves both strategic and practical objectives.

Strategically, the Missions create a shared governance structure where climate risks are assessed collaboratively and priorities are defined transparently. They strengthen relationships across sectors and help institutionalize long-term thinking within local systems.

Practically, the Missions drive forward the development of local action plans, the implementation of pilot projects, and the creation of investment pipelines for climate resilience. They support climate resilience knowledge-building through public engagement, facilitate co-design of solutions, and encourage communities to take an active role in shaping the future of their communities.

It is important to note that the Missions **remain open to new partners over time.** Whether a new NGO, a youth-led movement, a regional agency or some other stakeholder decides to join the mission, the missions are open to evolve and expand over time. This flexibility allows them to grow organically and adapt to changing needs.

CCRM Establishment Checklist
(from idea to functioning mission)

1 | Set the foundation

- ☐ Identify the main local climate risks (heat, flooding, drought, coastal erosion, etc.).
- ☐ Define the mission purpose and scope (1–2 sentences).
- ☐ Choose a coordination lead (host organisation) and a backup.
- ☐ Confirm which existing strategies it connects to (e.g., Adaptation Plan, SECAP, Smart City strategy).

2 | Stakeholder mapping (Quintuple Helix Model)

- ☐ Local public authority (policy/coordination).
- ☐ Academia/research (evidence and tools).
- ☐ Business/private sector (implementation capacity/innovation).
- ☐ Civil society/NGOs (community outreach/justice lens).
- ☐ Environment/natural system actors (utilities, land managers, climate agencies).
- ☐ Citizens and community groups (lived experience and acceptance).

3 | Engagement and trust-building

- ☐ Conduct bilateral meetings with priority stakeholders.
- ☐ Agree shared benefits: what each partner gains from participation.
- ☐ Define "what success looks like" (3–5 indicators).

4 | Formalise cooperation

- ☐ Draft and sign a Memorandum of Understanding (MoU) or equivalent.
- ☐ Agree meeting cadence (e.g., monthly/quarterly).
- ☐ Set basic governance: roles, decision-making, transparency rules.

5 | Co-design priorities

- ☐ Run a launch event + listening session.
- ☐ Identify 2–4 priorities for the first cycle (e.g., action plan, pilot, data governance, engagement campaign).
- ☐ Select one pilot concept to test.

6 | Operate as a living lab

- ☐ Maintain an open invitation for new partners.
- ☐ Document decisions, learning, and data.
- ☐ Align pilots with municipal processes so results can scale.

CCRM Meeting Agenda Template

Agenda:

1. Welcome + round of updates
2. Climate risk focus (one issue) + evidence
3. Co-design / decisions needed
4. Actions assigned (who/what/when)
5. Communication plan + next engagement moment
6. Next meeting date + close

Minimum meeting outputs

- decisions made,
- clear "to-do" and action list,
- one public communication line ("What we did and what's next")

Communication Campaigns

Communication and Promotion Campaigns in Local Communities Preceding the Establishment of the Local CCRMs

The successful establishment of the community climate resilience missions did not happen in isolation—it was deeply interconnected with the communication campaigns implemented across the six project regions. From the earliest stages, communication was not simply about informing; it was about activating communities, building networks, and creating a sense of shared ownership.
In many cases, the very foundation of the Missions was laid through these campaigns.

The communication campaigns were designed to do more than just raise awareness about local current climate challenges. They served as an open invitation to citizens, NGOs, local institutions, and other stakeholders to step into a more active role in their local Missions. Public launch events, social media outreach, stakeholder dialogues, and media coverage provided both visibility, transparency, inclusiveness and legitimacy to the concept.
These activities generated interest and encouraged participation in the local CCRMs.

In Maribor, Slovenia, the communication campaign was centered around the slogan "Green Mission for Climate" (Zelena misija za podnebje), which aimed at promote community-level climate resilience through collaboration, awareness, and innovation. The campaign began with a series of targeted meetings with key local stakeholders, including NGOs, community representatives, and urban planning institutions. These meetings laid the groundwork for broader public engagement.

PICTURE 2

Green Mission for Climate cover photo.
Source: Regional Development Agency Podravje-Maribor

A launch event organized in March 2024 brought together a number of participants: citizens, civil society organizations, sectoral agencies, environmental activists, and municipal officials came together to learn about the mission and explore opportunities for cooperation. The event served not just to present the local Mission but also to facilitate direct networking among participants, who shared their own initiatives and expertise.

The successful campaign in Maribor resulted in the successful establishment of the local CCRM by signing the Memorandum of Understanding between: Regional Development Agency for Podravje – Maribor, the Municipality of Maribor, E-institute, Institute for Comprehensive Development Solutions, Energy and Climate Agency of Podravje and Chamber of Commerce and Industry of Štajerska.

In Dornbirn, Austria, the campaign titled Climate Resilience Mission (Klimaresilienz-Mission) focused on identifying climate risks and fostering community discussion around solutions. The campaign began with bilateral meetings in February 2024 that brought together local stakeholders, community representatives, and public institutions to set up the mission framework. The objective of the CCRM in Dornbirn is to promote climate resilience, to raise awareness and to gain a better understanding of the risks and potential solutions and make this knowledge available to relevant stakeholders outside of the CCRM.

Four organizations formally committed to the Mission by signing Memorandum of Understanding: the Vorarlberg University of Applied Sciences – FHV, the City of Dornbirn, the Energy institute KLAR! Modellregion and the company Weaves which is active in the field of environmental city monitoring platforms and support.

PICTURE 3

Local CCRM meeting in Dornbirn, Austria

PICTURE 4 Natural hazard conference where the Dornbirn CCRM was featured

In Lignano Sabbiadoro, Italy, the local campaign was branded under the Lignano Community for Climate Resilience, emphasized direct public engagement from the outset. A public launch event was held on January 2024, drawing in citizens, representatives from environmental NGOs, and community associations, and followed by other meetings. These events were not just informative but interactive, providing opportunities for local people to share their concerns and discuss specific risks facing their coastal town.

Local newspapers like the Messagero Veneto published articles to reach wider community audiences, ensuring that even those not digitally connected were made aware of the mission's objectives and events. The campaign helped to foster a strong local dialogue and inspired continued collaboration through the creation of an advisory team of local experts and activists.

In June 2025, Lignano Sabbiadoro hosted Lignano 180°, a two-days sustainability festival to celebrate its progress towards a climate-resilient future and attended by hundreds.

LIGNANO

Sicurezza di Porto Casoni Parte la consultazione popolare

Il Comune studia un progetto per difendere l'area da mareggiate e acqua alta
Per tutto il mese in programma riunioni con le associazioni e i residenti

LIGNANO

Sono partite le consultazioni che porteranno alla definizione dei primi dettagli da inserire nel complessivo progetto di difesa e di riqualificazione dell'area di Porto Casoni, così come proposti da fruitori, associazioni e semplici cittadini, chiamati a esprimersi per dare vita a un percorso partecipativo, le cui modalità operative sono state presentate nel corso di un incontro pubblico.

«L'iniziativa nasce dalla necessità di mettere in sicurezza la zona dal fenomeno dell'acqua alta e dalle mareggiate che frequentemente si verificano, ma è al contempo un'occasione notevole per accrescere la qualità urbana di un importante angolo della città», ha spiegato l'assessore ai Lavori pubblici Marco Donà, presente assieme al sindaco Laura Giorgi e alle colleghe di giunta, Marina Bidin e Liliana Portelio e di Consiglio, Carlo Teghil, all'architetto Daniele Daneluzzi dell'ufficio lavori pubblici, Stefano Carbone che avrà un ruolo di regia in questo processo partecipato e l'architetto Mauro Sarti dello studio Archpiùdue di Padova che si occuperà di trasformare in progetto le proposte raccolte.

«Sono tre i punti cardine che ruotano attorno alla riqualificazione di Porto Casoni – ha spiegato ancora Donà al numeroso pubblico presente –: lo sport, rappresentato dalle associazioni che nell'area di Porto Casoni svolgono le loro attività; il turismo, per il fascino dell'ambiente naturale della laguna e per la ciclabile che la costeggia, e l'esigenza di preservare quest'area dagli effetti, al momento ancora non noti, dei mutamenti climatici. Questa è la porta della laguna sulla città, è evidente che con cambiamenti climatici ha una sua pericolosità, lo abbiamo visto in occasione delle maree eccezionali del 2019 e dello scorso novembre».

A spiegare quanto potrebbe accadere nei prossimi 80 anni è stato l'architetto Daneluzzi: «Per quanto riguarda l'andamento delle precipitazioni si ipotizza al 2100 un incremento del 30% in inverno e un calo del 25% in estate; si prevedono all'anno 6/8 ondate di calore con temperature superiori alla media per più giorni, contro le 1/2 volte che si verificano ora. Si parla di un innalzamento delle maree tra 70 e 100 cm e un aumento della temperatura del mare di circa 3 gradi».

Alla serata era presente anche l'Agenzia regionale per l'energia partner di Lignano con l'obiettivo di creare una serie di occasioni di incontro con la comunità per parlare dei cambiamenti climatici.

Tornando alla presentazione del progetto partecipato, l'assessore Donà in una nota aggiunge che «il percorso prevede altri incontri che in alcuni casi saranno riservati a specifiche categorie di utenti e in altri saranno aperti a tutti. Durante la presentazione pubblica sono stati fissati i primi appuntamenti che continueranno con intensità per tutto il mese e si concluderanno con un incontro aperto alla cittadinanza nei primi giorni di marzo. Per metà aprile potrebbe esserci una prima presentazione del progetto. La modalità scelta per la definizione del progetto è quella della consultazione, sia di chi quell'area la vive, sia di tutti i cittadini che hanno piacere nell'esprimere il proprio punto di vista».

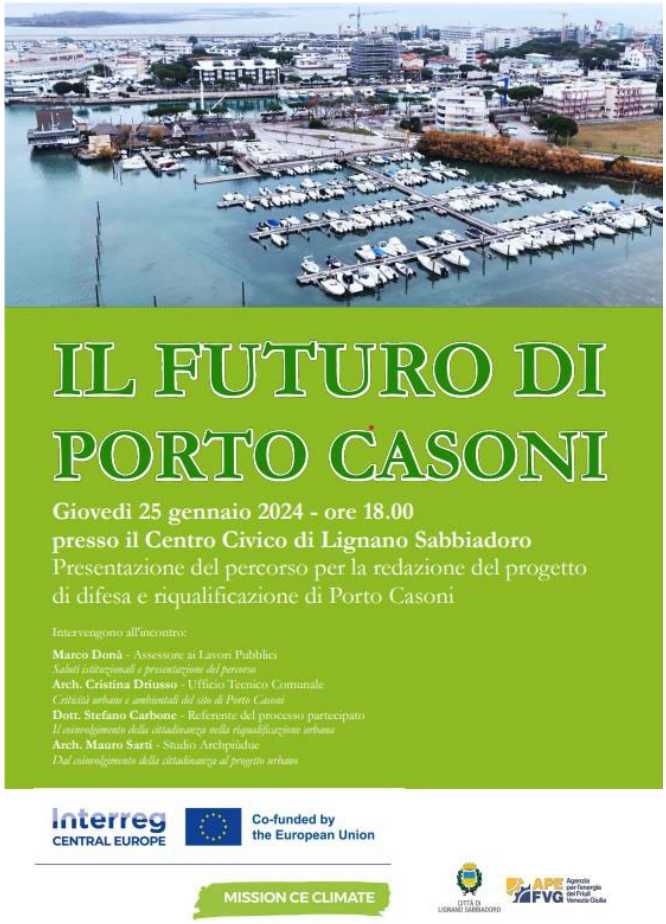
Per informazioni o per partecipare al percorso è possibile contattare l'Ufficio Urbanistica del Comune di Lignano alla mail urbanistica.demanio@lignano.org o chiamando lo 0431 409100.—

Il sindaco Laura Giorgi in occasione del primo incontro per discutere della sicurezza di Porto Casoni

PICTURE 5 Press review, news on Messaggero Veneto, Feb 4th 2024

In Košice, Slovakia, the outreach began with the identification of potential stakeholder organizations, including citizen associations, NGOs, and community development groups. The core of the public campaign was a kick-off meeting held on January 2024. Participants included representatives from local communities, civic organizations, and academia. The event enabled stakeholders to share ideas on the city's climate resilience strategy and helped establish the foundation for more inclusive, cross-sector governance.

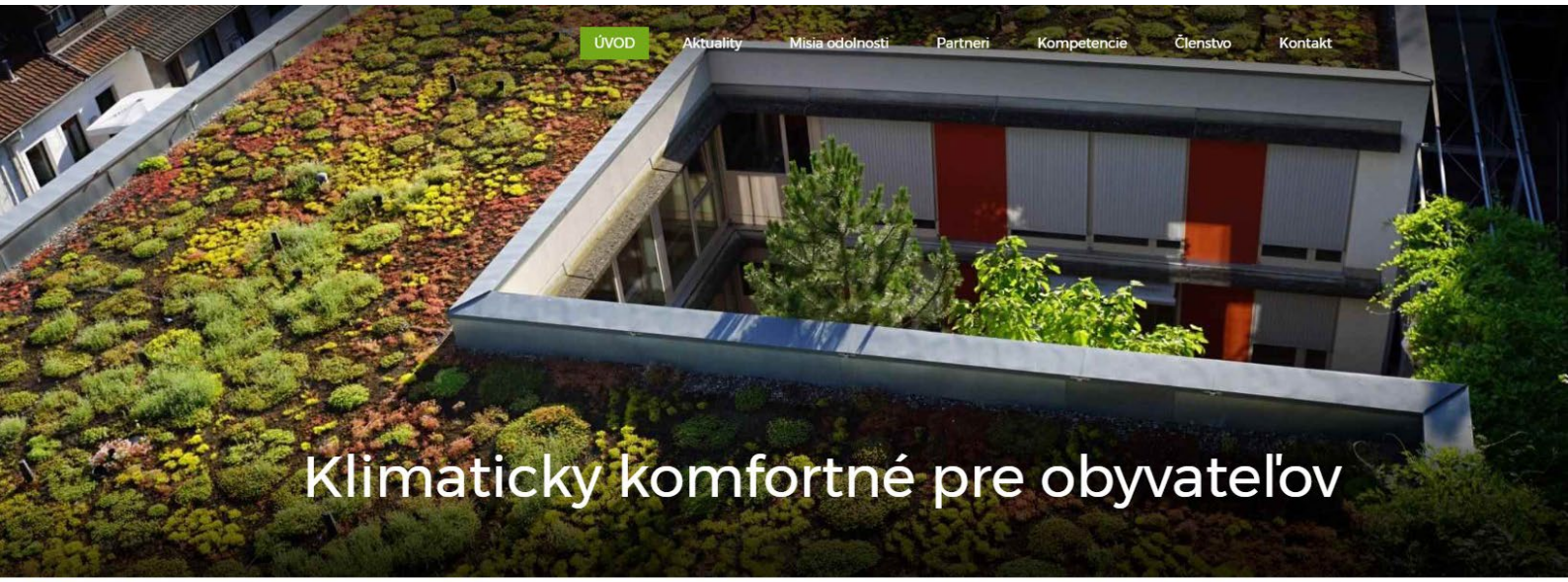
To ensure broader community engagement, a dedicated website was launched in March 2024. It features stories, updates, and resources tailored for citizens. A PR article was prepared for publication in local print media to reach citizens who are less active online, ensuring inclusivity in outreach.



PICTURE 6 Lignano CCRM launch event invitation

PICTURE 7

Snapshot from the Košice CCRM website (www.odolnekosice.sk)



In Brač, Croatia, the local campaign preceding the establishment of the local CCRM centered on updating the island's Sustainable Energy and Climate Action Plan (SECAP) and developing new solutions to address the specific climate risks faced by the local community, particularly regarding water scarcity. Community engagement began with stakeholder meetings in February and March 2024. These meetings included local NGOs, citizen groups, water utility providers, and municipal departments. During a study visit to Vodovod Brač, the local water supply company, participants–including local experts and civil society members–discussed water conservation and adaptation strategies. This hands-on engagement helped translate technical knowledge into actionable community-led solutions, resulting in the establishment of the local CCRM by: Split-Dalmatia County, Energy Institute Hrvoje Požar, public company Vodovod Brač, City of Supetar, Municipality of Sutivan and the Local Action Group Brač.

PICTURE 8

Coordinative meeting of the Brač CCRM

In the City of Pforzheim and throughout the Northern Black Forest region in Germany, the project team conducted a very community-targeted campaign through a series of "Citizen Dialog" events. These were open public forums organized in four different towns—Nagold, Calw, Freudenstadt, and Pforzheim in April 2024, attended by hundreds of citizens from the area, organized in collaboration with Pforzheim University and the Economic Development Agency of the Northern Black Forest Region (WFG).

PICTURE 9

CCRM presented at a community event in Pforzheim, Germany

Discussions focused on local city transformation and adaptation challenges, with climate resilience as a key topic. Citizens shared their experiences, asked questions, and expressed a strong interest in smart city solutions and technologies for sustainability. Following the successful campaign, the local CCRM was established by the University of Pforzheim, the digital company Krumedia and the Regional Public Authority of Nordschwarzwald (WFG)- representing 10 cities and 2 districts from the region.

The feedback from all of the communication events was overwhelmingly positive. Participants appreciated the opportunity to engage directly with researchers and policy experts, and many expressed interest in continued involvement in mission activities. Information regarding all of the CCRMs establishment, events and activities were communicated through webpage, social media, online local and regional media, and MISSION CE CLIMATE project channels. In order to reach citizens that have no online presence, articles in local newspapers and other printed media were published to inform and call citizens to action.

These efforts did more than raise awareness—they actively mobilized citizens, built networks, and created a sense of shared ownership across diverse local contexts. Communication served as a foundation for engagement, making the missions more visible, inclusive, and legitimate in the eyes of both the public and institutional stakeholders.

Recommendations for Similar Initiatives

For other citizen-led initiatives looking to strengthen their impact, the following recommendations can serve as guiding principles:

Start early and stay consistent – Engage your community from the very beginning, and keep communication flowing throughout the journey.

Use a mix of tools and channels – Combine digital outreach with face-to-face meetings, local media, and creative formats to reach as many people as possible.

Make it personal and local – Focus on issues that resonate with your community and highlight the voices of local people and organizations.

Create spaces for dialogue, not just information – Encourage co-creation and open exchange through workshops, forums, and informal gatherings.

Build partnerships – Collaborate with NGOs, schools, institutions, and local champions to strengthen legitimacy and pool resources.

Celebrate milestones and share stories – Visibility helps build momentum. Share successes and lessons openly to inspire others and keep your community engaged.

Campaign Planning Checklist
(for missions and pilots)

1 | Define the campaign

- ☐ What behaviour or action are we trying to trigger? (join, attend, co-design, volunteer, test a pilot, adopt a practice)
- ☐ Who is the audience? (citizens, NGOs, youth, schools, businesses, seasonal users/tourists)
- ☐ What is the key local message? (link to a lived local risk and benefit)

2 | Plan channels (mix digital + offline)

- ☐ Social media + website updates
- ☐ Local press / radio / community newsletters
- ☐ Posters / flyers / public noticeboards
- ☐ In-person events (launch, workshop, citizen dialogue)
- ☐ Schools or clubs as multipliers
- ☐ Festival / public fair / open day (where relevant)

3 | Design engagement moments

- ☐ One "invite" moment (launch)
- ☐ One "co-design" moment (workshop)
- ☐ One "see results" moment (pilot visit, dashboard demo, public summary)

4 | Make it inclusive

- ☐ Provide low-barrier entry points (short events, simple sign-up, accessible times/locations)
- ☐ Ensure non-digital reach (print media, community venues)
- ☐ Collect feedback (survey / comments / quick interviews)

5 | Measure and learn

- ☐ Track participation (numbers, diversity of groups)
- ☐ Track actions triggered (sign-ups, volunteers, pilot inputs)
- ☐ Track awareness (reach, shares, press mentions)
- ☐ Publish a short "what we learned" note after each campaign phase

Make Use of the "Benefit Framing" Communication Technique

Benefit framing in resilient climate governance means describing policies and governance tools in terms of the real-world outcomes they deliver—reduced climate risks, lower recovery costs, improved health and safety, and more reliable essential services—rather than listing technical features or institutional steps. For example, instead of saying "establish an interagency resilience committee," benefit-frame it as "coordinate decisions across departments so responses are faster and residents get consistent information during floods and heatwaves." Instead of "update building codes for future climate conditions," say "build and retrofit so homes and public facilities stay safer and functional during extreme weather, reducing repair bills and disruption." Used consistently, benefit framing helps stakeholders understand why governance changes matter and how resilience actions protect livelihoods, budgets, and community wellbeing.

Health and comfort: cooling, shade, safer public spaces during heatwaves.

Safety and disruption reduction: better preparedness for floods and storms; fewer service interruptions.

Cost and efficiency: reduced water losses; smarter maintenance and resource use.

Quality of life: greener public spaces, better schoolyards, more liveable neighbourhoods.

Education and empowerment: open data and monitoring that citizens can understand and use.

Tourism resilience (where relevant): protecting natural assets and seasonal infrastructure.

Simple invitation lines

- "Help us co-design one local climate solution."
- "Join the mission meeting and bring your lived experience."
- "Test the pilot with us and tell us what works."
- "See the data, learn the risks, and shape the response."

Joint Implementation of Pilot Projects & Catalogue of Best Practices

This chapter presents the joint implementation of pilot projects developed within the Community Climate Resilience Missions (CCRMs) and compiles the resulting insights as a catalogue of best practices. Building on the governance and co-creation approach described in Chapter 3, each pilot translates local climate risks into concrete, community-shaped actions—designed and delivered through collaboration between citizens, civil society, local authorities, academia, and the private sector in line with the Quintuple Helix Model.

The pilots reflect diverse local contexts and hazard profiles across six regions: urban heat stress and nature-based cooling solutions (Maribor), climate data governance and education through school-based monitoring (Košice), participatory regeneration of a flood-prone coastal space combined with awareness-raising and events (Lignano Sabbiadoro), evidence-based assessment of nature-based cooling potential through microclimate monitoring (Dornbirn), smart city and citizen science applications for climate resilience using IoT sensors and dashboards (Pforzheim), and water-scarcity resilience through upgraded monitoring, leak detection, and organisational capacity-building in a tourism-sensitive island context (Brač).

For each region, the chapter provides an overview of the local CCRM, the pilot project rationale, co-creation methods, stakeholder roles, implementation steps and timelines, risks and challenges encountered, and practical recommendations for replication. Together, these examples show how locally grounded experimentation—supported by structured collaboration and continuous learning—can accelerate climate resilience action and strengthen long-term community capacity beyond individual projects.

Pilot Co-Design & Implementation Checklist
(from concept to replication)

1 | Define the pilot

- ☐ Local problem statement (one paragraph).
- ☐ Pilot goal (one sentence).
- ☐ Expected benefits (health, safety, governance, efficiency, awareness).
- ☐ How the pilot supports local policy/s trategy (SECAP, adaptation plan, smart city).

2 | Build the co-creation group

- ☐ Identify key stakeholders (Quintuple Helix).
- ☐ Confirm who decides what (citizen input, technical validation, municipal approval).
- ☐ Agree roles and responsibilities.

3 | Co-design the solution

- ☐ Run a co-design workshop (or interviews + workshop).
- ☐ Select site(s) and include backup sites (to avoid permitting delays).
- ☐ Define indicators (technical + social): e.g., temperature, humidity, water losses, participation, perceived comfort.

4 | Plan delivery

- ☐ Permissions, procurement, safety measures.
- ☐ Maintenance protocol and responsible persons.
- ☐ Data governance (where applicable: dashboards, open data, access rules).

5 | Implement + communicate

- ☐ Implement the pilot in a visible and learnable way.
- ☐ Run a public communication moment (launch/demo).
- ☐ Collect citizen feedback (short survey or interviews).

6 | Evaluate and replicate

- ☐ Compare baseline vs. results.
- ☐ Document lessons learned and bottlenecks.
- ☐ Identify scaling requirements (budget, policy change, standards, partners).

Overview of the Maribor CCRM

The establishment of the Community Climate Resilience Mission (CCRM) Maribor – "Green Mission for Climate" – followed a participatory, multi-stakeholder process designed to foster collaboration and shared ownership.

Below is an overview and sequence of activities:

1 | Stakeholder mapping

Key actors from the public, private, research, and civil society sectors were identified during the preparatory phase. This mapping was based on Maribor's Local Energy and Climate Concept (2021) and other strategic documents.

2 | Early engagements

One-on-one consultations and coordination meetings with potential partners (e.g., Municipality of Maribor, RDA Podravje – Maribor, ENERGAP, E-Institute, Štajerska Chamber of Commerce and Industry) were held to discuss the mission's scope, expected outcomes, and synergies with ongoing initiatives.

3 | Signing of the Memorandum of Understanding (MoU)

In 2023, five key institutions formalized their cooperation by signing the MoU, confirming their commitment to jointly establish and operate the CCRM Maribor. The CCRM functions as a living lab embedded in the city's governance framework, coordinated by key partners (Municipality, RDA, ENERGAP, E-Institute). Regular meetings, monitoring, and updates will ensure sustainability beyond the project lifecycle.

4 | Co-design activities

Stakeholders participated in co-creation sessions and the inaugural expert consultation event "Green Mission for Climate" (March 2024), where over 30 representatives from 14 organisations discussed challenges, shared knowledge, and defined next steps.

5 | Priorities set

Partners agreed on joint priorities, including development of a local climate resilience strategy, creation of a local action plan, testing of pilot solutions, and continuous engagement of citizens and additional stakeholders.

The process emphasized cross-sectoral cooperation, transparency, and mutual learning, laying the foundation for a sustainable governance structure of climate resilience in Maribor.

The CCRM Maribor represents a practical application of the Quintuple Helix Model, integrating collaboration across political, economic, academic, environmental, and social systems.

Helix Dimension	Stakeholders / Examples
Political system	Municipality of Maribor, Regional Development Agency for Podravje – Maribor, Environmental Protection Service (Joint Municipal Administration Maribor)
Economic system	E-Institute, Chamber of Commerce and Industry of Štajerska, Public Holding Maribor (JHMB)
Academic system	University of Maribor, University Medical Centre Maribor
Natural environment	Energy and Climate Agency of Podravje (ENERGAP), EIT Climate-KIC Hub Slovenia
Civil society	NGOs: Ekološko-kulturno društvo za boljši svet, Mariborska kolesarska mreža – Društvo za vzpodbujanje kolesarjenja in trajnostnega prometa
Citizens	Engaged through awareness campaigns, participatory workshops, and living lab activities within the CCRM framework

Maribor Pilot Project

The pilot addresses the growing vulnerability of Maribor to heat stress caused by climate change. The city faces challenges related to urban heat islands, declining precipitation, and water management. The project focuses on improving coordination among local stakeholders and citizens to strengthen resilience and adaptive capacity

The city of Maribor faces increasingly intense summer heat waves and limited greenery in the city centre. Urban heat islands significantly affect public spaces such as bus stops, where passengers are directly exposed to high temperatures. The Municipality of Maribor launched a pilot project to test **nature-based solutions (NBS)** by greening bus shelters–installing green roofs and adding vegetation–to improve microclimate conditions, enhance well-being, and raise public awareness of climate resilience. Under the MISSION CE CLIMATE project, Maribor developed and began implementing the first green bus shelters in the city.

The pilot focused on a central bus stop at Vetrinjska Street–one of the busiest, with over 324,000 passengers in 2023–and several alternative micro-locations. The intervention included planting greenery on bus shelter roofs and surrounding urban furniture, installing sensor systems to monitor temperature, humidity, and air quality, and engaging citizens through on-site surveys.

Due to administrative and technical constraints, implementation began with greening five shelters at alternative city-centre locations (e.g., Glavni trg, Krekova and Trubarjeva Streets). These served as test sites for vegetation performance, microclimate measurement, and citizen feedback. The pilot brought together municipal departments, public companies (Nigrad, Snaga, Europlakat), private contractors, and the Regional Development Agency for Podravje – Maribor.

challenge

The pilot faced several urban governance and regulatory challenges. Implementing a nature-based solution in a dense city centre revealed a complex web of overlapping competencies and conflicting regulations. The pilot team had to navigate between multiple authorities responsible for traffic, advertising, cultural heritage protection, and urban design. These fragmented responsibilities led to delays in permits, public procurement, and location approval.

Additionally, funding restrictions during the temporary municipal financing period (early 2025) further postponed site works. The limited space, need for heritage protection consent, and coordination between concessionaires complicated even minor modifications. These factors reflect a broader governance issue: the lack of integrated urban management systems for climate adaptation projects.

Despite obstacles, strong interdepartmental coordination and the municipality's flexibility were key to sustaining progress. The project team adapted by identifying alternative sites and maintaining compliant with technical standards. Parallel communication campaigns, citizen engagement, and testing across several locations helped maintain momentum and collect valuable data for future replication.

methods and inclusion

Co-creation methods used: **workshops, expert consultations, regular stakeholder meetings, participatory planning, and co-design sessions for local action and resilience strategies.**

Citizens are engaged through **awareness campaigns, consultations, and involvement in pilot implementation and evaluation.** Their participation is key for testing adaptive solutions and ensuring long-term ownership.

Implementation steps & timeline of the Maribor pilot:

2023–2024: Stakeholder mapping and MoU signing.

March 2024: Inauguration event "Green Mission for Climate".

2024–2025: Development of local action plan and pilot testing.

2025 onwards: Expansion, replication, and long-term governance of resilience measures, continuous stakeholder dialogue. Cooperation between the City of Maribor, RDA Podravje, and public service providers enabled practical compromises–such as focusing on greening new shelters already.

The use of existing stakeholder infrastructure (predominantly RDA premises and municipal support), combined with the project-funded activities via Interreg Central Europe – MISSION CE CLIMATE project and in-kind contributions from partners (expertise, data, venues) were the main pillars of the Maribor pilot.

The risk & safety considerations in regard to this pilot were mainly in terms of climate and weather events during outdoor events, stakeholder engagement fatigue, as well as the need for transparent governance to avoid overlapping initiatives.

recommendations

Recommendations for shaping similar initiatives:

- **Integrate early:** Involve all relevant municipal departments and concessionaires from the start to reduce approval bottlenecks.
- **Plan flexible sites:** Anticipate location-specific constraints and prepare backup sites for pilot implementation.
- **Secure cross-departmental leadership:** Designate a coordinating unit for climate resilience pilots to avoid fragmented responsibilities.
- **Combine technical and social monitoring:** Pair environmental measurements with citizen surveys to assess holistic benefits.
- **Institutionalize learning:** Use pilot data to update municipal urban design and maintenance standards for broader NBS integration.

Interreg CENTRAL EUROPE
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MISSION CE CLIMATE

COMBATING URBAN HEAT ISLANDS

NATURE-BASED COOLING OF URBAN BUS STOPS SUPPORTED BY IOT MONITORING AND CITIZEN ENGAGEMENT

INNOVATIVENESS

The innovativeness of the solution lies in its integrated, micro-scale approach that combines:

- Nature-based solutions (green roofs on bus shelters and additional greenery in planters) implemented directly at places of everyday exposure to heat,
- Digital innovation, through the installation of IoT sensors measuring temperature, humidity, air quality, solar radiation, wind, and precipitation,
- Open data and transparency, by integrating collected data into the municipal data platform for further analysis and public use,
- Citizen participation, through pre- and post-intervention surveys capturing perceived comfort, heat stress, and acceptance of the measures,
- Awareness-raising and communication activities, including city-wide visual campaigns (city lights), informational leaflets explaining the pilot and resident-planted greenery, and branded bags distributed during surveys to increase public engagement and visibility of the initiative.

The pilot demonstrates how small-scale interventions at strategically selected locations can deliver tangible climate adaptation benefits while overcoming regulatory, institutional, and spatial constraints typical for dense historic city centres.

OBJECTIVE

The objective of the solution is to reduce heat stress and improve thermal comfort at highly exposed urban micro-locations by implementing nature-based solutions (NBS) at public transport stops. The solution aims to improve the well-being of public transport users, especially vulnerable groups, while generating measurable climate data to support evidence-based urban planning, awareness raising, and replication of the approach across the city and other Central European communities.

GEOGRAPHICAL COVERAGE:

CITY OF MARIBOR (SLOVENIA), WITH IMPLEMENTATION AT SELECTED BUS STOPS IN THE CITY CENTRE, INCLUDING THE MAIN PILOT LOCATION AND SEVERAL ALTERNATIVE BUS SHELTERS USED FOR INTERIM IMPLEMENTATION.

CLIMATE RESILIENCE SOLUTION IN MUNICIPALITY OF MARIBOR

The Maribor pilot implements a climate resilience solution focused on combating urban heat islands at public transport stops. Selected bus shelters were upgraded with green roofs and additional vegetation in planter boxes, providing shade, evapotranspiration cooling, and improved microclimatic conditions. All urban equipment installed within the pilot is newly procured and was selected in accordance with the specifications defined in the municipal Catalogue of Urban Equipment.

The intervention is supported by the installation of IoT sensor systems that continuously monitor key climate and environmental indicators, such as air temperature, humidity, particulate matter, selected gases, solar radiation, wind speed and direction, and rainfall. Data collected through the sensors are integrated into the existing municipal data infrastructure and prepared for open access and further analysis.

In parallel, citizen surveys were conducted before and after the intervention to assess perceived heat stress, comfort, and acceptance of nature-based solutions. The solution serves as a demonstrator for scalable, data-driven urban heat mitigation that can be replicated at other bus stops and public spaces.

Installation of green roof on bus stop

Vegetation installation next to bus stop for improved microclimatic conditions

IMPLEMENTATION STEPS

1. ANALYTICAL AND PREPARATORY PHASE

- Identification of urban heat challenges and priority micro-locations based on local strategic documents and stakeholder consultations
- Selection of suitable bus stop locations considering heat exposure, passenger frequency, spatial constraints, and regulatory conditions

2. DESIGN AND PLANNING PHASE

- Definition of appropriate nature-based solutions (green roofs, planters, plant species selection)
- Preparation of conceptual design, technical specifications, and cost estimations
- Coordination with municipal departments, concessionaires, and heritage protection authorities

3. PROCUREMENT AND IMPLEMENTATION PHASE

- Public procurement of urban equipment, greenery, and IoT sensor systems
- Installation of green roofs and additional greenery at selected bus shelters
- Preparation of pilot sites and integration of NBS into existing urban infrastructure

4. MONITORING AND DATA MANAGEMENT PHASE

- Installation of IoT sensors at selected bus stops
- Continuous measurement and collection of climate and environmental data
- Integration of data into the municipal platform and preparation for open access

5. CITIZEN ENGAGEMENT AND EVALUATION PHASE

- Implementation of surveys among public transport users before and after the intervention
- Collection of feedback on thermal comfort, well-being, and perception of greening measures
- Use of combined sensor data and citizen feedback to evaluate effectiveness and support replication

Anketiranje potnikov javnega avtobusnega mestnega prometa na postajališču Glavni trg -Elektro

Spoštovani potniki,

Mestna občina Maribor načrtuje prenovo avtobusnega postajališča Glavni trg - Elektro. Postajališče je v poletnih mesecih zelo **toplotno obremenjeno**, zato želimo v prihodnosti potnikom omogočiti **boljšo potovalno izkušnjo**. V okviru pilotnega projekta Mission CE Climate bomo, v sodelovanju s pristojnimi uradi, **ozelenili strehe novih avtobusnih nadstrešnic in namestili novo urbano opremo z dodatno ozelenitvijo.** Ozelenitev avtobusnih nadstrešnic izboljšuje kakovost zraka, saj rastline absorbirajo prašne delce, skladiščijo deževnico in zmanjšujejo učinek toplotnega otoka s hlajenjem okolice. Poleg tega zelene strehe spodbujajo biotsko raznovrstnost, privabljajo opraševalce, kot so čebele in metulji, ter prispevajo k trajnostnemu urbanemu okolju.
Prosimo vas, da odgovorite na nekaj vprašanj, ki nam bodo v pomoč pri načrtovanju aktivnosti. Prosimo upoštevajte, da se raziskava nanaša zgolj na omenjeno tematiko večjih toplotnih obremenitev, s katerimi se v zadnjih letih soočamo.

Zahvaljujemo se vam za sodelovanje! S pomočjo vaših odgovorov bomo ustvarili **prijetnejši in bolj zelen Maribor!**

1. Prosimo, zaupajte nam koliko ste stari?

Izberite vse primerne odgovore.

- od 10 - 25 let
- od 25 - 65 let
- več kot 65 let
- ne želim povedati

◀ Survey prepared for citizen feedback gathering and evaluation of intervention

Citizen engagement activity ▶

PILOT SUMMARY

The Maribor solution contributes to climate resilience by demonstrating a practical and replicable approach to mitigating urban heat at highly frequented public spaces. By combining nature-based solutions with digital monitoring and citizen participation, the pilot improves microclimatic conditions, supports evidence-based decision-making, raises awareness of climate adaptation measures, and provides a tested model that can be scaled up across the city and transferred to other Central European communities.

Overview of Košice CCRM

Košice, the second-largest city in Slovakia, faces increasing impacts of climate change. The following are its key climate change challenges:

• **Heat waves,** the effects of which are amplified by the effect of urban heat island;

• **Surface flooding,** which is caused by heavy and torrential rainfalls, when the ground rainfall is more than 20 mm per hour;

• **Prolonged periods of drought** as a secondary impact of irregular rainfall patterns.

In the group of hazard indicators, the city of Košice is particularly vulnerable due to two indicators:

• Observed trends in the **frequency of meteorological droughts,** the total area of burned sites in nuclear cities 2000-2018.

• Moderate risk with increasing tendency is posed by the **risk of floods and torrential rains,** which are interrelated with each other

CCRM setup process in the initial phase took into consideration identified challenges of the area based on the preliminary results of the vulnerability assessment and on the already adopted Adaptation plan of the City of Košice for Climate Change 2022-2030. The Mission is established with the assumption of a long-term operation beyond the period of individual climate-oriented projects and initiatives on the territory of the city, communication will focus on further engagement and mobilisation of local community members with identified potential to contribute to a systematic increase in the community climate resilience. Community Climate Resilient Missions are integrated, cross-sectoral and transdisciplinary networks. Due to this peculiarity, in this kind of context resilience processes can find fertile ground for developing.

A mechanism providing permanent flexibility and openness as well as simplicity was established for continuous cooperation by signing the Memorandum of Understanding - first signed by the two founding members, the City of Kovice and the Technical University, and then by the partners, the sectoral Agency for Economic Development and the Vychodne pobrezie civic association, providing sectoral diversity.

The objective of the Košice CCRM is to support local community to become climate resilient and enable it to react with coordinated response to the impacts caused by climate change through acting beyond sectoral approach and introducing cross-sectoral governance. Under the umbrella of CCRM a durable cooperation system and strengthen capacity of the community to plan and implement measures.

Košice Quintuple Helix Model matrix:

Institution name	Target Group Category	Quintuple helix category	Competencies & Responsibilities
Technical University of Košice, Faculty of Economics	Higher education and research organization	Education system	Climate Adaptation Science, Solution Design, Climate Resilience Research, Change Management
City of Košice	Local public authority	Political system	Leadership, Decision Making, Climate Change Science, Strategy & Planning, Risk Assessment, Climate-informed Professional Practice, Vulnerability & Impact Analysis
Regional Development Agency of Košice Region	Sectoral agency - Regional economic social development	Economic system	Economic Analysis, Risk Assessment, Climate Adaptation Science, Building Capability
Východné pobrežie	Interest group / NGO / network / association	Civil society	Cultural Agility, Climate Communication, Climate Change Science, Facilitation, Climate Adaptation Science
Technical University of Košice, Faculty of Civil Engineering	Higher education and research organisation	Education system	Climate Resilience Research, Climate Change Science, Climate Adaptation Science, Building Capability
Institute of Geography Faculty of Science, Pavol Jozef Šafárik University in Košice	Higher education and research organisation	Education system	Climate Change Science, Climate Resilience Research, Vulnerability & Impact Analysis
Klíma ťa potrebuje	Interest group / NGO / network / association	Civil society	Cultural Agility, Climate Communication, Climate Change Science, Facilitation, Climate Adaptation Science

TThe Košice pilot places schools at the center of community climate action by turning schools into long-term monitoring points for local air quality and heat-related indicators. By openly publishing data from seven elementary schools on the city's Open Data platform and using it directly in classrooms, the pilot connects children, teachers, families, and city planners around shared evidence. This "measure–learn–act" approach helps communities understand how heat waves or air pollution affect daily life. While the pilot is digitally driven, it intentionally guides communities toward future nature-based responses based on measured local climate conditions. By connecting classrooms, households, and planners through shared data, Košice translates climate concern into community-owned knowledge that supports both education and informed local decision-making.

methods and inclusion

Co-creation methods used: **Mapping of relevant locations for sensor placement, regular consortium meetings to gain comments and recommendations to pilot implementation and local Community Climate Mission meetings to discuss the relevance of the interventions.**

Creative workshops for creation of data use scenarios: **pedagogical, strategic, community, and spatial. Co-design sessions for local education plan preparation within the local community. Collaborative meeting for designing of platform for data visualization.**

Citizens are engaged through awareness campaigns and communication activities as well as through the education curriculum within the educational process in the schools.

Implementation steps & timeline:
2023-2024: Stakeholder mapping and MoU signing.

2024: Pilot design and Analysis activities in cooperation with stakeholders from CCRM and other stakeholders.

2025: Implementation of pilot activities within the pilot area, communication activities to public, collaboration with local stakeholders and communities.

The existing stakeholder infrastructure (Municipality office experts, education and technical know-how from TUKE experts) was put in use for the successful implementation of the pilot, combined with the project-funded activities via the Interreg Central Europe – MISSION CE CLIMATE project.

The main risks for this pilot are connected with the hardware installation issues and digital platform performance, and were addressed by establishing maintenance protocol and responsible personnel for technical and data quality assurance.

The pilot solution design was accepted by 4 regional stakeholders and pilot solution is aligned with implementation of 2 climate adaptation strategies or policies on local/regional level. The long-term sustainability of the pilot digital solution is ensured by officially described maintenance process. Cross-Platform Compatibility is ensured by development of digital dashboard for gathering and interpretation of climate data compatible with Open Data Košice platform by providing technical description. Analytical activities for sensor placement and selection were executed and documented in all 7 schools participating in the pilot implementation by installing and operating 7 sensors in their facilities. Thematic education program for climate data reading and operating was created and implemented in the 7 schools.

The output converts scattered climate concerns into a routine, evidence-based practice. City of Košice gains continuous, high-resolution readings (schoolyards) and human-centred signals (e.g., perceived heat, health relevance). This enables timely micro-decisions (activity timing, shading, ventilation) and strategic choices (where to plant trees, cool routes, permeable surfaces). Continuous data monitoring will serve educational purposes. Integrating data from sensors into Open Data Košice dashboard allows the general public to access the data.

The flow of climate data to related digital platform - Open Data Košice dashboard will continue to be managed by designated project partner organization (City of Košice). The municipality committed to long-term institutional support, ensuring continued accessibility and maintenance of the platforms. The maintenance of sensor network for the data collection will be ensured by these organizations through identified sensor network providers.

Best practice within the implementation activities
The Technical University of Košice and City of Košice, in cooperation with representatives of elementary schools, prepared an innovative educational program focused on the use of data from climate sensors installed directly in school premises. The aim of the program is to combine modern technologies, environmental education, and practical teaching of natural sciences. During the Curriculum Development workshops in 2025 4 different approaches to data usage have been identified for data usage. Teachers and TUKE experts gathered in co-creating educational content for preparation of environmental curriculum for 2025/2026 school year.

The aim is to use climate data in school subjects like Physics, Biology, Chemistry, Civic Education. Teaching worksheets have been developed for these subjects, instructing teachers on how to incorporate data from climate sensors into teaching in the given subject.

The educational program supports the development of students' digital, environmental, and analytical skills, while enabling teachers to innovate their teaching using real data and project-based learning.

challenge

Time constraints associated with implementing the educational program in classrooms were noted, as working with the relevant data is time-consuming and needs to be structured to follow the school year cycle. Furthermore, summer months will not be observed in real time due to school vacation period. In order to be successful in climate data monitoring, students need to be taught how to use the dashboard correctly to complete the assigned tasks in a narrow timeframe.

To simplify access to the right data, specific links have been created that provide students with relevant data for individual tasks directly on school dashboards.

recommendations

Always design educational programs together with those for whom they are intended, so that their needs and specificities are reflected. Collect their feedback and implement improvements to make the work effective and time efficient.

Interreg CENTRAL EUROPE
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MISSION CE CLIMATE

CLIMATE DATA MANAGEMENT

DIGITAL SOLUTION FOR LOCAL CLIMATE MONITORING IN OUTDOOR AREAS TO SUPPORT DECISION-MAKING, AWARENESS, AND CLIMATE RESILIENCE.

INNOVATIVENESS

The solution presents high integration of digital technologies. Its innovativeness lies in combining:

- **open data** principles,
- participatory and **data-driven education**,
- a functional link between technical monitoring and **community engagement**.
- **multifactorial comparison** of combined and individual cooling effects of different surfaces and shading in urban environments

OBJECTIVE

To improve data governance for climate adaptation in the municipalities through systematic data collection, processing, and visualization of local climate data with the aim to gain insights into the potential of nature-based solutions in improving urban microclimate, enabling infirmed decisionmaking, and raising public awareness and educate citizens.

GEOGRAPHICAL COVERAGE:

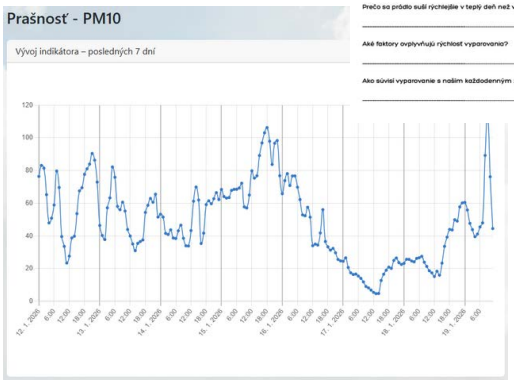
OUTDOOR SCHOOL AREAS OF THE CITY OF KOŠICE AND PARK AREAS OF THE CITY OF DORNBIRN

CLIMATE RESILIENCE SOLUTION IN MUNICIPALITY OF KOŠICE

The Košice school-based climate resilience pilot provides a controlled, real-world testbed for the full digital data lifecycle–from sensor readings to public interpretation.

The solution implemented by pilot project in the geographical area of City of Košice consists of:

- a network of IoT climate sensors installed in seven outdoor school areas.
- an open digital dashboard for visualization and interpretation of climate indicators published on www.klimatickedata.sk
- integration of collected data into the existing Open Data Platform of the City of Košice (See here)
- an Educational programme for participating schools and school communities based on real, locally measured data.



Climate sensors installed on rooftops of school buldings
Graphical visualization of measured climate indicator's values
Example of worksheet for studens of elementary schools

IMPLEMENTATION STEPS

The development of the digital solution within the City of Košice followed a structured, phased approach:

1. ANALYTICAL PHASE

- Identification of priority climate indicators based on Risk and Vulnerability Assessment (See here)
- Selection of suitable school locations for sensor installation based on local GISspatial analyses and local temperature maps (See here)
- Definition of technical specifications for sensors (in the case of pilot project on Košice following indicators were selected:

  Meteorological conditions: temperature, humidity, atmospheric pressure

  Wind dynamics: wind speed, wind gusts, wind direction

  Air quality – particulate matter: PM10, PM4, PM1

  Air quality – gases: CO, NO_2

2. TECHNICAL IMPLEMENTATION PHASE

Public procurement and installation of sensors

A public procurement process was conducted to acquire IoT climate stations, ensuring compliance with technical specifications and long-term warranty conditions. The sensors were installed in schoolyards and rooftops in early 2025, each measuring eleven indicators of air quality and meteorological conditions. The stations were connected to the Microsoft Azure IoT Central platform, enabling secure data transfer, cloud storage, and integration with visualization tools.

Establishment of data infrastructure

The solution generates continuous timeseries data with precise timestamps. These data allow both real-time analysis and longterm evaluation of local climate conditions. IoT devices are integrated into the Microsoft Azure IoT Central platform, supporting standard protocols (MQTT, AMQP, HTTPS). Data are stored in Azure Blob Storage and Azure Data Lake, while access and security are managed through Azure Active Directory (Entra ID). System monitoring and stability are supported by Azure Log Analytics, Azure Monitor, and Azure Security Center for IoT.

Preparation of dashboard visualization logic

Data are further processed and visualized in Microsoft Power BI dashboards dedicated for visualization of data and education purposes in schools and one integrated dashboard into the OPEN DATA KOŠICE platform for research, municipal governance, and transparency.

Testing and Fine-Tuning

Testing of the digital dashboard, resolution of technical issues and documentation of technical solution sustainability and maintenance.

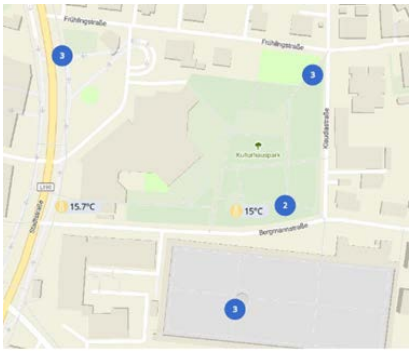
3. PARTICIPATORY EDUCATION AND COMMUNITY AWARENESS RAISING PHASE

Involvement of seven schools as active partners & joint development of educational worksheets and teaching instructions:

- Active collaboration with school representatives and educational experts in creation of curriculum for elementary schools consisting of educational worksheets for 4 school subjects and the implementation of the education program in schools.
- Awareness raising of school communities is ensured by presentation of climate monitoring dashboards at school premises via LED screens.

CLIMATE RESILIENCE SOLUTION IN MUNICIPALITY OF DORNBIRN

Rather than relying on satellite data or city-wide averages, the study directly measures surface temperature, air temperature, and humidity on the ground capturing microclimatic conditions that most affect human thermal comfort. It introduces a scalable and replicable low-cost methodology for assessing urban heat island mitigation which enables easy adaptation to other areas and climatic context.



Area where sensors are installed in City of Dornbirn

Climate sensors installed on street lamps

The solution implemented by the pilot project in the City of Dornbirn consists of:

- A network of climate sensors to measure air temperature, surface temperature, as well as humidity to assess a heat index and the perceived temperature. The sensors are located in sealed/unsealed and shade/no shade areas.
- The data is collected and visualized on the CityMonitor dashboard to to enable transparency and informed decision-making on the city level.

IMPLEMENTATION STEPS

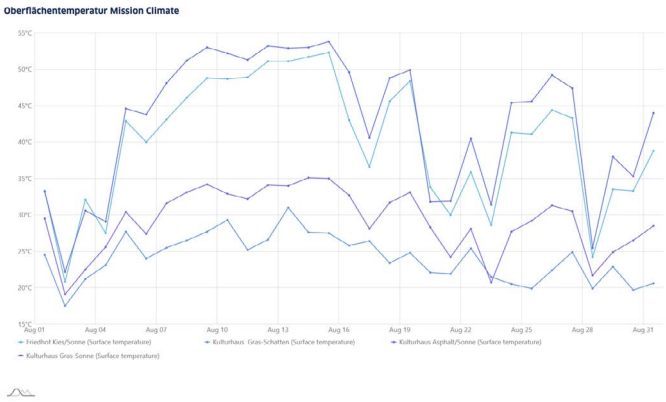
The development of the digital solution within the City of Dornbirn followed the following approach:

1. ANALYTICAL PHASE

- **Identification of climate indicators** based on the Risk and Vulnerability Assessment – heat and changes in the water cycle were the most relevant climate risks for the city of Dornbirn
- Selection of **suitable locations** for sensor installation in close cooperation with the relevant departments in the city of Dornbirn
- Definition of **technical specifications for sensors**. In the case of the pilot study in the city of Dornbirn, the following data is collected: air and surface temperature and humidity to calculate the heat index and the perceived temperature.
- To go beyond mere measurement of heat, a **multi-factor design** was chosen comparing temperatures between sealed and non-sealed and shade and non-shade to each other.

2. TECHNICAL IMPLEMENTATION PHASE

- **Public procurement and installation of sensors**
  A public procurement process was conducted to acquire the sensor network, ensuring compliance with technical specifications and long-term warranty conditions. The sensors were installed in the "Kulturhauspark" in 2025.
- **Establishment of data infrastructure**
  The solution generates continuous timeseries data with precise timestamps. The data allows both real-time analysis and longterm evaluation of local climate conditions. The data is used to assess the heat index.
- **Integration into the Dashboard**
  The Data is visualized in the already existing citymonitor dashboard dedicated for visualization of data and transparency within the city to enable informed decision-making.
- **Testing and Fine-Tuning**
  Testing of the digital dashboard, resolution of technical issues and documentation of technical solution sustainability and maintenance.



This graph shows the surface temperature of four locations within the time frame of a month, which highlights the temperature difference between shade and non-shade.

SCALE-UP OF THE PILOT STUDY IN DORNBIRN

Water, alongside heat, is one of the most significant climate risks in Vorarlberg in general, but also for the city of Dornbirn. Heavy rainfalls pose **a threat**.

In collaboration with the city's fire brigade, the pilot study is now being expanded to incorporate water into the climate monitoring system. This will include **tracking water levels of rivers and streams and monitor underground passageways for water**. This data will then be integrated into a dashboard to provide access to the data and the relevant **information in real-time** to enable the catastrophe response team to act swiftly and effectively in emergencies.

PILOTS SUMMARY

The Dornbirn pilot advances climate adaptation by proving a practical, city-ready pipeline for data acquisition, monitoring, analysis, and interpretation of urban heat. Using the heat index to compute perceived temperature, it translates raw sensor data into human-centric risk signals for planners. These insights are then published via the CityMonitor dashboard, which turns technical readings into clear visuals that support awareness, policymaking, and replication across new sites. In sum, the pilot operationalizes an end-to-end digital method– from robust sensing to meaningful public interpretation–that municipalities can reuse to target, validate, and prioritize nature-based cooling measures.

The Košice school-based climate resilience pilot provides a controlled, real-world testbed for the full digital data lifecycle–from sensor readings to public interpretation. Multi-parameter sensors installed on school grounds capture local air and weather conditions and transmit them to the city's Open Data platform. On top of this pipeline, a public "Climate data monitoring" dashboard transform raw streams into intelligible insights, linking values to health and environmental impacts and recommended behaviors. Thanks to cooperation with teachers, human-centered interpretation of data was ensured, and the solution was incorporated into the curriculum through prepared lesson plans and student projects, thereby promoting its lasting acceptance.

Overview of the Lignano Sabbiadoro CCRM

The City of Lignano Sabbiadoro is a very tourist-oriented area, with one of its peculiarities being that the population increases exponentially during the summer season, reaching up to 100,000-150,000 people per day from the general population of 6.800 inhabitants outside the summer season. From a climate perspective, the greatest influence comes from the presence of the Adriatic Sea, a shallow sea, the Marano Lagoon and the Tagliamento River delta. Coastal erosion affects the coastline. In the area facing the lagoon, the greatest criticality is due to sea flooding and high tides. As a matter of fact, **flooding** – pluvial, coastal and river - caused by extreme weather events is another critical climate risk. On top of this, the analysis of current and projected climate trends shows that **sea level rise and heat waves** add on the overall frame of the climate hazards that need to be taken into consideration, as well as wildfires.

The establishment of the Community Climate Resilient Mission (CCRM) in Lignano Sabbiadoro was initiated by the Municipality as part of its commitment to implementing the Sustainable Energy and Climate Action Plan (SECAP) adopted in 2022. The Mission aims to enhance community engagement in the city's pathway towards climate resilience, in line with local objectives for awareness-raising and participatory governance by 2030. The process followed a structured sequence. The Municipality, in collaboration with APE FVG, conducted a comprehensive stakeholder mapping based on the Quintuple Helix approach, identifying key actors relevant to the local climate transition. Initial engagement activities involved stakeholders previously contributing to the SECAP under the Interreg IT-HR RESPONSe project, namely LISAGEST and the Civil Protection office, selected for their operational knowledge of local climate impacts. Afterwards, other local stakeholders were contacted and engaged in the CCRM and to formalise the Mission establishment a Memorandum of Understanding (MoU) was signed between the Municipality of Lignano Sabbiadoro, APE FVG, Civil Protection unit, the Lignano Rowing Club, the Lignano Yacht Club and Lignano Sabbiadoro Gestioni (LISAGEST).

Subsequently, co-design activities were launched through meetings aimed at identifying shared priorities and defining the pilot actions under the Mission CE Climate project.

As a result, the CCRM defined three main priorities: updating and enhancing local adaptation tools (revising adaptation measures); testing for the first time a public space co-design process involving citizens and stakeholders, to be replicated in future circumstances; and strengthening awareness-raising and capacity-building actions targeting residents and tourists.

As mentioned before, the Lignano Sabbiadoro CCRM fully reflects the Quintuple Helix Model, integrating actors across diverse systems and with peculiar competences. Public authorities, which provide institutional leadership and coordination. Business actors contribute with operational expertise and a direct link with tourism and coastal management. Academic and expert stakeholders, including professionals engaged in the RVA updating, support evidence-based approaches and climate knowledge transfer. Civil society and NGOs participate in awareness and co-design activities, ensuring inclusiveness and community ownership. Finally, citizens and tourists are directly engaged through outreach and participatory processes, fostering shared responsibility and behavioural change towards a more climate-resilient Lignano Sabbiadoro.

Lignano Sabbiadoro faces increasing climate risks including **sea level rise, coastal erosion, heat waves, and flooding from extreme weather events.** The pilot project addressed the urgent need to enhance climate governance by fostering civic participation, co-designing adaptation measures, and raising awareness among residents and tourists.

The pilot in Lignano Sabbiadoro exemplifies the Quintuple Helix Model by actively involving actors across five key domains:

Public sector: Municipality of Lignano Sabbiadoro as coordinator, promoter and catalyst of the initiative; competent Regional Authority bodies and Civil Protection.

Private sector: business stakeholders and public-owned maritime concessionaires contributed operational expertise and insights into tourism and coastal management.

Academia and experts: University of Udine, University of Trieste, OGS provided technical support and climate risk data, and facilitation of participatory processes.

Civil society: local sports associations, arts & culture groups, and environmental NGOs played a vital role in co-design activities and awareness campaigns.

Citizens: Residents, tourists, and citizen representatives were engaged through consultations, public events, and the Lignano 180° Festival, fostering shared responsibility and behavioral change.

Lignano Sabbiadoro Pilot Project

Porto Casoni, a flood-prone area in Lignano Sabbiadoro, faces increasing vulnerability due to sea level rise and storm surges. The area is used by diverse stakeholders - from sports clubs to restaurants – and holds significant ecological and social value. These factors prompted the municipal administration of Lignano and APE FVG to launch the local activities of the MISSION CE CLIMATE project, starting from this area. Porto Casoni is, in fact, the first demonstration action of this pilot project and was therefore aimed at regenerating the space through a participatory process designed to ensure climate resilience and community ownership.

To achieve this, the Municipality, supported by APE FVG, launched a co-design process involving 16 stakeholder groups through interviews, public events, and consultation meetings. A facilitator guided the participatory process, which culminated in the development of a Masterplan integrating stakeholders' inputs. The plan was approved by the City Council in October 2024 and is now seeking funding for implementation. The process was transparent and inclusive, and marked the first time the local administration adopted such an approach.

The second demonstration action focused on the development of a Green Management Plan aimed at enhancing the municipality's climate resilience. The Plan, developed by an external consultancy and approved by the City Council, represents a strategic tool to guide the long-term and sustainable management of urban green areas across the city. Urban green management plays a critical role in enhancing climate resilience, biodiversity, and quality of life in cities. It refers to the planning, maintenance, and sustainable use of green infrastructure to provide ecological, social, and economic benefits.

In parallel with the drafting process, the Municipality and the consultancy team planned a dissemination and engagement strategy to ensure that the objectives, results, and foreseen actions of the Plan and the Regulatory Framework were shared with local stakeholders, particularly the general public. To this end, awareness-raising activities with local schools and a free arboriculture course for citizens (4 lessons, 10 hours in total), delivered with the involvement of a forestry expert as instructor, were organized at the end of 2025.

The third demonstration action focused on promoting climate awareness, sustainable urban transformation, and civic engagement through a sustainability festival to celebrate the city progress towards a climate-resilient future: held in June 13 and 14, 2025, **Lignano 180°** was conceived as a space for dialogue, participation, and collective imagination about the future of coastal cities in a changing climate, bringing together technical experts, researchers, public administrators, urban designers, local citizens and tourists. The name "180°" symbolizes the need for change – a radical shift in how we think about and shape our urban environments. The festival aimed to promote a new mindset that embraces sustainability, inclusiveness, and resilience as guiding principles in planning the city of tomorrow. It also served as a platform to showcase recent initiatives led by the Municipality to address climate challenges, improve urban liveability, and protect the city's rich coastal and ecological heritage, alongside the results achieved throughout the MISSION CE CLIMATE project. In this context, guided study visits were also organized, allowing participants to explore firsthand key sites involved in Lignano's transformation. The 2025 Festival is intended as a first edition, as the administration aims to establish it as an annual event for citizens.

The co-creation methods used so far to engage the local community during the pilot's climate governance activities are the following:

- Stakeholder mapping and bilateral interviews
- Public hearings and consultation events
- Participatory design workshops
- Festival panels and guided study tours
- Coordination meetings with facilitators and experts.

In particular, citizens acted as co-creators in the regeneration of Porto Casoni, were actively involved in informative events on topics linked with the Green Management Plan, and participated in the Lignano 180° Festival. Their input influenced planning decisions, validated priorities, and built ownership of climate resilience strategies.

Hereafter are listed the implementation steps and related timeline per each demo activity completed under the Pilot:

1 | Porto Casoni co-design activity

Oct 2023: **Design of engagement process for the regeneration of Porto Casoni**

Jan–May 2024: **Stakeholder consultations and Masterplan of Porto Casoni development**

Oct 2024: **Masterplan approved by City Council**

2 | Green Management plan drafting and regulatory framework

Nov 2024–Apr 2025: **Green Management Plan drafted and approved**

Feb–Sep 2025: **Regulatory framework and civic engagement strategy developed**

Nov-Dec 2025: **Events targeting the citizens**

3 | Festival Lignano 180°

Jan-Jun 2025: **Design and planning of Lignano 180° Festival**

Jun 2025: **Lignano 180° Festival**

Pilot activities were finalized by December 2025 and long-term activities have been planned for proceeding beyond the project end.

Pilot activities have been co-funded by the Interreg Central Europe – MISSION CE CLIMATE project and the City of Lignano Sabbiadoro's budget (with total costs amounting at around 100 000 €).

Implemented activities have taken into account risk and safety aspects, including a flood risk analysis for the Porto Casoni area and the definition of safety protocols for public events and site visits.

In terms of progress, the Porto Casoni Masterplan has been approved by the City Council and the Green Management Plan adopted. Moreover, the Sustainability Festival has been successfully launched and implemented, serving as a key moment for engagement and awareness-raising.

Among the main results and early outcomes, three integrated demo actions have been completed: over 800 participants have been engaged through the Festival, 60–70 stakeholders have taken part in the Porto Casoni consultation process, a total of 10 people have participated in the arboriculture course, and 250–280 students have been involved in the awareness-raising activities implemented in schools (200–220 from primary schools and 50–60 from middle schools). These activities have contributed to increasing public awareness and institutional commitment, laying the foundations for long-term climate governance.

For the post-pilot phase, the Municipality will continue implementing the Green Management Plan and seek additional funding for the construction works at Porto Casoni. The Lignano 180° Festival is planned as an annual event, while civic engagement activities will continue beyond the pilot to consolidate participatory governance practices within future climate initiatives.

challenge

One major challenge was coordinating diverse interests – recreational users, businesses, environmental groups – in a redesign process of a flood-prone area with competing priorities and clashing interests. Another was ensuring meaningful participation within tight project timelines and limited prior experience with inclusive climate governance.

Success stemmed from early stakeholder mapping, dedicated facilitation, and strong institutional commitment. The Mayor and Councillor actively participated, reinforcing trust among the stakeholders and the local community. A communications secretariat ensured consistent outreach, while technical data from APE FVG grounded the process in climate evidence.

recommendations

- Start with thorough stakeholder mapping and needs assessment.
- Engage professional facilitators to guide co-design.
- Ensure political leadership is visible and consistent.
- Combine technical planning with cultural and civic engagement.
- Use festivals or public events to amplify visibility and connect actions.

Interreg CENTRAL EUROPE
Co-funded by the European Union
MISSION CE CLIMATE

GOVERNANCE OF CLIMATE CHANGE

INTEGRATED PARTICIPATORY CLIMATE GOVERNANCE MODEL FOR LOCAL CLIMATE-RESILIENT PLANNING.

INNOVATIVENESS

The innovativeness of the solution lies in its systemic and governance-oriented approach to climate resilience. Rather than focusing on single adaptation measures, the method integrates participatory processes into formal decision-making and planning cycles, linking community engagement with binding instruments such as masterplans, management plans, and regulatory frameworks.

The solution also introduces a modular combination of tools – co-design procedures, green infrastructure management guidelines, capacity-building actions, and public engagement spaces – that can be scaled and adapted to different local contexts.

OBJECTIVE

The objective of the solution is to provide local and regional authorities with a structured and transferable framework to strengthen climate governance through coordinated, cross-sectoral and participatory processes. The solution supports municipalities in translating climate risks into shared planning priorities, co-designed spatial and management stategies, and longterm civic engagement mechanisms, thereby increasing institutional capacity, public ownership, and resilience to climate impacts.

GEOGRAPHICAL COVERAGE:

APPLICABLE AT LOCAL AND URBAN LEVEL ACROSS CENTRAL EUROPE AND OTHER EUROPEAN REGIONS, PARTICULARLY IN MUNICIPALITIES FACING CLIMATE RISKS RELATED TO FLOODING, HEAT STRESS, WILDFIRES AND ECOSYSTEMS DEGRADATION.

CLIMATE RESILIENCE SOLUTION IN MUNICIPALITY OF LIGNANO SABBIADORO

The climate resilience solution consists of an integrated governance model that enables public authorities to design, adopt, and implement climate resilience strategies through inclusive and coordinated processes.

The method is structured around three interconnected pillars:

- Participatory spatial and strategic planning, enabling the co-design of climate-resilient interventions in vulnerable areas;
- Institutionalisation of climate resilience tools, through the development and adoption of management plans, regulatory frameworks, and operational guidelines;
- Continuous civic engagement and capacity building, ensuring awareness, skills development, and long-term community ownership of climate action.

The method has been tested and validated through pilot actions, demonstrating its effectiveness in aligning technical expertise, political leadership, and stakeholder knowledge within a coherent climate governance framework.

Below are examples of individual results achieved through the application of the participatory model described above (Please note that all of these materials are currently available only in Italian):

- Green management plan documents
- Web page of the Lignano 180° Festival

Green Management plan activities - fostering civic engagement

Lignano 180° Festival

IMPLEMENTATION STEPS

1) CONTEXT ANALYSIS AND STAKEHOLDER MAPPING
2) DESIGN OF PARTICIPATORY GOVERNANCE PROCESS
3) CO-DESIGN AND VALIDATION OF CLIMATE RESILIENCE STRATEGIES
4) INSTITUTIONALISATION THROUGH PLANNING AND MANAGEMENT INSTRUMENTS
5) CAPACITY BUILDING AND CONTINUOUS CIVIC ENGAGEMENT
6) COMMUNICATION, DISSEMINATION, AND REPLICATION

STEP 1 – CONTEXT ANALYSIS AND STAKEHOLDER MAPPING

Assessment of local climate risks, existing policy frameworks, and governance structures, with specific reference to the Sustainable Energy and Climate Action Plan (SECAP) or equivalent local climate strategies and plans. The step ensures alignment of the participatory process with municipal mitigation and adaptation objectives already adopted or under development.

In parallel, a systematic stakeholder mapping is carried out to identify and engage relevant public authorities, technical departments, private actors, civil society organisations, and citizen groups with a role or interest in climate resilience and land-use management.

Example from the pilot: in Lignano Sabbiadoro, the process was grounded in existing climate planning frameworks (SECAP) and supported by a detailed stakeholder mapping of users and actors connected to a flood-prone coastal area.

Inputs/tools: climate risk assessments; SECAP (or equivalent climate action plans); stakeholder mapping templates.

STEP 2 – DESIGN OF PARTICIPATORY GOVERNANCE PROCESS

Design of a structured participatory governance process, including the clear definition of its scope, objectives, roles, and boundaries. This step establishes transparent premises for participation, clarifying from the outset which elements are open to co-design, which constraints are non-negotiable (e.g. legal, technical, financial), and how stakeholder inputs will inform decision-making.

The process design also defines participation principles, representation criteria, timelines, and decision-making responsibilities, ensuring a balanced, inclusive, and manageable engagement framework. Professional facilitation is identified to support dialogue, manage conflicting interests, and maintain trust among participants.

Example from the pilot: in Lignano, the engagement process was explicitly designed upfront, with clear rules, facilitation support, and shared understanding of the decision-making scope among all participants.

Inputs/tools: participatory governance guidelines; facilitation protocols; terms of reference defining scope, roles, and decision-making boundaries.

STEP 3 – CO-DESIGN AND VALIDATION OF CLIMATE RESILIENCE PROJECTS

Implementation of structured co-design activities (e.g. workshops, consultations, public hearings) to jointly develop climate resilience strategies, spatial concepts, and priority actions, integrating technical evidence with local knowledge and stakeholder perspectives.

The co-creation process is explicitly grounded in the principle of safeguarding people, assets, and ecosystems, ensuring that climate resilience strategies are primarily oriented towards risk reduction and safety of places. While the process seeks to balance and integrate the needs and expectations of different users and stakeholder groups, it also acknowledges that certain limitations or trade-offs may be necessary in order to protect the common good.

The validation phase ensures that co-created outcomes are technically sound, socially acceptable, and aligned with climate risk assessments and public interest objectives.

A core condition of this step is the active involvement of the technical professionals responsible for drafting plans and related instruments throughout the participatory process. Planners, consultants, and technical experts are required to participate in engagement activities, be familiar with participatory methodologies, and be willing to integrate public inputs into technical solutions, within the defined legal and safety constraints.

Example from the pilot: in Lignano, stakeholders contributed to the co-design of a regeneration project for a vulnerable area explaining their users-needs, while accepting certain limitations linked to flood risk mitigation and public safety. The external consultants already had expeperiences in participatory processes and actively participated during each plenary consultations.

Inputs/tools: participatory design tools; climate risk and safety analyses; draft masterplans or strategic climate resilience documents.

Porto Casoni co-design meeting

Porto Casoni Lignano rendering

STEP 4 – INSTITUTIONALISATION THROUGH PLANNING AND MANAGEMENT INSTRUMENTS

Design of a structured participatory governance process, including the clear definition of its scope, objectives, roles, and boundaries. This step establishes transparent premises for participation, clarifying from the outset which elements are open to co-design, which constraints are non-negotiable (e.g. legal, technical, financial), and how stakeholder inputs will inform decision-making.

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Example from the pilot: in Lignano, the engagement process was explicitly designed upfront, with clear rules, facilitation support, and shared understanding of the decision-making scope among all participants.

Inputs/tools: participatory governance guidelines; facilitation protocols; terms of reference defining scope, roles, and decision-making boundaries.

STEP 5 – CAPACITY BUILDING AND CONTINUOUS CIVIC ENGAGEMENT

Design and implementation of a systematic capacity-building framework that is automatically activated whenever new plans, regulations, or strategies affecting citizens and local stakeholders are introduced. This step ensures that capacity-building and information activities are not treated as ad-hoc actions, but as an integral and recurring component of climate governance processes.

The approach aims to equip citizens, stakeholders, and local actors with the knowledge needed to clearly understand municipal strategies, management choices, and related responsibilities, thereby enabling informed participation and compliance over time. Capacity-building actions are designed to accompany the full lifecycle of planning and regulatory instruments, supporting transparency, trust, and long-term public ownership of climate resilience policies.

Example from the pilot: in Lignano, capacity-building and awareness-raising activities were implemented in parallel with the introduction of the Green management Plan and regulatory framework, supporting citizens' understanding of municipal climate resilience strategies.

Inputs/tools: training and educational programmes; structured communication and learning modules linked to planning instruments; guidelines for institutionalised civic capacity building.

Green management plan Capacity building activities

STEP 6 – COMMUNICATION, DISSEMINATION, AND REPLICATION

Development of communication and dissemination activities to ensure transparency, public accountability, and knowledge-sharing regarding local climate strategies and plans. This step supports the visibility of results, the documentation of lessons learned, and the sharing of methodologies, tools, and planning instruments with peer authorities, stakeholders and general public.

The dissemination approach combines technical outputs (e.g. guidelines, plans, methodological documents) with accessible communication formats and public events, enabling knowledge exchange and peer learning. The step explicitly supports replication by providing adaptable tools and clear guidance for application in different territorial and governance contexts.

Example from the pilot: in Lignano Sabbiadoro, the communication and dissemination of pilot results and other climate-related initiatives implemented by the Municipality were centred around the Lignano 180° Sustainability Festival, conceived as a public platform for dialogue, awareness-raising, and knowledge exchange on climate resilience and urban transformation.

Inputs/tools: communication and dissemination strategies; methodological guidelines; knowledge-sharing platforms and public engagement formats.

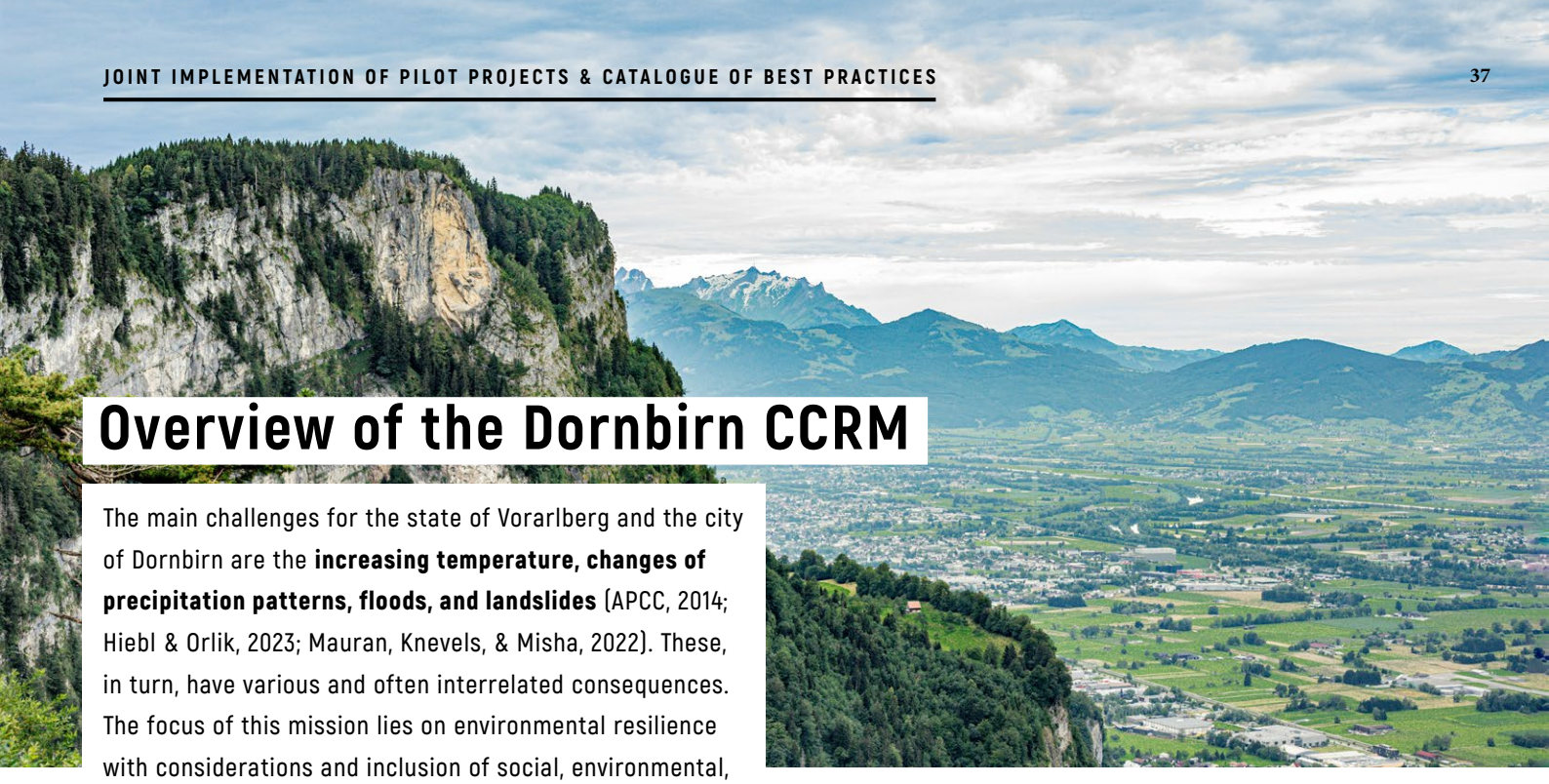
Lignano 180° Festival

PILOT SUMMARY

The Lignano Sabbiadoro pilot contributes to addressing climate challenges in community climate governance by demonstrating a cross-sectoral, coordinated, and participatory model that translates strategy into broadly accepted action. It mobilised the municipality and a wide range of stakeholder groups to co-design interventions and resulted in a City Council–approved masterplan for a flood-vulnerable area, thereby building social licence for implementation.

The pilot also advanced city-wide governance by introducing a Green Management Plan and accompanying capacity-building activities linked to its regulatory framework, ensuring that objectives, responsibilities, and standards are clearly communicated to citizens and that everyday practices are aligned with climate resilience goals.

To mainstream awareness and coordination across initiatives and disciplines, the Lignano 180° Sustainability Festival connected technical planning, nature-based approaches, mobility, and public-space quality with civic dialogue, positioning climate governance as both a technical and a cultural endeavour.



Overview of the Dornbirn CCRM

The main challenges for the state of Vorarlberg and the city of Dornbirn are the **increasing temperature, changes of precipitation patterns, floods, and landslides** (APCC, 2014; Hiebl & Orlik, 2023; Mauran, Knevels, & Misha, 2022). These, in turn, have various and often interrelated consequences. The focus of this mission lies on environmental resilience with considerations and inclusion of social, environmental, and economic resilience as they are highly interconnected with all the other aspects of the climate resilience.

The Dornbirn's local CCRM enables a cross-sectoral and interdisciplinary collaboration, with stakeholders from different backgrounds invited to join the formation of the CCRM. First, a key stakeholder mapping occurred to define who should be invited to gain a better understanding of climate risks from different perspectives. The CCRM-Vorarlberg aims at understanding climate risks better and drawing informed recommendations for climate resilience from them. To kick-off this CCRM, a half day workshop (focus group) was organized to understand climate hazards from different perspectives and map the interdependencies between them and secondly, the focus was put on possible solutions.

Key stakeholders that have signed the MoU for joining the CCRM: The city of Dornbirn, Vorarlberg University of Applied Sciences, Weavs and Energieinstitut Vorarlberg.

Dornbirn Quintuple Helix Model matrix:

Institution name	Target Group Category	Quintuple helix category	Competencies
City of Dornbirn	Local public authority	Political system	Climate change communication; engagement of citizens; strategy & planning; leadership and decision-making; policy & governance
University of Applied Sciences	Higher education and research organisation	Educational system	Climate change adaptation; research & analysis; climate resilience research; climate change communication
Weavs	Service providers / private sector	Economic System	Development of digital solutions for monitoring climate change impacts to enable climate change adaptation
Energieinstitut Vorarlberg	Sectoral Agency	Natural System	Expertise in climate change adaptation and energy-related topics, research; experience with collaboration of diverse stakeholder groups

Dornbirn Pilot Project

The main goal of the pilot project is to demonstrate the temperature reduction potential of nature-based solutions. Specifically, different climate data indicators (surface and air temperature, humidity) are collected to compare the perceived temperature on different surface types, as well as on places with and without shade from trees. To minimize external influences on the microclimate, all data collection for different surfaces and shading conditions will be conducted within the same park, ensuring consistent general weather conditions for accurate comparison.

Heat islands are a pressing issue for the city of Dornbirn and nature-based solutions such as tree planting can reduce the heat island effect. This preliminary pilot study focuses on exploring the potential impact of trees and different surfaces on temperature reduction. The aim is to quantify the extent of temperature reduction achievable through nature-based solutions. Through a sensor network, the cooling effect of trees will measured. By using sensors, data is gathered on surface and air temperature, as well as humidity levels. Subsequently, the perceived temperature (heat index) is calculated, enabling an assessment of the actual reduction in perceived temperature. This pilot can be described as a digital solution, supporting the decision for nature-based solutions through climate data results.

The primary objective is to gain insights into the potential of nature-based solutions and unsealed surfaces to improve urban microclimate by mitigating the heat island effect. A secondary objective of the pilot project is to raise public awareness and educate citizens. Additionally, the pilot project aims to support the city of Dornbirn´s existing climate action plan by providing data-driven evidence on the importance of nature-based solutions and temperature-reducing surfaces. The third objective is to provide data-driven insights to strengthen Dornbirn´s climate action plan. The project results are integrated into the Citymonitor dashboard for transparency and informed decision-making. The city of Dornbirn ensured continutation of the pilot study and maintenance of the sensor network after pilot completion.

methods and inclusion

Co-creation happened through several bilateral meetings where climate risks were discussed not only in terms of climate hazards, but also in terms of their social, environmental, and economic consequences. A specialized risk workshop was organized for the members of the local CCRM.

Citizens were informed about the pilot project through media, newspapers and through our participation at conferences.

Implementation steps & timeline of the Dornbirn pilot project:

2023–2024: Stakeholder mapping, MoU signing, Pilot planning.

January 2025: Risk Workshop

2024-2025: Development of action plans

Spring 2025: Implementation of Pilot study

Fall 2025: Natural hazards conference

2025 onwards: Scale-up of the pilot study

All pilot activities were funded by the Interreg Central Europe – MISSION CE CLIMATE project.

challenge

Challenges and delays happened in the search of on finding a suitable location for the on-field pilot activities and obtaining the needed permissions for setting up the equipment. Nevertheless, intersectoral and joint close collaboration, being open to changes and focusing on the shared objective proved crucial for the timely and successful completion of this pilot project.

recommendations

- Involve relevant stakeholders from the beginning.
- Make sure that all stakeholders involved have the same understanding of the purpose of the project, initiative, or pilot to ensure flexibility and adaptability to project changes without loosing the overall objective out of sight.
- Be flexible and open to changes.
- Clear division of responsibilities.

Overview of Pforzheim CCRM

The city district of Pforzheim is affected by climate change in many ways. Trends that can already be observed will intensify in the future. Both the number and duration of **heatwaves** will increase significantly. **Due to the increased amount of water vapour in the air, heavy precipitation will be more intense in the future.** An increase in **thunderstorms and hailstorms** with grains larger than 2 cm in diameter is to be expected (Schröder 2019, Rädler et al. 2019). Examples of priority climate impacts include the increased cooling requirements of buildings in summer (construction and housing action area) or the increase in dry and drought periods (forestry and agriculture action areas). The increase in heat stress in Pforzheim was also identified as a priority for various fields of action (tourism and leisure, people and public health).

The initial set of stakeholders to be involved in the local CCRM had already been identified during the preparation phase of the MISSION CE CLIMATE project and builds on solid existing partnerships in Pforzheim and the Northern Black Forest region. This was confirmed by the signing of the MoU in April 2024.

Since the beginning of the project, it was agreed that the activities of the CCRM would be aligned with the overall Smart City strategy of the City of Pforzheim. Under the Comprehensive Climate Resilience Management (CCRM) umbrella, a series of activities were defined, focusing on enhancing the capabilities of Stadtwerke Pforzheim in implementing smart solutions and fostering knowledge among citizens to mobilize them effectively.

The following priorities have been defined for the local CCRM:

Development of Smart City Infrastructure

This action involves deploying IoT devices and other information and communication technology (ICT) infrastructure to monitor and manage the city's climate risk mitigation efficiently. The data collected will be used to inform decision-making, optimize resource allocation, and improve climate risk mitigation.

Community engagement

This action involves organizing communication and awareness-raising activities to inform and engage the community about climate resilience initiatives. Activities may include public campaigns, community events, and educational programs.

The following stakeholders from the Quintuple Helix Model are included in the Pforzheim CCRM:

Institution name	Target Group Category	Quintuple helix category	Competencies
Hochschule Pforzheim	Higher education and research organisation	Educational system	Climate change adaptation; research & analysis; climate resilience research; climate change communication Development of digital solutions for monitoring climate change impacts to enable climate change adaptation
krumedia	Service providers / private sector	Economic System	Development of digital solutions for monitoring climate change impacts to enable climate change adaptation
WFG Nordschwarzwald	Sectoral agency – Regional economic social development	Economic System / Political system	Climate change communication; engagement of citizens; strategy & planning; leadership and decision-making; policy & governance
City of Calw	Local public authority	Political system	
City of Bad Teinach			
City of Mühlacker			
District of Calw			
Enz district			
City of Knittlingen			
City of Nagold			
City of Niefern-Öschelbronn			
City of Maulbronn			
City of Pforzheim			
City of Illingen			

Pforzheim Pilot Project

The pilot addresses the challenge of enhancing climate resilience in Pforzheim and the Northern Black Forest by empowering citizens with practical tools and smart city-based solutions. It seeks to overcome barriers to effective climate action, such as limited public engagement and fragmented access to relevant information, by fostering active participation and collaboration among local communities.

methods and inclusion

Municipal staff, citizens, students, SMEs, and the regional development agency were engaged from design to rollout. Co-design sessions defined use cases and data needs; students built and installed sensor packs, wrote decoders, and configured dashboards. Municipal teams hosted pilots (flood sites, green areas, traffic spots) and tested alerts in daily operations. Citizens participated in placements and data interpretation via workshops and realized public event together with feedback surveys drove iterative updates and governance choices.

The most prominent example of the use of a co-creation method in the pilot is the joint definition of use cases, which was made through the interaction of the students at Pforzheim University with the representatives of the utility company of the city of Pforzheim. They jointly developed potential use cases, decided on the locations where to place the sensors and the definition of feedback mechanisms to trigger a reaction to the measures and data collected. Citizens participated via interaction during public events and related consultations, and pilot projects.

Implementation steps of the Pforzheim pilot project:

Feasibility - The project includes the development and deployment of sensor boxes designed for environmental monitoring. A comprehensive data acquisition and processing workflow has been established to ensure efficient collection and analysis of sensor data. Field tests were conducted using eight sensors to evaluate their performance under real-world conditions. Additionally, procedures for data acquisition and storage have been implemented to securely manage the collected environmental data.

Prototype Development - Based on the identified objectives, stakeholders collaborate to develop prototypes of the IoT sensor technology and the Citizen Toolkit. This involves designing and testing sensor configurations, as well as drafting instructional materials for the Citizen Toolkit.

Pilot Testing - Once prototypes were developed, pilot testing was conducted in the designated pilot area within the Pforzheim community. This involved deploying IoT sensors in real-world environmental monitoring scenarios and assessing their functionality, usability, and effectiveness.

Data Collection and Analysis - Throughout the pilot testing phase, data is collected from the deployed IoT sensors to monitor environmental parameters such as air quality, temperature, and humidity. This data is then analysed to evaluate the performance of the sensors and assess their impact on environmental monitoring efforts.

Iterative Improvement - Based on the findings from pilot testing and data analysis, stakeholders iterate on the design of the IoT sensors and the Citizen Toolkit to address any identified issues or areas for improvement. This iterative process ensures that the final products meet the needs and expectations of end-users.

Documentation and Reporting - Throughout the implementation and testing phase, comprehensive documentation is maintained to track progress, record findings, and document lessons learned. This documentation serves as a valuable resource for future initiatives and informs the final reporting of project results.

recommendations

One of the most significant lessons is the symbiotic relationship between technological advancement and societal involvement. Technology alone cannot drive meaningful or lasting change in urban sustainability.

It is the convergence of innovative tools with motivated, informed citizens that has brought about palpable results–from optimized salt logistics and more resilient flood prevention to improved public resource management and greener mobility.

The ongoing analysis and visualization of sensor data through user-centric dashboards proved essential for turning raw numbers into actionable intelligence. For example, continuous records of air quality, soil moisture, traffic density, and public-space occupancy allowed both municipal authorities and everyday citizens to track trends, benchmark progress, and intervene with timely, sustainability-minded actions.

Beyond the technical realm, the integration of citizen science emerged as a crucial ingredient for project success and for realizing a deeper dimension of sustainability. Engaging citizens–both as data collectors and informed users–transformed the project from a purely technological exercise into a participatory movement. Citizens actively contributed by installing sensors in their homes, gardens, and workplaces, as well as by responding to emergent insights from the dashboard data. For instance, real-time alerts regarding flood risks or road salt depletion empowered local communities to take preemptive, sustainable actions. The "Do It Yourself" instructions, which were initially devised during the first campaign, enabled broader public participation and enhanced the project's reach and impact.

The citizen science approach also enriched the educational process, as students and non-experts gained hands-on experience in sensor deployment, data analysis, and digital literacy. This democratization of technology resulted in increased public awareness of sustainability challenges and the value of open data. Participants developed a sense of ownership and agency, recognizing that environmental impact is not solely the domain of experts but something shaped by everyday actions and informed decisions.

On the operational side, several valuable lessons surfaced. The effectiveness of collaboration between stakeholders was amplified by clear communication and well-defined roles from the very beginning.

challenge

Routine data collection worked best when both technological and human factors were given equal attention. Challenges–such as the theft of water level sensors–underscored the need for robust security measures and contingency planning. In response, future deployments will emphasize sensor protection and rapid replacement strategies.

The implementation of the pilot was funded by the Interreg Central Europe MISSION CE CLIMATE project. In-kind contribution was obtained from Pforzheim University professors and students, as well as in-kind participation from the utility company of the city of Pforzheim.
Some public events organised by the city were used to communicate about the pilot.

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CITIZEN SCIENCE AND PARTICIPATION

CITIZEN TOOLKIT FOR ENVIRONMENTAL MONITORING.

INNOVATIVENESS

The solution presents high integration of digital technologies. Its innovativeness lies in combining:

- open data principles,
- participatory and data-driven education,
- a functional link between technical monitoring and community engagement.

OBJECTIVE

Develop and implement a Citizen Toolkit focused on environmental monitoring and engagement within the Pforzheim area. This toolkit aims to empower citizens to contribute data and insights using IoT sensors, thereby fostering community participation in smart city initiatives and promoting environmental stewardship.

GEOGRAPHICAL COVERAGE:

THE PILOT PROJECT WAS IMPLEMENTED IN THE CITY OF PFORZHEIM. UPTAKES ARE PLANNED IN FURTHER AREAS OF THE NORTH AND BLACK FOREST REGION.

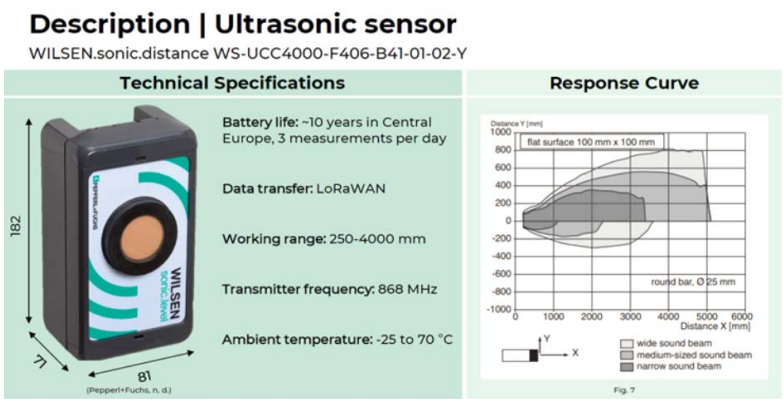
CLIMATE RESILIENCE SOLUTION IN MUNICIPALITY OF PFORZHEIM

The pilot delivered a working end-to-end civic-sensing stack–LoRaWAN devices feeding an enerchart dashboard–validated in real conditions across multiple use cases (water level, air quality, noise, soil humidity, and indoor/urban microclimate, etc. Most sensors have been running continuously; only early water-level units were lost to theft, prompting plans for secured replacements.

A "v1 Citizen Toolkit" with step-by-step guides was produced, with updates queued from subsequent field learnings. The approach for a wider citizen-science rollout was set with local partners, and a public presentation on 6 May 2025 drew roughly 250 attendees, surpassing awareness goals and generating demand for a follow-up. Data is already informing practical decisions–such as road-salt silo logistics, flood preparedness, green-space care, urban climate tracking, and mobility flows.

Key lessons include the robustness and scalability of LoRaWAN and the need for stronger device security. Interim KPIs indicate strong relevance and smooth technical operation, with user satisfaction to be quantified as the rollout expands.

Overall, the pilot progressed from feasibility to stable, real-world sensing with a documented, citizen-ready toolkit and clear momentum for regional scaling.



Description of ultrasonic sensor

IMPLEMENTATION STEPS

The development of the digital solution within the City of Pforzheim took place according to the following steps:

1) PROTOTYPE DEVELOPMENT
2) PILOT TESTING
3) DATA COLLECTION AND ANALYSIS
4) ITERATIVE IMPROVEMENTS

STEP 1 – PROTOTYPE DEVELOPMENT

Based on the identified objectives, stakeholders collaborate to develop prototypes of the IoT sensor technology and the Citizen Toolkit. This involves designing and testing sensor configurations, as well as drafting instructional materials for the Citizen Toolkit.

STEP 2 – PILOT TESTING

Once prototypes are developed, pilot testing is conducted in the designated pilot area within the Pforzheim community. This involves deploying IoT sensors in real-world environmental monitoring scenarios and assessing their functionality, usability, and effectiveness. Citizens are actively involved in the testing process, providing feedback on the usability and utility of the Citizen Toolkit.

STEP 3 – DATA COLLECTION AND ANALYSIS

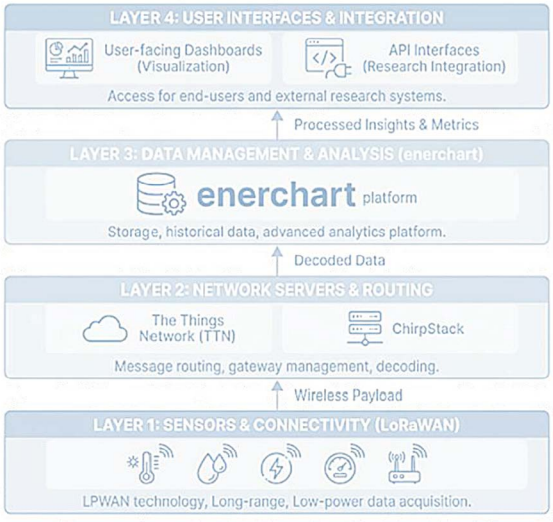
Throughout the pilot testing phase, data is collected from the deployed IoT sensors to monitor environmental parameters such as air quality, temperature, and humidity. This data is then analyzed to evaluate the performance of the sensors and assess their impact on environmental monitoring efforts.

STEP 4 – ITERATIVE IMPROVEMENT

Based on the findings from pilot testing and data analysis, stakeholders iterate on the design of the IoT sensors and the Citizen Toolkit to address any identified issues or areas for improvement. This iterative process ensures that the final products meet the needs and expectations of end-users.

USE CASE REPORTS

Visualisation of short use case reports in the enerchart dashboard can be found here: **enerchart**



Infrastructure layers visualization of digital solution

Over the course of this project, numerous lessons have emerged, encompassing both the technological aspects of IoT deployment and the broader impacts of engaging citizens in data-driven urban and environmental sustainability.

TECHNOLOGY APPROACH

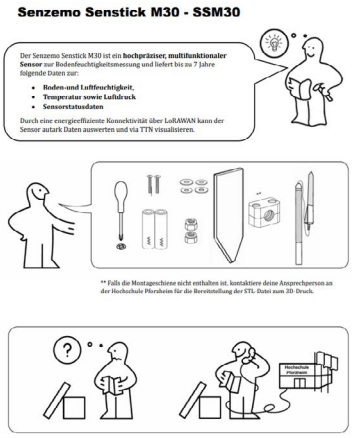
From a technological perspective, the adoption of LORAWAN technology has proven highly advantageous for connecting a diverse array of sensors to a robust, Internet-based dashboard. The long-range, low-power capabilities of LORAWAN enabled the installation of sensors in locations that are traditionally challenging for wired solutions or short-range wireless alternatives. The flexibility and scalability of the network have allowed stakeholders to continuously expand sensor coverage and experiment with new use cases with minimal incremental investment. Notably, LORAWAN's energy efficiency and reliable connectivity have facilitated real-time data collection for applications such as road salt silo management, flood level detection, soil condition monitoring, environmental sensing, and even dynamic crowd and traffic analysis.

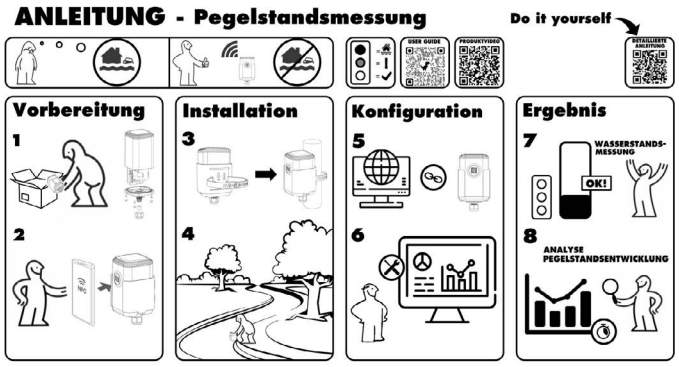
Utilizing **The Things Network** (TTN), an open, global platform, has further accelerated both technology adoption and knowledge sharing. With its suite of accessible tools and strong security features, TTN allowed project teams and citizen collaborators alike to rapidly prototype, test, and scale their IoT applications. The thriving TTN community proved instrumental not only in technical troubleshooting but also in fostering a sense of shared purpose. Local communities across Europe participated in parallel efforts, exchanging expertise and even integrating data streams, which laid a foundation for future cross-regional collaborations.

CITIZEN SCIENCE APPROACH

Beyond the technical realm, the integration of citizen science emerged as a crucial ingredient for project success and for realizing a deeper dimension of sustainability. Engaging citizens–both as data collectors and informed users–transformed the project from a purely technological exercise into a participatory movement. Citizens actively contributed by installing sensors in their homes, gardens, and workplaces, as well as by responding to emergent insights from the dashboard data. For instance, real-time alerts regarding flood risks or road salt depletion empowered local communities to take preemptive, sustainable actions. The Do It Yourself instructions, which were initially devised during the first campaign, enabled broader public participation and enhanced the project's reach and impact.

The citizen science approach also enriched the educational process, as students and non-experts gained hands-on experience in sensor deployment, data analysis, and digital literacy. This democratization of technology resulted in increased public awareness of sustainability challenges and the value of open data. Participants developed a sense of ownership and agency, recognizing that environmental impact is not solely the domain of experts but something shaped by everyday actions and informed decisions.





Examples of DYI manuals for sensors installation

COLLABORATION APPROACH

On the operational side, several valuable lessons surfaced. The effectiveness of collaboration between krumedia and Hochschule Pforzheim was amplified by clear communication and well-defined roles. Ongoing, routine data collection worked best when both technological and human factors were given equal attention. Challenges–such as the theft of water level sensors–underscored the need for robust security measures and contingency planning. In response, future deployments will emphasize sensor protection and rapid replacement strategies.

Perhaps one of the most significant lessons is the symbiotic relationship between technological advancement and societal involvement. Technology alone cannot drive meaningful or lasting change in urban sustainability. It is the convergence of innovative tools with motivated, informed citizens that has brought about palpable results–from optimized salt logistics and more resilient flood prevention to improved public resource management and greener mobility.

The ongoing analysis and visualization of sensor data through user-centric dashboards proved essential for turning raw numbers into actionable intelligence. For example, continuous records of air quality, soil moisture, traffic density, and public-space occupancy allowed both municipal authorities and everyday citizens to track trends, benchmark progress, and intervene with timely, sustainability-minded actions.

Demonstration of pilot approach at SMART CITY DAYS 2025, Pforzheim

PILOT SUMMARY

The pilot in Pforzheim contributes a practical, scalable pathway for tackling climate challenges by turning citizen participation into continuous environmental intelligence and actionable local decisions. It delivers a low-cost LoRaWAN sensing network, using The Things Network and an enerchart dashboard, that citizens and students help install and operate, shifting monitoring from occasional expert surveys to always-on, community data streams.

The project couples technology with a DIY Citizen Toolkit and campaigns that grow digital literacy and ownership. By blending open IoT, user-centric dashboards, and structured citizen science, the pilot accelerates how communities monitor and adapt to climate change while building the social capital needed for long-term resilience.

Overview of the Brač CCRM

The Island of Brač in Croatia faces rising climate risks driven by **hotter, drier summers, more frequent heatwaves, and unreliable rainfall, all of which directly intensify drought and water scarcity concerns across the island.** Brač is a tourism-dependent island with limited freshwater sources and a seasonal population surge, which places additional pressure on its water supply system. The old water supply system is contributing to high water losses, but the water supply company, Vodovod Brač, is now responding through modernisation efforts—including the replacement of outdated metering technology, leak-detection upgrades, and the creation of a dedicated water loss reduction team—to strengthen resilience.

The establishment of the Community Climate Resilient Mission (CCRM) on the island of Brač was initiated by the **Split Dalmatia County (SDC)** and **Energy Institute Hrvoje Požar (EIHP)** as part of its commitment to implementing equipment procured during the Mission CE Climate project and to implement the Sustainable Energy and Climate Action Plan (SECAP). The objective of the CCRM is to support the Island of Brač to become climate resilient and enable a coordinated response to the local challenges of climate change. The process followed a structured sequence. The SDC and the EIHP conducted a comprehensive stakeholder mapping based on the Quintuple Helix approach, followed by consultation rounds with local government, public utilities and community actors to identify shared priorities and identify key actors relevant to the local climate transition.

These interactions led to the signing of a Memorandum of Understanding between core stakeholders:

- Split-Dalmatia County
- Energy Institute Hrvoje Požar
- Vodovod Brač
- The City of Supetar
- The Municipality of Sutivan
- Local Action Group Brač

The Memorandum formalized collaboration and responsibility-sharing and enabled the launch of co-design activities under the Climate Mission framework. Through workshops, technical exchanges and participatory meetings, stakeholders co-identified **water scarcity, heat risks and infrastructure vulnerability as priority resilience topics,** leading to the upgrading of Brač's water distribution system. The mission unites multiple sectors, with representation from public institutions (regional and municipal authorities), science and research (EIHP), public utilities (Vodovod Brač), local development organizations (LAG Brač), and community representatives.

Brač Pilot Project

The pilot relies on the Quintuple Helix Model by involving actors from government, public utilities, research, civil society, and the local economy. Regional and local public authorities–Split-Dalmatia County, the City of Supetar and the Municipality of Sutivan–provided governance, political support and access to local knowledge. Vodovod Brač, the publicly owned water utility, served as the technical implementer, installing equipment and creating a leak-detection team. EIHP contributed scientific and technical expertise in project design, monitoring and validation. Citizens were included indirectly through events and community engagement activities, while the Local Action Group Brač represented civil society and acted as a bridge between community actors and institutions.

methods and inclusion

- Stakeholder mapping
- Bilateral interviews with stakeholders
- Coordination meetings with core team (SDC, Vodovod Brač, EIHP)
- Coordination meetings and knowledge exchange with stakeholders
- Participation at local festival to raise awareness about climate change
- Distribution of educational materials

Citizens participated primarily through awareness and behaviour-change activities–adjusting consumption habits, learning how to use water more efficiently, and supporting adaptation actions identified in the SECAP. Outreach events, including the Mission CE Climate presentation and public guidance materials, equipped residents and seasonal users with practical water-saving measures. Over time, residents are expected to help shape demand management and provide feedback on system improvements.

Project implementation followed a clear timeline:

2023 – early 2024: early scoping and equipment planning

Mar 2024: stakeholder contracting and MoU signing

Mid-late 2024: procurement of technical equipment by Vodovod Brač and Split-Dalmatia County

Sep 2024 – Apr 2025: installation of data loggers and meters

Early 2025: establishment and training of a three-person leak-detection team

May 2025 – present: active monitoring and verification

Sep – Oct 2025: public dissemination, including local presentations and stakeholder events

Procured equipment, consisting of 15 magnetic-inductive meters, 10 data loggers, 1 remote water flow detector, and Vibrophone MTC, was funded partially by the SDC, through the Mission CE Climate project, and partially by direct investment of Vodovod Brač. Total investment is valued at aproximately 70.000 euros. EIHP contributed technical consultancy, and the SDC supported coordination and administrative processes.

Key risks centered on equipment installation in functioning water facilities, working during night or winter periods to avoid service disruption, especially during tourist season, and ensuring the safe handling of pressurized infrastructure. Operational risks included service interruptions, limited access due to tourism traffic and differences in material costs compared to initial market research.

As of late 2025, all planned equipment had been delivered and installed, and the pilot entered full operational testing. A new loss-detection team was established, monitoring systems are live, and data is being verified in structured phases.

As expected, the most tangible result has been a reduction in water losses. Additional outcomes include the formation of a dedicated water-efficiency team, improved system transparency through real-time monitoring, increased institutional capacity across municipal stakeholders, and community awareness materials, including a household water and energy guide to support broader climate and drought resilience.

Vodovod Brač is responsible for the continued operation, now equipped with modern tools and human capacity to maintain and manage the upgraded system. Monitoring will continue beyond the project period, and findings are expected to potentially be replicated on other Adriatic islands. Split-Dalmatia County and EIHP will maintain advisory roles through ongoing regional planning processes, while LAG Brač and municipalities will continue community engagement.

The pilot focused on upgrading leak detection and management capabilities within Vodovod Brač's water supply system. The installation of new equipment was paired with the formation of a dedicated leak-detection unit—three employees trained to operate the new equipment, analyse data and intervene rapidly when losses were detected. Monitoring began gradually, with staged verification periods aligning with procurement, testing and full rollout, enabling the utility to transition from manual estimation to real-time system insight. In parallel, project partners, Split-Dalmatia County and EIHP, coordinated planning, reporting and communication, ensuring that municipalities and civil society actors remained informed.

challenge

The initiative encountered administrative and technical barriers. Procurement planning was complicated by price changes, forcing partners to adjust purchase lists and split procurement responsibilities between SDC and Vodovod Brač. Technically, installation had to be conducted while ensuring uninterrupted drinking-water delivery, often requiring nighttime or off-season work to avoid tourist-season disruptions. These constraints lengthened installation timelines.

Close cooperation, adaptation and flexibility among partners were decisive in overcoming these challenges. Splitting procurement tasks, securing additional investment from the utility and forming a specialised internal team ensured both continuity and ownership. Working during low-demand seasons and coordinating calendars with residents and tourism cycles allowed installations to progress without compromising service. Strong communication between partners sustained momentum and kept delays manageable.

recommendations

- Anticipate cost changes and design procurement plans with flexible scopes or phased purchasing options
- Align technical work with community rhythms in your area (peak tourism, school holidays or seasonal workloads)
- Combine technological upgrades with organisational change—hardware alone is insufficient without trained staff and monitoring routines.
- Treat pilots as learning platforms—monitor data, document lessons, create public materials and communicate results

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COMBATING WATER SCARCITY IN COASTAL AREAS

UPGRADING THE EFFICIENCY OF THE WATER DISTRIBUTION SYSTEM AND DECREASING WATER LOSSES TO ADAPT TO POSSIBLE DROUGHTS CAUSED BY CLIMATE CHANGE.

INNOVATIVENESS

The presented solution demonstrates a high level of integration of digital technologies and team management to achieve the best possible results. Its innovativeness lies in combining:

- modern water consumption measurement systems and loss detection equipment
- the team organisation and new team for the detection of losses

OBJECTIVE

This pilot project aims to upgrade the water supply network for the island of Brač, which would directly reduce significant losses in the network and introduce monitoring and management of the water supply system to control losses / possible leaks and enable timely and appropriate intervention. This would improve the water supply of the population of the island of Brač and the general quality of life (especially in summer).

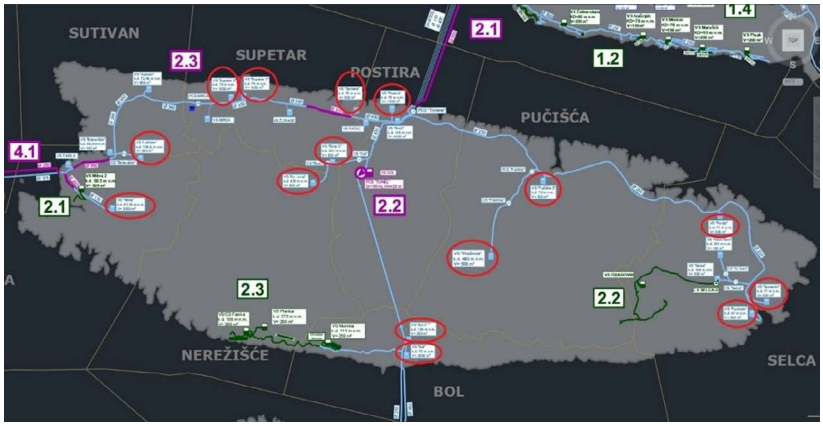
GEOGRAPHICAL COVERAGE:

THE PILOT PROJECT'S FOCUS IS ON REDUCING LOSSES IN THE ISLAND OF BRAČ'S WATER SUPPLY NETWORK, AND THEREFORE THE PROJECT AIMS TO IMPACT THE ENVIRONMENTAL SYSTEMS RELATED TO WATER USE ON THE ISLAND OF BRAČ.

CLIMATE RESILIENCE SOLUTION ON THE ISLAND OF BRAČ

The solution implemented by pilot project in the geographical area of the island of Brač consists of:

- improvement of the existing equipment in the Vodovod Brač water supply company with modern water consumption measurement systems and loss detection equipment
  See more here
- inauguration of the new team inside the organizational structure of **Vodovod Brač**, specialized in water leak detection in the water supply system.



- Circled in red are facilities where magnetic-inductive consumption meters were installed.
- Purple lines. Existing pipelines in the plan for re-construction.
- Green lines. New pipelines in plan for construction

IMPLEMENTATION STEPS

Implementation of the solution followed clear steps as listed below:

1) DEFINITION OF TOR
2) SIGNING OF THE CONTRACT WITH VODOVOD BRAČ
3) PUBLIC PROCUREMENT OF EQUIPMENT
4) DELIVERY AND INSTALLATION OF EQUIPMENT
5) MONITORING
6) VERIFICATION PROCESS

STEP 1 – DEFINITION OF ToR

The project partners EIHP and SDC have organized several meetings with members of Vodovod Brač in an effort to define the necessary equipment for the upgrade of the existing process of detecting water leaks in the water supply network of the Island of Brač. The major constraint for the equipment was the previously defined budget, which was sufficient for the planned investment at the time the project was prepared, but not after COVID pandemic and the rise of prices. The conclusion was two lists for procurement, one for the SDC to purchase and the other for Vodovod Brač.

STEP 2 – SIGNING OF THE CONTRACT WITH VODOVOD BRAČ

The contract regulating ownership, installation and service of the pilot project investment has been signed by SDC and Vodovod Brač

STEP 3 – PUBLIC PROCUREMENT OF EQUIPMENT

The close collaboration between project partners (EIHP and Splitsko/Dalmatinska County), the final beneficiary (Vodovod Brač), and members of CCRM was crucial for the relevant identification of technical and market analysis for the pilot project equipment and preparation of tender documentation. Following equipment was procured:

- 10 pieces of data logger
- VIBROPHONE MTC
- 15 Magnetic-inductive water meters for replacement of existing turbine meters
- 1 piece of remote water flow detection

STEP 4 – DELIVERY AND INSTALLATION OF EQUIPMENT

The installation schedule is done according to water consumer needs. The installation will stop the water supply, and the installation needs to be done when the effect of stopping the water supply will be minimal (mainly during nights on weekdays).

Therefore the implementation of the solution needs to be coordinated with the beneficiaries, including specific conditions (summer holiday season, traffic jams...)

The installation process took a long time due to the required additional electrical installation work and adjustments to ensure that the equipment functioned in accordance with the manufacturer's recommendations and the full product warranty.

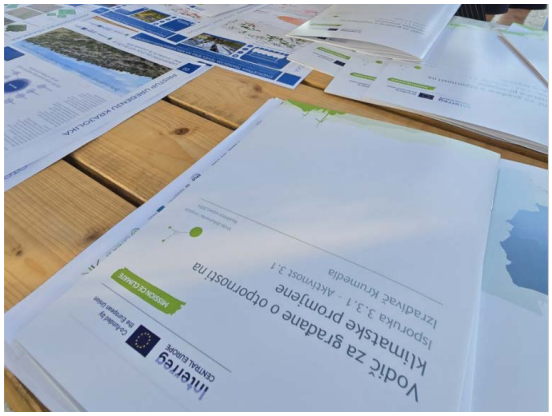
Examples of equipment investments into the water supply network

STEP 5 – MONITORING

- The initial steps of the monitoring process started from the beginning of the pilot project implementation. All activities were coordinated by EIHP and SDC according the plan and process was slightly delayed due to post-COVID changes in the market, but finalized with expected outcomes and tangible results.
- A dedicated Water Loss Department was established, demonstrating a systematic approach to leak detection.
- Household Guide for citizens was created, offering practical advice on reducing energy and water use.

STEP 6 – VERIFICATION PROCESS

- The verification of the results obtained from the pilot project implementation has been modified due to the equipment delivery timeline (and existing equipment before the pilot project implementation).
- Final equipment (existing + invested) of Vodovod Brač consists of: 16 data loggers: "ORTOMAT O4G data logger + 2 pieces of VIBROFON MTC-1.8 m cable + Antenna (GSM/UMTS+ MAGNET)" , 15 new magnetic-inductive water meters and an application for communication with them.
- Water loss was reduced from 26% to 20%, with plans to reach 15%, significantly improving energy efficiency and service reliability



Dissemination of Manual for citizens during local festival FOR FLAG Sustainable Development Festival in SUPETAR

Final presentation of the solution for local stakeholders

LESSONS LEARNED

- The close cooperation between project partners and beneficiaries is crucial for the implementation
- The budget planning needs to be done according to market analysis also revised by specialist
- The time for pilot project implementation needs to be coordinated with the beneficiaries, including specific conditions (summer holiday season, traffic jams...)
- The work on the water reservoirs and installation of equipment has been done during the winter season, and usually during the night, which caused extra work and a longer time for the installation.
- Before purchasing the equipment, make preparations for the installation, especially the electrical installation and metal joints
- The reduction of water losses has been a result of the new equipment and the new team that has the knowledge to use the new equipment most efficiently.

PILOT SUMMARY

The Brač pilot contributes a practical, scalable solution set for combating water scarcity in coastal areas by turning non-revenue water into a resilience resource. It replaces aging meters with magnetic-inductive units and expands telemetry and leak-detection capability to continuously find and fix losses, cutting distribution losses and stabilizing supply during droughts and peak tourist seasons. The project couples technology with governance–creating a dedicated Water Loss Unit, integrating data into simple operator dashboards, and validating savings over a full seasonal cycle–so utilities can act on evidence, not estimates. Night-time works and staged procurement show how to modernize coastal networks with minimal service disruption and within tight budgets, while citizen guidance materials reduce household demand. The result is a replicable "coastal playbook": instrument priority reservoirs and trunk lines, isolate sectors to pinpoint leaks, align interventions with tourism cycles, and use split-financing to de-risk delivery. Beyond securing potable water, the approach lowers pumping energy and emissions, strengthens drought preparedness, and offers a ready-to-adopt toolkit and operating model for other island and shoreline utilities facing climate-driven water stress.

Pilot Draft Template

Pilot title: .....

Location(s): .....

Local climate risk addressed: .....

Goal: .....

Co-creation method used: .....
(e.g., workshop, interviews, citizen dialogue,
school curriculum co-design)

Key stakeholders: .....
(Quintuple Helix list)

Implementation steps + timeline: .....

Data/indicators: .....
(technical, economic, social, etc.)

Risks and safety considerations: .....

Maintenance and sustainability plan: .....

Replication notes: .....
(sustainability, what must be in place to upscale or mirror in other
initiative or within a different context)

Participatory Tools for Community-Led Initiatives and Co-Designing Pilot Projects with Citizens

This toolbox provides practical methods used across the CCRMs and pilots in this manual. Each tool includes purpose, when to use it, and minimum outputs so communities can apply it immediately.

Tool 1:

Stakeholder mapping (Quintuple Helix Model)

Purpose: Identify who must be involved for legitimacy, knowledge, implementation, and community ownership.

When to use: Before forming a CCRM, launching a campaign, or designing a pilot.

How: List actors under the five helix categories; then prioritise by influence and willingness.

Minimum outputs: Stakeholder list + contact points + engagement plan (who to meet first and why).

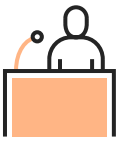
Tool 2:

Bilateral interviews / one-to-one meetings

Purpose: Build trust early, surface concerns, and identify resources and constraints.

When to use: Before workshops; when dealing with sensitive topics or fragmented responsibilities.

Minimum outputs: Short notes capturing (a) needs, (b) offers, (c) risks, (d) decision constraints.



Tool 3:

Launch event + networking session

Purpose: Make the mission visible, invite participation, and connect actors who do not normally collaborate.

When to use: At the start of a CCRM or pilot cycle.

Good practice: Combine short presentations with small-group discussion and a clear "how to join" step.

Minimum outputs: Attendance list, top priorities, sign-ups for next meeting/workshop.

Tool 4:

Citizen dialogue / open forum

Purpose: Collect lived experience (heat, flooding, mobility constraints, seasonal pressures) and validate priorities.

When to use: Early in problem definition; when trust and inclusion are key.

Minimum outputs: List of issues, locations, and community ideas; agreement on one focus area.

Tool 5:

Co-design workshop (solution shaping)

Purpose: Move from problems to a feasible solution design with shared ownership.

When to use: Once a priority is chosen; before procurement/permissions.

Format: 60–120 minutes. Use a simple canvas: Problem → Users → Ideas → Constraints → Actions → Roles.

Minimum outputs: One selected solution concept, roles, timeline, and next steps.

Tool 6:

Participatory mapping (risk and opportunity)

Purpose: Identify hotspots (heat islands, flood-prone streets, overheated schoolyards, water-loss areas) and feasible pilot sites.

When to use: When location matters (most adaptation pilots).

Methods: Mapping walk, printed map session, or digital map tool.

Minimum outputs: Priority locations + site notes + backup options.

Tool 7:
Surveys and rapid feedback (on-site or online)

Purpose: Capture user experience and perceived benefits (comfort, safety, usability, acceptance).

When to use: During or after pilot implementation (e.g., at bus stops, schools, public events).

Minimum outputs: 3–8 key questions, response summary, and at least 2 actionable improvements.

Tool 8:
Living lab routine (regular mission meetings)

Purpose: Maintain momentum beyond one-off events and projects.

When to use: Throughout the CCRM lifecycle.

Good practice: Keep meetings short; publish decisions; rotate hosts; invite new partners periodically.

Minimum outputs: Action list, decision log, one outward-facing update message.

Tool 9:
Risk and vulnerability workshop (expert + community)

Purpose: Understand hazard interdependencies and prioritise responses.

When to use: For complex hazards (heat + flooding + landslides; coastal risks; infrastructure vulnerability).

Minimum outputs: Priority risk list, interdependencies, and recommended adaptation actions.

Tool 10:
Data and dashboard co-design (open data for climate action)

Purpose: Make climate data usable for citizens, schools, and municipal decision-making.

When to use: When using sensors, monitoring, or open data platforms.

Steps: Define use cases → choose indicators → design visualisation → test with users → refine.

Minimum outputs: Agreed indicators, user-friendly dashboard layout, maintenance protocol.

Tool 11:
Education co-creation (schools as climate hubs)

Purpose: Convert monitoring into learning and community awareness.

When to use: When schools can host sensors or climate learning modules.

Good practice: Co-create content with teachers; align with the school year; simplify data access with direct links.

Minimum outputs: Lesson plan(s), worksheets, and a simple student task tied to local data.

Tool 12:
Public festivals / open days (amplification tool)

Purpose: Scale visibility and engagement beyond "already involved" groups.

When to use: After pilots or major milestones; in tourism-heavy locations for seasonal outreach.

Minimum outputs: Engagement numbers, key messages delivered, sign-ups, and feedback.

Tool 13:
Implementation coordination (multi-competence management)

Purpose: Reduce delays caused by fragmented responsibilities (permits, heritage protection, concessionaires, utilities).

When to use: Urban pilots and infrastructure-linked pilots.

Minimum outputs: Named coordination lead, responsibility matrix, and a "permissions/procurement" timeline.

Tool 14:
Learning capture and replication note

Purpose: Convert pilot experience into a best practice others can adopt.

When to use: At pilot completion and after major milestones.

Minimum outputs: What worked, what did not, costs/effort, prerequisites, and replication steps.

Tools at a Glance

Tool	Purpose	When to use	Minimum outputs
1. Stakeholder mapping	Identify who must be involved for legitimacy, knowledge, implementation, and ownership	Before forming a CCRM, launching a campaign, or designing a pilot	Stakeholder list + contact points + engagement plan (who to meet first and why)
2. Bilateral interviews / one-to-one meetings	Build trust early, surface concerns, identify resources and constraints	Before workshops; for sensitive topics or fragmented responsibilities	Short notes: needs, offers, risks, decision constraints
3. Launch event + networking session	Make the mission visible, invite participation, connect actors	Start of a CCRM or pilot cycle	Attendance list + top priorities + sign-ups for next meeting/workshop
4. Citizen dialogue / open forum	Collect lived experience and validate priorities	Early problem definition; when trust and inclusion are key	Issues + locations + community ideas + agreement on one focus area
5. Co-design workshop (solution shaping)	Turn problems into a feasible, shared solution design	After choosing a priority; before procurement/ permissions	Selected solution concept + roles + timeline + next steps
6. Participatory mapping (risk and opportunity)	Identify hotspots and feasible pilot sites	When location matters (most adaptation pilots)	Priority locations + site notes + backup options
7. Surveys and rapid feedback (on-site or online)	Capture user experience and perceived benefits; improve implementation	During or after a pilot (e.g., bus stops, schools, public events)	3–8 questions + response summary + at least 2 actionable improvements
8. Living lab routine (regular mission meetings)	Maintain momentum beyond one-off events and projects	Throughout the CCRM lifecycle	Action list + decision log + one outward-facing update message
9. Risk and vulnerability workshop (expert + community)	Understand hazard interdependencies and prioritise responses	For complex hazards (e.g., heat + flooding + landslides)	Priority risk list + interdependencies + recommended adaptation actions
10. Data and dashboard co-design (open data for climate action)	Make climate data usable for citizens, schools, and decision-makers	When using sensors, monitoring, or open data platforms	Agreed indicators + user-friendly dashboard layout + maintenance protocol
11. Education co-creation (schools as climate hubs)	Turn monitoring into learning and community awareness	When schools host sensors or climate learning modules	Lesson plan(s) + worksheets + simple student task tied to local data
12. Public festivals / open days (amplification tool)	Scale visibility and engagement beyond "already involved" groups	After pilots/milestones; tourism-heavy locations for seasonal outreach	Engagement numbers + key messages delivered + sign-ups + feedback
13. Implementation coordination (multi-competence management)	Reduce delays from fragmented responsibilities (permits, utilities, etc.)	Urban and infrastructure-linked pilots	Named coordination lead + responsibility matrix + permissions/ procurement timeline
14. Learning capture and replication note	Convert pilot experience into a best practice others can adopt	At pilot completion and after major milestones	What worked/what didn't + costs/effort + prerequisites + replication steps

Trainings for Participants of Citizen-Led Initiatives

Community-led climate resilience depends not only on people's motivation to act, but also on their capacity to do so. Across Europe and globally, communities are increasingly stepping forward to address the impacts of climate change—flooding, heatwaves, drought, and ecological degradation. However, to ensure their efforts are informed, inclusive, and effective, communities must be equipped with the right tools, knowledge, and skills.

This chapter outlines the critical role of training and capacity-building in enabling and sustaining citizen-led climate initiatives. It presents key training themes for climate-resilience for citizens, highlights successful examples from across Europe, and demonstrates how structured learning can turn grassroots enthusiasm into resilient and equitable action.

Training is not a peripheral activity in climate governance—it is central. When communities are well-informed, they are better positioned to:

- **Understand and assess their specific climate risks;**
- **Design and implement locally relevant solutions;**
- **Participate in decision-making processes** with confidence;
- **Access funding and resources;**
- **Monitor progress and adapt** over time.

Our Approach

A series of structured training sessions were developed within the MISSION CE CLIMATE project to build foundational knowledge and strengthen the capacity of local actors involved in Community Climate Resilient Missions (CCRMs). Climate resilience requires not only strategic planning and technical solutions but also shared understanding among all stakeholders. The training programme was designed to equip CCRM members with the scientific background, policy frameworks, and practical tools needed to respond effectively to climate challenges in their communities.

Covering essential themes such as climate adaptation, temperature and precipitation-related risks, and urban resilience within planetary boundaries, the sessions aimed at support a common learning baseline while addressing the specific needs of different local contexts. This approach ensures that all participating communities, regardless of scale or focus area, can develop informed, collaborative, and adaptive responses to the climate crisis.

To build the knowledge and capacity of citizens, NGOs, and local actors in addressing climate challenges, initiatives should offer structured training sessions that combine scientific grounding, policy awareness, and practical application. The aim is to establish a **shared understanding among stakeholders** while tailoring content to the unique needs of each community.

Below are some training topics organized within the MISSION CE CLIMATE project that any CLI can adopt or adapt to strengthen community climate resilience.

1. Introductory training on climate change and its effects

Provided a clear introduction to climate change and its local and global impacts.

What the training covered:

- The science of climate systems and the greenhouse effect;
- How cities contribute to CO2 emissions;
- The importance of vulnerability assessments as a basis for adaptation planning;
- Practical examples of vulnerability assessments from other cities to inspire local action.

2. Understanding Temperature-Based Climate Risks

Educated participants on the health, environmental, and social risks of rising temperatures.

What the training covered:

- The urban heat island effect and its implications
- Climate projections under different emission scenarios
- Strategies for urban cooling and nature-based solutions
- Examples of both incremental and transformational adaptation actions from other cities

3. Addressing Precipitation-Based Climate Risks

Help communities prepare for floods, droughts, and shifting rainfall patterns.

What the training covered:

- Current trends and projected changes in precipitation;
- Types of flooding (riverine, pluvial, coastal) and related vulnerabilities;
- Adaptation measures such as flood defenses, water conservation, and ecosystem restoration;
- The economic and environmental costs of inaction.

4. Building Resilient Cities Within Planetary Boundaries

Guide participants in aligning urban development with the planet's ecological limits.

What the training covered:

- Introduction to the concept of planetary boundaries;
- Key resilience qualities: flexibility, inclusiveness, integration;
- Approaches for upgrading infrastructure and applying nature-based solutions;
- Ensuring equity in adaptation and engaging communities in decision-making;
- Setting up monitoring and evaluation processes for continuous improvement.

5. Using the Copernicus System for Climate Action

Introduced the EU Copernicus Earth Observation Programme and how communities can use its free data and tools.

What the training covered:

- Monitoring climate trends
- Assessing local risks
- Supporting evidence-based decision-making

6. Financing Strategies for Climate Adaptation

Provided guidance on how to secure and manage funding for climate resilience measures.

What the training covered:

- Public and private funding sources
- Innovative financing models (e.g., green bonds, climate funds)
- Building compelling proposals and partnerships
- Ensuring financial accountability and transparency

7. The Potential of Civic Participation

Highlighted how community engagement can accelerate climate action.

What the training covered:

- Methods for involving residents in planning and implementation
- Building trust and fostering collective ownership
- Case studies where civic participation led to stronger climate outcomes

8. Data for Climate Action: OpenData & CLIMAAX Tools

The journey towards an Open Data Platform (concept, key milestones, and enabling process).

What the training covered:

- Barriers and challenges encountered (technical, organisational, and data-related) and how to address them;
- Presentation of core datasets (environmental, climate, and geospatial) and their practical value;
- CLIMAAX tools: functions, ecosystem overview, and data requirements;
- Case study: Košice – how OpenData and CLIMAAX tools support local climate-risk analysis;
- IoT & LoRaWAN networks and practical applications to monitor climate-relevant data;
- Practical examples and peer learning from experts involved in the MISSION CE CLIMATE project.

Recommendation for Development of Training Curriculums for Community-Led Climate Initiatives

A robust training program for community-led initiatives should address both technical knowledge and organizational capacity. Below are some recommended topics that form the foundation of such programs:

Climate Science and Local Risk Awareness

Communities need to understand how climate change manifests locally. Training in basic climate science, risk mapping, and local projections helps individuals and groups recognize how flooding, heatwaves, sea-level rise, or biodiversity loss may affect them directly. This knowledge is often the catalyst for action.

Community-Based Vulnerability and Capacity Assessment (CVCA)

Participatory tools like vulnerability mapping, seasonal calendars, and asset inventories allow communities to assess their risks and strengths. These tools enable self-reflection and set the foundation for locally driven planning.

Nature-Based Solutions (NbS) and Green Infrastructure

Green roofs, rain gardens, urban forests, and restored wetlands are low-cost and multifunctional responses to climate impacts. Training on how to design, implement, and maintain such solutions enables communities to enhance local resilience while co-benefiting from improved health and biodiversity.

Community Organizing and Governance

Sustained climate action depends on organized structures and strong leadership. Training in local governance, meeting facilitation, consensus-building, and transparency ensures that groups can coordinate effectively and inclusively.

Project Planning and Management

Even grassroots projects require structure. From writing a project plan to managing budgets and evaluating outcomes, communities benefit from learning professional planning tools that help translate ideas into tangible results.

Climate Finance and Fundraising

Understanding where and how to access funding is critical for scaling community initiatives. Training might include how to apply for EU grants, pitch to donors, manage funds transparently, and report effectively.

Communication and Climate Storytelling

Communities need to tell their stories—to engage others, influence policy, and attract resources. Training in media engagement, public speaking, and visual storytelling can amplify local voices and inspire broader change.

Just Transition and Climate Justice

Climate change affects communities unequally. Training in equity, social justice, and intersectional inclusion ensures that resilience initiatives reflect the needs and priorities of all residents, especially those most at risk.

Community Engagement

This action involves organizing communication and awareness-raising activities to inform and engage the community about climate resilience initiatives. Activities may include public campaigns, community events, and educational programs.

Training Programme Design Checklist
(for citizens, NGOs, local actors)

Design

- ☐ Define training purpose: awareness, skills, implementation, funding readiness.
- ☐ Segment target groups (citizens, NGOs, municipal staff, teachers, youth, SMEs).
- ☐ Choose format: short workshop / modular series / mentoring / blended.

Make training practical

- ☐ Link each module to one real local task (mapping, pilot design, communication, data reading).
- ☐ Include one hands-on exercise per session (e.g., vulnerability mapping, co-design canvas, dashboard demo).
- ☐ Provide take-home materials (worksheets, checklists, links).

Integrate learning with pilots

- ☐ Use local pilot examples as teaching cases.
- ☐ Invite pilot partners (municipality, utility, school, NGO) for credibility.
- ☐ End training with an action commitment: who will do what by when.

Accessibility and inclusion

- ☐ Offer non-digital access where needed (print, local venues, short sessions).
- ☐ Schedule around school calendars, seasonal workloads, and tourism peaks.
- ☐ Collect feedback and refine content each cycle.

European Case Studies: Impact of Community Training

Across Europe, communities are increasingly stepping into leadership roles in responding to the climate crisis. While policy frameworks and infrastructure investments are essential, it is the knowledge, skills, and agency of local people that often determine the success–or failure–of climate adaptation efforts on the ground. Community training plays a pivotal role in this transformation. It bridges the gap between awareness and action, enabling residents to understand climate risks, co-design solutions, and sustain long-term resilience measures.

This chapter presents a selection of European case studies that demonstrate how strategic, inclusive training programs have catalyzed citizen-led climate initiatives.

From rain gardens in Rotterdam to climate-sheltering schoolyards in Barcelona, each example shows how empowering people with the right tools and understanding can lead to meaningful environmental and social outcomes. These cases highlight not only the diversity of training formats and topics but also the shared principles of participation, ownership, and capacity-building that underpin successful community resilience.

By examining these stories, practitioners and policymakers can gain valuable insight into how to design and scale community training programs that are not only technically effective but also socially inclusive and locally grounded.

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Rotterdam, Netherlands – Water Sensitive Neighborhoods and the Sponge Garden

In response to increasing rainfall and urban flooding, Rotterdam developed an ambitious strategy to become a "water-sensitive city." Central to this effort was the active involvement of local communities in understanding and co-designing nature-based flood management solutions. One of the most prominent examples of this approach is the **Sponge Garden**, a living laboratory established in collaboration with community members, local designers, and water experts.

Residents participated in training sessions and workshops where they learned how green-blue infrastructure works– specifically how soil, vegetation, and landscape features can be designed to store and slowly release rainwater. They were involved in testing various soil compositions, choosing plant species, and designing small-scale bioswales and rain gardens. Local participants also learned how to monitor water absorption and contribute to long-term maintenance.

The Sponge Garden not only reduced flood risks in the area, it also became a model for similar community-based projects across Rotterdam. The initiative demonstrated how well-informed and engaged citizens can play a meaningful role in urban climate adaptation, creating more livable, green, and flood-resilient neighborhoods.

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Barcelona, Spain – Climate Shelters in Schools

As part of its urban climate adaptation strategy, the city of Barcelona developed an innovative program to **transform schoolyards into climate shelters.** These redesigned spaces aimed at reduce the effects of urban heat, increase access to green infrastructure, and serve as safe community hubs during extreme weather events.

The success of the program relied heavily on the active involvement of school communities–teachers, students, parents, and local organizations. Through participatory workshops and hands-on training sessions, community members learned about climate risks, thermal comfort, and landscape design. Children were taught how green spaces could cool the environment, reduce flooding, and support biodiversity. Adults collaborated with city planners to identify the best features to include, such as trees, shaded seating areas, water play zones, and permeable pavements.

The program resulted in the transformation of eleven schoolyards into multifunctional climate shelters. Families reported improved comfort during heatwaves, increased usage of outdoor space, and stronger community engagement. Based on this success, the initiative has been expanded to additional schools and integrated into Barcelona's long-term urban resilience strategy. It has become a leading example of how participatory design and climate education can turn everyday public spaces into hubs of resilience and well-being.

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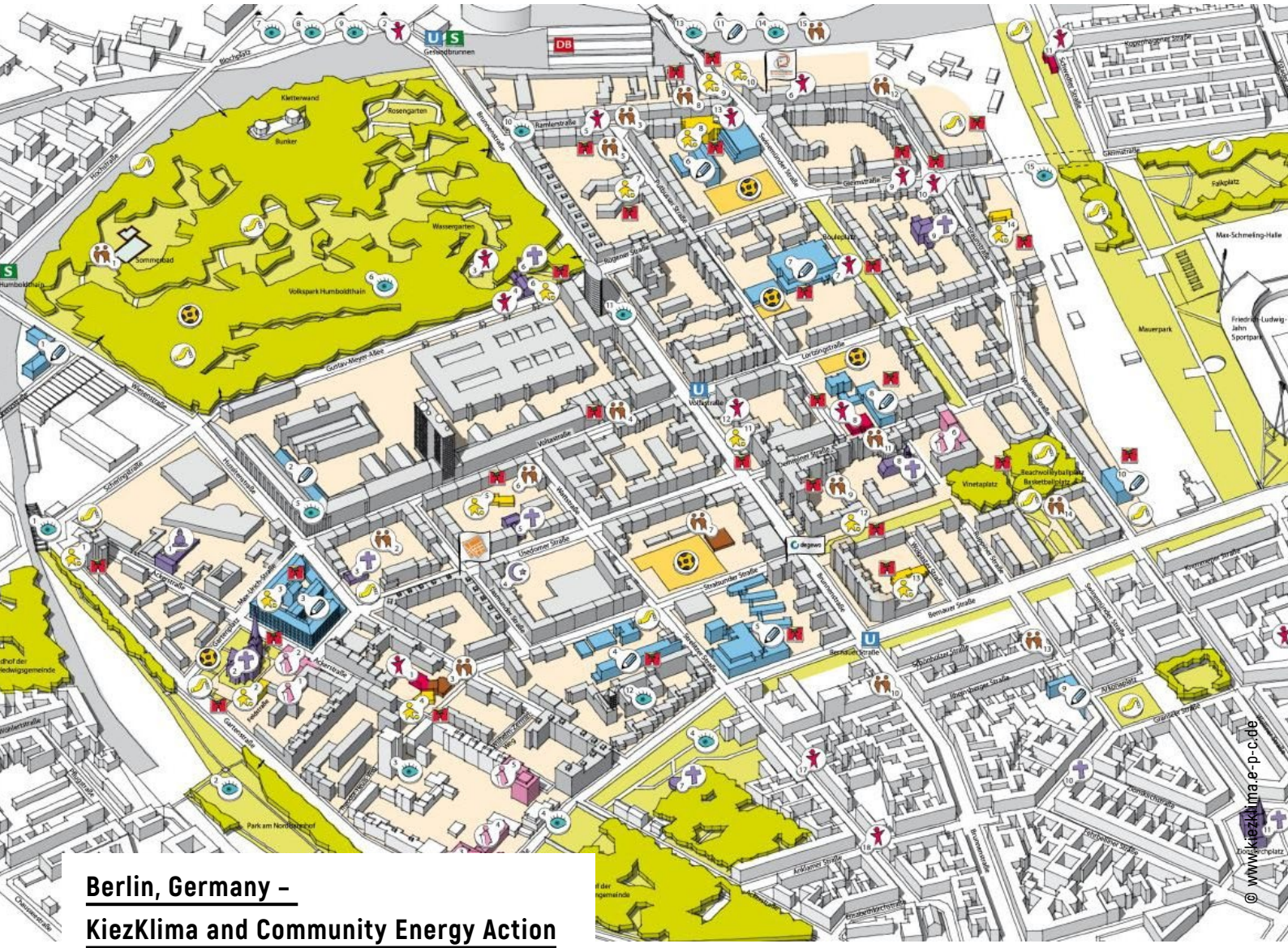

Berlin, Germany – KiezKlima and Community Energy Action

In Berlin, the **KiezKlima initiative** targeted inner-city neighborhoods where residents faced both socioeconomic challenges and exposure to environmental risks such as heat and poor air quality. The program focused on empowering local people through environmental education, hands-on greening activities, and energy-saving initiatives.

Community workshops were held to teach residents how to reduce household energy consumption, improve building insulation, and implement small-scale renewable energy solutions. At the same time, participants received training on urban greening techniques, including rooftop gardening, planting shade trees, and managing shared green spaces.

Residents applied their new skills by creating small neighborhood parks, greening inner courtyards, and forming local groups to monitor energy use and promote behavior change. The program fostered a strong sense of ownership and mutual support, particularly in areas where trust in public institutions had historically been low.

Although its outcomes were less formally measured than other programs, KiezKlima demonstrated the power of knowledge-sharing and grassroots collaboration in fostering climate resilience. It showed that when people are given the opportunity and tools to act, even small interventions can have a cumulative and transformative impact on urban environments.

Cluj-Napoca, Romania – Urban Labs and Youth-Led Climate Action

In Cluj-Napoca, Romania's growing interest in climate governance intersected with a vibrant civic culture and youth activism. Through a series of **urban living labs** supported by EU-funded initiatives, local residents–particularly young people–were trained in participatory planning, climate risk analysis, and sustainable neighborhood development.

Workshops introduced participants to tools like participatory mapping, scenario planning, and systems thinking. These sessions encouraged citizens to explore how different climate risks–such as extreme heat, air pollution, and flooding–could be addressed through nature-based solutions and low-carbon infrastructure. One flagship outcome was the "Net Zero Champions" initiative, which trained young people to advocate for and co-develop retrofitting strategies for apartment blocks, helping entire communities reduce energy use and emissions.

The project not only resulted in concrete proposals for climate-resilient neighborhoods, but also strengthened youth leadership in local governance. Many participants continued to collaborate with municipal planners, influencing public policy and budget decisions related to sustainability. Cluj's experience shows that empowering communities–especially young people–with knowledge and planning skills can result in long-term civic engagement and system-level change.

The case studies in this chapter illustrate that when communities are equipped with the knowledge, confidence, and tools to act, they become powerful drivers of climate resilience. In cities across Europe–from Malmö to Cluj-Napoca–training has proven to be more than a learning exercise; it is a strategic investment in social infrastructure. It transforms residents from passive recipients of climate policy into co-creators of adaptation and sustainability.

What unites these diverse examples is the central role of inclusive, context-sensitive training that reflects local realities and builds on community strengths. Whether it involves technical skills like designing green infrastructure or soft skills like facilitation and advocacy, training fosters both individual empowerment and collective capacity. It builds trust, unlocks creativity, and supports long-term stewardship of climate solutions.

As climate impacts continue to intensify, the need for localized, community-driven responses will only grow. These European experiences offer clear guidance: for resilience to take root and endure, community training must be seen not as a support activity, but as a core pillar of any climate initiative. Integrating such training early and consistently into climate planning can ensure that local people are not only prepared for what's ahead–they are leading the way.

Next Steps for Practitioners

Effective training does more than transfer information—it builds confidence, trust, and the practical ability to act. When communities understand their climate risks and have the skills to respond, participation becomes meaningful and sustained rather than symbolic or reactive. In the context of escalating heatwaves, floods, droughts, and coastal risks, strengthening local capacity is one of the most cost-effective and socially beneficial investments in resilience.

Building on the experiences of the CCRMs and pilot projects presented in this manual, the following steps can help practitioners (local governments, NGOs, schools, utilities, universities, and community groups) embed training as a core pillar of community-led climate resilience:

1 | Start with a training needs assessment

Map the target groups (citizens, municipal staff, teachers, youth, SMEs, community organisations) and assess what they need in order to participate effectively. Identify barriers such as time constraints, digital literacy gaps, language accessibility, or lack of prior experience with participatory processes.

2 | Co-design training with the community

Co-create learning objectives, formats, and materials with those who will use them. The Košice experience shows that training works best when teachers and practitioners shape content together, test it in real settings, and improve it through feedback.

3 | Combine scientific grounding with practical application

Balance core climate knowledge (local hazards, vulnerability, adaptation options) with hands-on tools: participatory mapping, nature-based solutions design principles, data interpretation, monitoring routines, and project planning. Link training directly to ongoing initiatives (pilots, local action plans, SECAP/Adaptation Plans) so learning immediately translates into action.

4 | Offer modular and accessible formats

Use a mix of short workshops, online sessions, peer-learning exchanges, mentoring, and practical demonstrations. Schedule activities around local rhythms (tourism peaks, school calendars, seasonal workloads) and ensure accessibility for those less digitally connected by using local media, printed materials, and in-person outreach.

5 | Build long-term capability, not one-off events

Treat training as an ongoing process that strengthens the CCRM as a living lab. Develop local trainers and facilitators, document materials for reuse, and create simple onboarding packs so new partners can join missions over time without losing momentum.

6 | Connect training to governance and implementation

Training should reinforce clear roles, shared decision-making, and transparent processes within the CCRM. This includes facilitation skills, conflict management, and collaboration across sectors—especially important when pilots involve many competencies and approvals, as seen in dense urban settings.

7 | Integrate monitoring, evaluation, and learning

Define how progress will be tracked (e.g., participation, knowledge gain, behaviour change, pilot performance indicators). Pair technical monitoring (sensor data, microclimate measures, water-loss metrics) with social feedback (surveys, interviews, community reflection sessions) to capture full benefits and inform replication.

8 | Link capacity-building with funding and sustainability

Support communities in identifying funding sources, preparing proposals, and managing resources transparently. Where possible, combine external project funding with local budgets, in-kind contributions, and institutional commitments to ensure continuity beyond individual project cycles.

Ultimately, community-led climate resilience succeeds when people are equipped to lead: when citizens can interpret local risks, co-design solutions, and sustain long-term stewardship of climate actions. By embedding training early and consistently—alongside real projects and inclusive governance—practitioners can strengthen local ownership, accelerate implementation, and make resilience a lasting feature of everyday decision-making.

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MISSION CE CLIMATE Project

Climate Resilient Communities of Central Europe

Central Europe faces many climate change challenges like the rest of the world. The main aim of the MISSION CE CLIMATE project is to overcome the disjointed sectoral responses to climate change by introducing a coordinated, cross-sectoral approach that puts local/ regional authorities at the centre of the governance and management of the climate resilience process. The overall objective is to support communities in Central Europe to become resilient to climate change and to enable them to respond in a coordinated way to the impacts caused by climate change. The project will build sustainable systems (community climate missions) and community capacities (integrated strategy, local action plans, and solutions).

THE PROJECT'S INTENDED OUTCOMES ARE:

1. Establishment of climate resilience systems in partner communities (Community Climate Missions) supported by a joint 2030 Climate Resilience Strategy (definition of actions, business models, financing mechanisms) and locally tailored action plans (project portfolio approach);

2. Enhancing community capacity to adapt to climate change with new skills and tools;

3. Activated citizens contributing to community climate resilience through increased awareness and capacity (tools, etc.);

4. Solutions developed through pilot projects that respond to community adaptation challenges.

For more information on climate adaptation and good practices, consult our websites:

www.interreg-central.eu/projects/mission-ce-climate/
www.climatehub.si

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