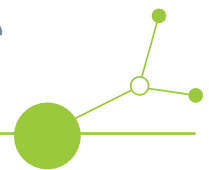


RE-PUBLIC SPACES

REVITALISATION OF PUBLIC SPACES IN HISTORIC CITIES -
adaptation of cities courtyards to climate change
in Central Europe



Version 1
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D1.2.1 REPORT ON REGULATIONS AND PROCEDURES TO SUPPORT THE IMPLEMENTATION OF A CLIMATE ADAPTATION STRATEGY FOR COURTYARDS

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A. INTRODUCTION

As the impacts of climate change become more severe and more frequent across Europe, the urgency to adapt urban environments is growing. Cities are experiencing rising average temperatures, more intense and prolonged heatwaves, sudden and heavy rainfall leading to flooding, and increasingly long periods of drought. These changes not only affect infrastructure and ecosystems but also pose significant threats to public health and social equity—particularly in densely built and vulnerable urban areas.

In this evolving context, urban courtyards—small, often semi-private or communal open spaces located within residential or institutional blocks—are gaining prominence as strategic sites for local climate adaptation. Though historically designed for circulation, light, and ventilation, courtyards today hold untapped potential to function as green microclimates, rainwater retention areas, biodiversity habitats, and socially inclusive spaces that can contribute to a city's overall resilience.

The four countries examined in this report—Italy, Slovenia, Croatia, and Poland—each exhibit different climatic conditions, legal frameworks, and urban planning traditions. Yet they share a common need to accelerate climate-proofing of urban space, particularly through scalable and cost-effective interventions at the neighborhood and building-block level. In all four nations, courtyards represent a critical interface between built and natural environments, and between policy and practice.

While approaches vary, each country has developed a set of regulations, strategies, spatial planning instruments, and financial tools that support the transformation of courtyards into climate-adaptive spaces. These include national climate laws, spatial planning and building codes, biodiversity and green infrastructure strategies, and access to EU and national funding for energy-efficient renovations and nature-based solutions. Additionally, some cities have pioneered participatory models and technical guidelines to ensure that courtyard transformations respond to local needs and contribute to broader environmental goals.

This comparative report aims to:

- Present the regulatory and procedural landscape supporting courtyard adaptation in each country;
- Highlight best practices and innovative mechanisms that facilitate the integration of climate resilience into everyday urban design;
- Identify gaps and opportunities for harmonizing efforts across national and municipal levels;



- Support knowledge exchange and capacity-building among local governments, planners, and civil society actors working to green and adapt urban spaces.

In doing so, the report positions courtyards not just as residual spaces, but as active components of climate adaptation policy—capable of improving environmental performance, fostering community engagement, and contributing to more sustainable and livable cities across Europe.

B. POLAND

1. Introduction

In light of the increasing impacts of climate change—such as heatwaves, intense rainfall, and periods of drought—urban spaces, including courtyards, require targeted adaptation measures. This report outlines existing regulations, best practices, and recommendations for creating climate-resilient courtyards.

2. Legal and Policy Framework

2.1. National Strategic and Legal Documents

- State Environmental Policy 2030 (PEP2030) - emphasises the need for adaptation of urbanised areas.
- National Climate Change Adaptation Strategy (KPA2020) - includes actions for urban areas, such as green and blue infrastructure.
- Building Law and the Spatial Planning and Land Management Act - provide tools for implementing local adaptation standards.
- Act of July 23, 2003 on the protection and care of historical monuments (Dz.U. 2003 No. 162 item 1568).

2.2. Local Spatial Planning Regulations

- Local Spatial Development Plans (MPZP) may include provisions promoting:
 - An increase in biologically active surface areas;
 - The use of permeable paving materials;



- The planting of native vegetation.

3. Procedures and Tools Supporting Implementation of the Strategy

3.1. Adaptation Implementation Procedures

- Courtyard Climate Audit - analysis of local microclimatic conditions, water retention, and green space accessibility.
- Assessment of a project's impact on climate adaptation - applied during courtyard revitalisation or modernisation projects.
- Design Guidelines - local green infrastructure standards (e.g. the Warsaw Greenery Standard).

3.2. Financial and Programmatic Instruments

- Municipal grants for courtyard greening (e.g. Warsaw Civic Budget, local grant programmes).
- Tax incentives or exemptions for housing associations implementing pro-climate solutions (e.g. rain gardens, green roofs).

4. Climate Adaptation Good Practices

4.1. Technical Solutions:

- Rain gardens and water retention tanks;
- Vertical greenery and climbing plants providing façade shading;
- Planting large-canopy trees to counteract the urban heat island effect.

4.2. Organisational and Social Approaches:

- Resident participation in designing green courtyards;
- Education and workshops on climate adaptation;
- Appointment of local adaptation coordinators.



5. Recommendations

1. Integrate adaptation requirements into Local Spatial Development Plans (MPZP) and development conditions.
2. Develop local design standards for climate-friendly courtyards.
3. Establish a monitoring system for adaptation effectiveness.
4. Ensure financial and advisory support for housing communities.
5. Increase community participation in planning and implementing adaptation measures.

C. ITALY

1. Introduction

Italian cities are increasingly vulnerable to the impacts of climate change, including heatwaves, flooding, and droughts. Urban courtyards (cortili), especially in historical and residential areas, represent underutilized spaces that can be transformed into climate-resilient micro-ecosystems. By hosting rain gardens, shade trees, permeable pavements and small wetland features, these spaces have the potential to host Nature-Based Solutions (NBS), enhance urban biodiversity, manage stormwater, and mitigate the urban heat island effect. This section reviews the national and local regulations, procedures, and funding mechanisms that support the integration of climate adaptation strategies in courtyard design and renovation, with a focus on regulatory coherence, conservation of heritage values, and access to EU and national funds.

2. Regulatory and Policy Framework

2.1. National-Level Documents and Legislation

- PNACC - *Piano Nazionale di Adattamento ai Cambiamenti Climatici* (National Adaptation Plan to Climate Change).

Developed by the Ministry for the Environment and Energy Security (MASE), PNACC (approved in 2024) defines strategic guidelines for adaptation across sectors, including urban areas. It explicitly promotes:



- Nature-Based Solutions (NBS) such as green roofs, bioswales, and urban wetlands;
- green and blue infrastructure in cities to reduce flooding and heat stress;
- sustainable stormwater management through retention, infiltration, and reuse.

It also encourages the integration of adaptation measures into urban and regional planning, especially in vulnerable areas such as historical centres.

- *Decreto Legislativo 152/2006 - Codice dell'Ambiente* (Environmental Code).

This legislative decree regulates environmental protection, including air, water, soil, and climate. It sets the legal basis for:

- integrated water cycle management, relevant for sustainable drainage in courtyards;
- Environmental Impact Assessments;
- landscape compatibility of interventions;
- soil conservation and remediation;
- protection of urban ecosystems—laying the groundwork for permeable surfaces, vegetated courtyards, and pollutant filtration in urban design;
- the general framework for implementing urban green infrastructure in adaptation strategies.

- *Strategia Nazionale del Verde Urbano (SNVU)* (National Urban Green Strategy).

Proposed by the *Comitato per lo sviluppo del verde pubblico* and coordinated by ISPRA (Italian Institute for Environmental Protection and Research), this strategy outlines:

- guidelines for integrating urban greenery into planning tools at the municipal level;
- recommendations for greening private areas such as courtyards, internal gardens, and rooftops;
- the promotion of multifunctional green areas as tools for both climate mitigation and social wellbeing.

- *Piano Nazionale Integrato Energia e Clima (PNIEC)* (National Integrated Energy and Climate Plan).

This plan includes urban regeneration goals and climate adaptation measures, including:

- increasing urban green space;
- improving energy performance of buildings;
- promoting passive cooling strategies (e.g., shading, ventilation) in building and open space design;
- encouraging the use of climate-resilient materials and techniques in renovation projects.



- Decreto Legislativo n. 42 del 22 gennaio 2004 - Codice dei beni culturali e del paesaggio.

This law provides the legal framework for the protection and management of Italy's cultural and landscape heritage. Key aspects relevant to courtyard interventions include:

- restrictions and authorizations required for interventions on historical buildings and their surroundings;
- the obligation to preserve architectural identity and visual integrity in historic courtyards;
- integration of cultural and environmental values in climate adaptation measures;
- coordination between local heritage authorities (Soprintendenze) and municipalities when designing adaptive reuse or greening strategies in protected areas.

2.2. Regional and Local Planning Instruments

- *Piani Regolatori Generali (PRG) and Piani Urbanistici Comunali (PUC).*

At the municipal level, comprehensive land-use plans embed climate-sensitive zoning provisions to guide new development and courtyard renovations. Typical measures include:

- minimum permeable surface ratios, mandating that a portion of every lot must remain unsealed to promote natural infiltration and reduce runoff;
- incentives for vegetated courtyards and green infrastructure, such as density bonuses or reduced fees for projects that install rain gardens, green roofs, or living walls in internal courts;
- urban heat island mitigation strategies, which encourage planting trees, installing reflective materials, and introducing shading devices in inner blocks.

- *Regolamenti Edilizi Comunali (Municipal Building Regulations).*

In cities like Milan (Regolamento Edilizio del Comune di Milano), Florence, and Bologna, building codes include mandatory or incentivized provisions for:

- green roofs and facades;
- rainwater harvesting systems;
- shading solutions in courtyards.

These regulations often also include technical specifications for the selection of paving materials, water drainage, and energy efficiency standards compatible with heritage constraints.

- *Linee Guida per il Verde Urbano e Resilienza Climatica.*



Several cities have adopted urban greening guidelines specifically focused on increasing climate resilience. These include:

- Milano Adaptation Strategy which integrates climate resilience into urban planning and explicitly mentions internal courtyards as spaces to prioritize for greening interventions;
- Piano di Resilienza Climatica di Bologna, which includes courtyard transformation as part of its climate justice and neighborhood renewal strategy;
- Linee guida per la mitigazione climatica urbana del Comune di Torino, which provide design and maintenance standards for green spaces, including internal courtyards, especially in areas with vulnerable populations.

3. Implementation Procedures and Tools

3.1. Operational Procedures

- Climate Risk Assessment for Courtyards.

Local authorities increasingly require or recommend assessments of microclimatic conditions (heat exposure, solar access, surface permeability) as part of renovation or development projects evaluate:

- solar exposure and shading patterns;
- surface permeability and rainwater management capacity;
- heat accumulation risk and ventilation potential.

These assessments help determine the feasibility of incorporating nature-based solutions and inform the selection of climate-adaptive materials and vegetation.

- Guidelines for Climate-Resilient Courtyard Design.

In collaboration with national research bodies such as ENEA, CNR, and the Politecnico di Milano, local governments have developed handbooks for transforming courtyards into green infrastructure nodes. These typically include:

- plant palettes featuring native and drought-tolerant species;
- water retention and infiltration solutions such as bioswales, gravel infiltration beds, and underground cisterns;
- integration of shading structures, including pergolas, arboreal shading, and light tensile roofing;
- design guidance for heritage settings, ensuring visual compatibility with historic façades.



Some municipalities have also issued performance indicators for climate resilience, such as the reduction of surface temperature or the increase of evapotranspiration capacity.

3.2. Funding Mechanisms and Incentives

- Superbonus 110% (Legge n. 77/2020, extended).

Although focused on energy efficiency, this tax incentive can cover works related to thermal insulation, shading, and in some cases green roofs or vertical greening that benefit courtyards.

- PNRR - Piano Nazionale di Ripresa e Resilienza.

Funded by the EU's NextGenerationEU program, the PNRR includes urban greening and regeneration projects (Mission 2 - Green Revolution and Ecological Transition). PNRR supports municipalities through calls such as:

- Mission 2, Component 4 - Green Transition in Cities, financing projects that include green retrofits of courtyards, particularly in social housing and schools;
- Mission 2, Component 3 - Water Resources, supporting the construction of urban rainwater harvesting and permeable paving systems;
- Micro-forestation and urban biodiversity enhancement projects that may include courtyards as pilot areas.

- Local Grants and Regional Calls

Many Italian regions and large municipalities provide annual or project-based funding lines. For instance:

- "Bando Città Verde" from the Lombardy Region, which funds public and semi-public green space transformation);
- "Bando Quartieri Climaticamente Resilienti" from the Municipality of Bologna, dedicated to neighborhood-scale resilience, including courtyard retrofits;
- "Progetto VerdeDiffuso" in Rome, aiming to green underused open spaces and incentivize the use of green walls, tree planting, and sustainable paving in both public and private courtyards).

4. Best Practices in Climate-Resilient Courtyard Transformation

4.1. Technical Solutions

Courtyards in dense urban environments can serve as:



- stormwater management systems, using rain gardens, bioswales, and permeable pavements to absorb and filter runoff,
- urban cooling zones, integrating vertical greenery and pergolas to create shaded microclimates,
- biodiversity hubs, with tree planting schemes using native, pollinator-friendly, and drought-resistant species.

4.2. Participatory and Social Measures

- Participatory design processes involving residents, building managers, and community associations.
- Workshops and urban labs to promote climate awareness and co-design.
- Courtyard resilience committees or neighborhood green stewards to maintain green infrastructure over time.

5. Recommendations

1. Integrate mandatory climate adaptation criteria/targets into municipal building and zoning regulations, requiring permeability ratios, tree planting, and water-sensitive design in courtyard renovations.
2. Develop national and regional design standards for climate-resilient courtyards, ensuring coherence across municipalities and alignment with heritage protection.
3. Increase dedicated funding lines for green retrofit projects in private and shared urban spaces, especially in vulnerable or climate-critical neighborhoods.
4. Promote knowledge exchange and capacity-building among municipalities, including shared tools for assessment and co-design.
5. Ensure long-term maintenance strategies are part of any retrofit plan, ideally involving citizens and local actors in the monitoring and care of green infrastructure.



D. SLOVENIA

1. Introduction

Slovenia, like other Central European countries, is increasingly affected by climate change, facing more frequent heatwaves, flash floods, and drought periods. Urban spaces, including courtyards (dvorišča), are critical microenvironments that can be transformed into tools for climate resilience. This section outlines the legal framework, strategic guidelines, and implementation procedures supporting courtyard climate adaptation in Slovenia.

2. Regulatory and Strategic Framework

2.1. National Legal and Strategic Documents

- Climate Change Act (*Zakon o podnebnih spremembah* - ZPS, under preparation)

Slovenia is in the process of adopting its first comprehensive Climate Change Act, which will define long-term goals for mitigation and adaptation. The act will align national efforts with the EU Climate Law and Slovenia's 2050 climate neutrality target.

- Resolution on the National Environmental Action Programme 2020-2030 (ReNPVO20-30).

This resolution sets strategic objectives for sustainable urban development, biodiversity preservation, and adaptation to climate change, including:

- expanding green infrastructure;
- increasing urban green areas;
- promoting nature-based solutions in cities.
- Spatial Planning Act (*Zakon o urejanju prostora* - ZUreP-3, Official Gazette RS, No. 199/21).

Regulates land-use planning at national and municipal levels, including guidelines for:

- climate-resilient urban planning;
- inclusion of green and permeable surfaces;
- promotion of sustainable building design.
- Construction Act (*Gradbeni zakon* - GZ-1, Official Gazette RS, No. 199/21).



Introduces provisions for sustainable construction, energy efficiency, and environmental protection. Municipalities may include criteria for building permits that consider microclimatic and environmental impacts, including for courtyards.

- Decree on Green Public Procurement (*Uredba o zelenem javnem naročanju*, Official Gazette RS, No. 51/17).
- Cultural Heritage Protection Act *Zakon o varstvu kulturne dediščine* (ZVKD-1).

Encourages environmentally friendly design in public construction and renovation projects, which can apply to public courtyards and semi-public housing developments.

Strategic plan for circular spatial management 2024-2030 Link:
https://www.gov.si/assets/organi-v-sestavi/GURS/Projekti/SLO4D/eMOP_SkupnaIPI_RSS_POVZETEK.pdf.

2.2. EU and Regional Policy Alignment

- EU Climate Law (Regulation (EU) 2021/1119) and European Green Deal.

Slovenia is obliged to align with EU-wide goals on climate adaptation, biodiversity, and zero pollution – especially through local urban greening and resilience initiatives.

- EU Biodiversity Strategy for 2030.

Promotes the integration of urban biodiversity, green corridors, and tree planting initiatives within cities, supporting local courtyard transformations.

3. Procedures and Implementation Tools

3.1. Climate Adaptation in Urban Planning

- Municipal Spatial Plans (*Občinski prostorski načrti* - OPN).

Municipalities can define:

- minimum green or permeable surface ratios per parcel (e.g., $\geq 30\%$);
- rules on rainwater management;
- recommendations for courtyard vegetation and shading infrastructure.
- Urban Green Infrastructure Guidelines (Slovenian Environmental Agency, ARSO).

These national-level guidelines support municipalities in integrating:

- multifunctional green spaces;
- adaptation corridors;
- stormwater retention and biodiversity support zones.



3.2. Renovation and Investment Tools

- Recovery and Resilience Plan of Slovenia (*Slovenski načrt za okrevanje in odpornost* - NOO).

Funded by the EU's Recovery and Resilience Facility (RRF), it supports:

- green renovation of buildings;
 - sustainable urban development;
 - pilot projects using nature-based solutions, including courtyard retrofits.
- Eko Sklad - Slovenian Environmental Public Fund.

Provides grants and loans for:

- green roofs and walls;
- rainwater harvesting systems;
- energy-efficient renovation that includes external shading and green elements.

4. Best Practices for Climate-Resilient Courtyards

4.1. Technical Solutions

- Rain gardens and infiltration trenches for managing stormwater runoff.
- Shading with deciduous native trees to reduce summer heat.
- Permeable pavements and green zones to prevent flooding and heat accumulation.
- Green walls or pergolas to enhance building cooling and air quality.

4.2. Social and Participatory Models

- Community-based courtyard planning, especially in Ljubljana and Maribor.
- Green courtyard programs supported by municipalities, involving residents in planting and maintenance.
- Climate workshops and urban labs to raise awareness and co-design solutions in social housing areas.

Project Hotspots by Prostoroz, Ljubljana:

<https://www.prostoroz.org/projects/hotspots#:~:text=Among%20the%20locations%20that%20received,stop%20stands%20out%20among%20them.>



Creative laboratory Krater, Ljubljana: <https://krater.si/en>

5. Recommendations

1. Incorporate climate adaptation criteria in all new and renovated courtyard developments through municipal spatial plans.
2. Adopt national design standards for green courtyards based on nature-based solutions and multifunctionality.
3. Expand funding access for courtyard retrofits through Eko Sklad and EU cohesion funds.
4. Integrate community engagement procedures into all publicly supported courtyard transformations.
5. Develop a national monitoring framework to track adaptation impact at the building-block level.

E. CROATIA

1. Introduction

Croatia is increasingly vulnerable to climate change impacts such as extreme heat, intense rainfall, and prolonged droughts. Urban spaces, particularly internal courtyards (dvorišta), represent an important but often underutilized opportunity for climate adaptation. This section outlines the national legal frameworks, strategic policies, and implementation procedures relevant to the climate adaptation of courtyards in Croatian cities.

2. Legal and Strategic Framework

2.1. National Legislation and Strategies

- Climate Change and Ozone Layer Protection Act (Zakon o klimatskim promjenama i zaštiti ozonskog sloja, OG 67/25).

This law provides the overarching framework for Croatia's climate policy, in line with EU Regulation 2018/1999. It includes national targets and sets the foundation for adaptation strategies in urban planning and construction.



- Environmental Protection Act (Zakon o zaštiti okoliša, OG 80/13, 153/13, 78/15, 12/18, 118/18).

This act establishes principles for sustainable development and environmental protection, relevant for managing urban microclimates and green infrastructure in courtyards.

- Nature protection Act (Zakon o zaštiti prirode, OG 80/13, 15/18, 14/19, 127/19, 155/23).

The Act promotes the sustainable use of natural resources and spatial planning that respects ecological balance, which directly supports the principles of green infrastructure. It obliges all individuals and legal entities to act in ways that preserve biodiversity, landscape diversity, and geodiversity, aligning with the goals of integrating nature-based solutions into urban and rural development.

- Spatial Planning Act (Zakon o prostornom uređenju, OG 153/13, 65/17, 114/18, 39/19, 98/19, 67/23).
- and Building Act (Zakon o gradnji, OG 153/13, 20/17, 39/19, 125/19, 145/24).

These acts regulate urban planning and construction at national, regional and local levels. Municipal spatial plans can:

- define mandatory green surfaces;
- encourage energy-efficient and climate-resilient urban forms;
- regulate water management and soil permeability.
- Low Carbon Development Strategy of the Republic of Croatia until 2030 with an outlook to 2050 (2021).

This strategy emphasizes the use of nature-based solutions and green infrastructure in the built environment to reduce vulnerability to climate change impacts.

- Climate Change Adaptation Strategy for Republic of Croatia for period 2040. with an overlook on 2070. (OG 46/20).

This strategy defines green infrastructure as one of the structural measures for ensuring climate change adaptation and climate resilience, through different sectors.

- National Development Strategy Croatia 2030.

Includes goals to promote sustainable, green, and resilient urban development. Calls for increased urban greenery and climate-resilient public spaces.

- Green infrastructure development Program in urban areas for the period 2021-2030.

This medium-term strategic document outlines the development needs and potential for green infrastructure in urban areas of Croatia. It details goals, priorities, and measures to establish sustainable, safe, and resilient cities and settlements.

- Longterm Strategy for renewing nation building fund until 2050.



This strategy emphasizes integrating green infrastructure into urban areas to reduce heat islands and enhance energy efficiency.

- Act on protection and preservation of cultural goods (Zakon o zaštiti i očuvanju kulturnih dobara OG 145/24).

This Act defines cultural goods as part of the national heritage and governs their protection and preservation. It establishes legal procedures and criteria for interventions on cultural properties.

2.2. EU Integration and Policy Context

As an EU member, Croatia aligns with:

- EU Climate Law (Regulation 2021/1119),
- EU Strategy on Adaptation to Climate Change,
- EU Biodiversity Strategy for 2030,
- Territorial Agenda 2030,
- European Green Deal,

which encourage integration of nature-based solutions and urban greening in national policies and local implementation.

3. Implementation Procedures and Urban Planning Instruments

Spatial planning in Croatia is conducted on three levels: national, county, and municipal.

3.1. Municipal Spatial Planning (Prostorni planovi uređenja općine/grada)

- Municipalities are empowered to define in which way the space is used and further developed. Including setting:
 - minimum ratios for permeable surfaces (e.g., 20-30% of each plot, in the city of Osijek this is at least 30 % of each plot for buildings within areas designated for public and social purposes);
 - greening requirements for courtyards and building surroundings, preservation measures in regard to existing green infrastructure;
 - mandatory rainwater retention or infiltration zones.



- In cities like Zagreb, Rijeka, and Split, updated spatial plans already integrate climate resilience goals, including:
 - promoting shaded public areas;
 - green buffers between buildings;
 - preservation of existing courtyard vegetation.

3.2. Construction Permits and Environmental Impact

- Regulations governing spatial planning, construction and environmental protection require Strategic Environmental Assessments (SEA) (mandated for spatial planning documents, development strategies etc.) of Environmental Impact Assessments (EIA) for certain urban development projects. The EIA procedure is governed by Act on environmental protection, Act on nature protection and Regulation on Environmental Impact assessment.
- Courtyard transformations in larger residential blocks or protected zones must comply with local heritage and environmental standards.

3.3. Green Infrastructure Guidance

- Green infrastructure is embodied in different laws (acts) (e.g. Building Act), and supported through the Green infrastructure development Program in urban areas for the period 2021 - 2030. and National development Strategy until 2030. In addition, Green Infrastructure Planning Methodology provides a unified, integrated framework for planning and enhancing green infrastructure in Croatian cities and municipalities for the period up to 2030. It guides the development and revision of local planning documents (excluding NATURA 2000 areas) and ensuring coordination between green spaces and other elements of urban infrastructure. City of Osijek has a Strategy for Green infrastructure development up to 2032 (Strategija zelene infrastrukture grada Osijeka za razdoblje 2022. do 2032. godine).

These local strategies analyse and integrate green infrastructure into urban tissue through:

- defining minimum green areas;
- planting native vegetation in courtyards;
- use of permeable paving;
- integration of green walls, facades and rain gardens;
- integrating floral meadows;
- integrating green roofs.



4. Financial Instruments and Support Mechanisms

4.1. EU and National Funds

- National Recovery and Resilience Plan (NRRP / NPOO).

Funded by the EU's Recovery and Resilience Facility, the Croatian NPOO supports:

- energy renovation of buildings;
- greening of urban areas;
- pilot projects using nature-based solutions.

- Environmental Protection and Energy Efficiency Fund (FZOEU).

Provides co-financing for:

- green roofs and facades;
- courtyard revitalization projects;
- water-saving and energy-efficient infrastructure.

Several EU founding programmes support the revitalization and greening of urban areas. For example, the city of Zagreb has been designated as a pilot city within the Net ZeroCities platform to revitalize and green city courtyards for carbon neutrality (HorizonEU).

4.2. Local Funding Programs

- Some municipalities provide small grants for:
 - communal green space improvement;
 - participatory courtyard renovation;
 - community gardening in housing blocks.

5. Best Practices in Courtyard Adaptation

5.1. Technical Measures

- Permeable paving and green cover to reduce runoff and heat.
- Rainwater harvesting systems for reuse in courtyard irrigation.
- Native tree planting and shade structures to mitigate heatwaves.



- Biodiverse vegetation to support pollinators and microclimate regulation.

5.2. Social and Participatory Approaches

- Community design initiatives in Zagreb's older residential districts.
- Pilot projects engaging residents in managing green courtyards.
- Urban labs and workshops supported by NGOs or municipal authorities.

6. Recommendations

1. Incorporate mandatory climate adaptation criteria into all courtyard renovation regulations at the municipal level.
2. Integrate guidelines for courtyard transformation into the Green infrastructure development Program in urban areas and/or in local Green infrastructure strategies.
3. Increase dedicated funding lines for small-scale, citizen-led climate adaptation in shared urban spaces.
4. Establish training programs for architects, engineers, and planners focused on courtyard adaptation.
5. Monitor and evaluate the environmental and social benefits of courtyard transformations.

F. CONCLUSIONS AND RECOMMENDATIONS

1. Regulatory and Procedural Landscape

All four countries—Poland, Slovenia, Croatia, and Italy—possess national and regional legal frameworks that, to varying degrees, support the integration of climate adaptation into urban planning and development. Core legislation such as climate acts, environmental protection laws, spatial planning and building codes, as well as EU-aligned climate and biodiversity strategies, provide the legal foundation for climate-resilient interventions in urban areas, including courtyards.



However, while the legal basis exists, the explicit mention of courtyards as key adaptation sites is still rare. Most regulatory support comes indirectly—through general provisions on green infrastructure, sustainable drainage, urban greenery, and energy efficiency. Municipal spatial plans (e.g., in Ljubljana, Zagreb, Milan, Warsaw) play a pivotal role in translating national goals into local design requirements, such as green surface ratios or stormwater retention obligations.

Recommendation: National and local planning frameworks should be updated to explicitly recognize courtyards as strategic adaptation spaces, with dedicated design standards and incentives.

2. Best Practices and Innovative Mechanisms

Across the countries studied, numerous best practices and pilot initiatives demonstrate how courtyards can be transformed into multi-functional, climate-resilient spaces. These include:

- Nature-based solutions such as rain gardens, permeable pavements, and native vegetation.
- Participatory courtyard renewal programs involving residents in co-design and maintenance (e.g., Milan’s “Green Courtyards,” Zagreb’s local initiatives).
- Green public procurement mechanisms and environmental funds (e.g., Eko Sklad in Slovenia, FZOEU in Croatia, the Polish Clean Air Programme).
- Integration of courtyard greening into energy-efficient building renovations, supported by EU Recovery and Resilience funds.

These examples show that multi-benefit approaches—combining environmental, social, and aesthetic goals—can significantly improve urban resilience at the building-block scale.

Recommendation: Scale up best practices by embedding them in national funding criteria, technical guidelines, and urban regeneration frameworks.

3. Gaps and Opportunities for Coordination

Despite progress, there are several key gaps across all four countries:

- Fragmentation between levels of governance—with adaptation goals often not fully implemented at the municipal level.
- Lack of standardized design guidelines for climate-resilient courtyards.
- Limited integration between adaptation and housing/energy policies, especially in social housing contexts.



- Insufficient data and monitoring on the performance of green interventions in courtyards.
- At the same time, there is strong potential for harmonizing strategies through.
- Coordinated urban greening targets aligned with EU climate and biodiversity objectives.
- Joint regional projects (e.g., Interreg, Horizon Europe) fostering cross-border learning.
- Standardization of green design metrics (e.g., minimum green ratio, water retention volume per m²).

Recommendation: Develop national courtyard adaptation frameworks or guidelines that bridge environmental, housing, and urban planning sectors, and ensure coordination between ministries, municipalities, and public housing agencies.

4. Knowledge Sharing and Capacity Building

Capacity gaps persist among local governments, planners, and housing managers when it comes to integrating climate adaptation into everyday urban design—especially in retrofitting existing courtyards.

Encouragingly, each country has examples of capacity-building tools such as urban living labs, municipal workshops, public-private pilot projects, and civil society-driven initiatives. Yet to make meaningful progress, these efforts must be systematized and scaled, particularly in smaller and medium-sized cities.

Recommendation:

- Create national knowledge hubs or platforms to collect and disseminate models of good practice.
- Support training programs for urban professionals on climate-adaptive courtyard design.
- Encourage community participation by offering micro-grants, technical assistance, and engagement tools.



G. OVERALL CONCLUSION

Urban courtyards across Poland, Slovenia, Croatia, and Italy hold significant untapped potential as catalysts for climate resilience, biodiversity restoration, and social well-being. While legal and policy foundations are gradually aligning with EU objectives, more targeted action is needed to activate courtyards as essential infrastructure in the face of climate change.

By addressing regulatory gaps, scaling best practices, fostering inter-level coordination, and strengthening local capacities, governments and communities can transform these overlooked spaces into green, inclusive, and climate-ready environments—helping cities adapt from the ground up.

