



Urban Climate Resilience in Europe

Ricardo Martinez, Eugenia Mansutti and Heather Brooks (eds.)

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Cover photo:

A group of bikes parked on the side of a road.

https://unsplash.com/photos/a-group-of-bikes-parked-on-the-side-of-a-road-pSo_ShW5l0k

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Eugenia Mansutti, Heather Brooks and Ricardo Martinez

On the state of climate adaptation in European cities: Institutional capacities and strategic responses to key climate risks (Diana Reckien)

This chapter examines the actions cities can take and are taking to adapt to climate change, focusing on institutional capacities, key climate threats, and prominent responses, including nature-based solutions (NbS), heat mitigation, and flood management. Heatwaves are identified as the most pressing threat, yet vulnerable populations remain inadequately addressed, underscoring the need for targeted training and support. Flooding is the second-largest threat, requiring long-term planning and careful management in floodplains, and can be mitigated through expanded rainwater harvesting and reuse. There is widespread experience with adaptation planning and near-universal deployment of NbS. However, limited funding, lack of measurable targets, and insufficient maintenance constrain their full potential. Clear objectives, innovative financing, standardised benefit assessments, and stronger policy integration are required. Smaller municipalities often lack dedicated staff and technical capacity. Enhanced training, increased staffing, cross-municipal cooperation, regulatory simplification, and improved multilevel coordination are essential to strengthen urban climate resilience.

Financing urban climate adaptation in Europe (Diana Kupper and Stelios Grafakos)

Climate adaptation is increasingly central to European cities, yet adaptation finance remains fragmented, under-tracked and insufficient relative to needs. This chapter draws on recent literature with evidence from a Eurocities Pulse survey (n = 54) to analyse how adaptation is currently financed and why gaps persist. While the majority of surveyed cities have an adaptation plan, only a fraction have a dedicated finance strategy; adaptation spending is often “invisible” in budgets and dispersed across departments; and almost half of cities lack tools to appraise and prioritise measures. Adaptation is financed predominantly from municipal budgets, national transfers and EU funds, with limited use of non-traditional instruments. Three structural constraints emerge: public-budget dependence and competing mandates; pipeline and capacity gaps; and access and enabling-environment barriers. The chapter concludes with practical implications for cities, national governments and EU/international financiers, focusing on financial management reform, investment-pipeline readiness and lower transaction costs for accessing finance.

Data and monitoring in urban climate adaptation across Europe (Attila Buzási)

This study examines climate change adaptation practices in European cities, with a particular focus on the role of data use and monitoring. Based on responses from members of the Eurocities network, it analyses the implementation gap between strategic objectives and actual practice. While the majority of cities systematically collect technical data on temperature and precipitation, the integration of socioeconomic indicators and the involvement of vulnerable groups remain significant shortcomings. The research highlights that the main barriers to successful adaptation are not technological in nature but are linked to limited human and financial resources as well as institutional silos. The study concludes that the key to effective adaptation lies not in new technologies but in horizontal governmental coordination, policy integration, and a more deliberate use of existing data that also takes social considerations into account.

Partnerships and community engagement strategies across European cities (Lorenzo Chelleri)

This chapter builds on current understandings of climate plans and the governance implementation gaps in consistently engaging civil society toward systemic urban transformations. Predominantly driven by project-based implementation, climate agendas are supported by a wide range of tools and methods available through different knowledgesharing platforms, yet face political limitations in integrating motivational, capacity-building, and ownership-related actions into their implementation. The chapter reports on cities' initiatives related to communication, partnerships, citizen engagement, education, and coping strategies addressing potential behavioural barriers. It identifies a variety of innovative practices but also challenges in leveraging community action. It depicts a landscape of civil society and stakeholder engagement that remains far from fully understanding and harnessing the real potential of societal transformation, which is an essential condition for meeting climate agenda targets.

The key role of buildings and capacity building in achieving climate resilience (Monica Salvia)

This chapter explores the importance of the built environment and capacity building in achieving climate resilience through a holistic approach to adaptation and mitigation. It presents evidence on the key findings obtained from the Eurocities Taskforce on Climate Resilience survey respondents regarding their current activities, needs, challenges and emerging directions in relation to these two themes. Drawing on the experiences of respondent cities, the chapter outlines the following implications and key messages for enhancing climate resilience through effective policies and strategies. Firstly, although building codes (including energy codes) are highly effective in reducing emissions and enhancing resilience related to buildings, adaptation of the built environment lags behind in practice. This highlights the urgent need to give them greater consideration in EU policy and to strengthen national policies by making specific adaptation measures mandatory for new and renovated buildings. Secondly, to address the

complexities of urban climate resilience, capacity building and tailored technical assistance should be provided to cities, particularly small and medium-sized ones. Existing barriers in terms of financial capability, multidisciplinary knowledge, technical skills, governance, comprehensive policies and planning, collaborative networks, awareness-raising and communication should be overcome.

FOREWORD: CITIES AND CITIZENS AT THE HEART OF CLIMATE RESILIENCE

Leena Ylä-Mononen

Executive Director, European Environment Agency

Climate change is accelerating, and cities are on the frontline of both climate impacts and climate action. Climate hazards affect urban settings differently – and often more intensely – than rural areas. Extreme heat is amplified by the urban heat island effect, increasing heat stress, illness and mortality. At the same time, flooding is exacerbated by widespread soil sealing that prevents water infiltration.

Climate change is set to exact a heavy toll. Projected damage from coastal flooding alone could reach EUR 1 trillion per year by 2100, impacting the lives of millions. The high concentrations of people, infrastructure and interdependencies found in cities create distinct and systemic vulnerabilities. Rising sea levels and the associated coastal flooding and erosion pose growing risks to low-lying cities, while health threats include the spread of infectious disease vectors and increasing pressure on health services.

The list of urban climate risks continues to grow as the impacts of climate change become ever more evident. Nevertheless, given sufficient resources, adaptation actions at city level can address multiple risks simultaneously. This was highlighted in the European Environment Agency's (EEA) first European Climate Risk Assessment (EUCRA) in 2024.

Water management, transport measures and nature-based solutions are among the most common local adaptation actions. Together with targeted urban planning and climate-resilient building standards, these represent some of the most effective adaptation levers available at local level. This is where real change can happen.

However, EUCRA also issues a warning: although cities are a critical front line for climate risk management, current urban adaptation efforts are not keeping pace with the speed of change and the magnitude of the risks. European cities must step up, better coordinate, and more clearly quantify their adaptation efforts – not only to address the impacts already being felt, but also to protect lives and livelihoods from the greater impacts to be expected in the future.

Some trends are worrying. Urban areas remain highly vulnerable to flooding due to extensive soil sealing and limited drainage capacity. The EEA's 2024 report on urban adaptation in Europe shows that the overall proportion of sealed land in Europe has increased by more than 6% since 2000, while between 2011 and 2021, an estimated 26.9% of urban areas saw a significant rise in population living within existing floodplains. Cities are also prone to the urban heat island effect, creating hotspots 2-10 °C warmer than surrounding rural areas. Around 46% of hospitals and 42% of schools are located within these urban heat-island zones, amplifying heat-related health risks.

With three quarters of Europe's population living in urban areas, cities carry both a responsibility and a unique potential to drive change.

Cities can be highly progressive in climate action. Many frontrunner city administrations have adopted more ambitious climate targets than those set at national, EU or international levels. Local authorities are well positioned to translate adaptation strategies into practice, and increasingly they are legally mandated to do so. Adaptation projects implemented locally can be fine-tuned to address local climate impacts and people's specific needs.

As the level of governance closest to people, cities are also uniquely positioned to act on public health protection, citizen engagement and social equity. Social cohesion is not only a buffer against cascading climate risks; it is a prerequisite for long-term societal preparedness. Risk and inequality are often concentrated in cities, and those cities that foster strong social networks, local participation and ownership of adaptation measures will be better prepared. When cities integrate equity considerations directly into adaptation planning and implementation, more people benefit and the overall impact is amplified.

Ultimately, creating a Europe that is environmentally sound and resilient to climate change requires comprehensive, interconnected solutions that address multiple aspects of urban life and infrastructure. The benefits of action in cities extend beyond reducing direct climate impacts. Such actions also contribute to improved health and well-being, quality of life and social sustainability.

The CIDOB Monograph "Urban Climate Resilience in Europe" is a welcome addition to our shared knowledge base. It can support cities in their work to scale up adaptation to climate change, informed by a common vision of what a resilient urban future looks like: one that prioritises the integration of nature, ensures basic needs are met, and nurtures a sense of belonging, trust, equity, inclusiveness and hope.

INTRODUCTION: THE URBAN DIMENSION TO BUILDING CLIMATE RESILIENCE AND PREPAREDNESS

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Across Europe, cities are feeling the growing weight of the climate crisis. Summers are hotter, storms more intense and floods more frequent – testing the resilience of urban systems and the people who depend on them. From overheated apartments to disrupted transport networks and vulnerable communities, the impacts of climate change are no longer distant forecasts; they are shaping daily urban life.

Europe is the fastest-warming continent; since the 1980s, warming on the continent has been about twice the global rate (EEA, 2024). Researchers looking at 854 European cities estimate that climate change-intensified summer temperatures in 2025 caused an additional 16,500 deaths, accounting for 68% of the 24,400 total estimated heat-related deaths that year (Barnes et al., 2025). And the projections are not reassuring: temperatures across Europe are expected to keep rising faster than the global average, with different scenarios projecting an increase by 1.2 to 3.4°C and potentially up to 4.1 to 8.5°C (EEA, 2025a).

But it is not just heatwaves that pose a risk. Already, one in eight Europeans lives in areas potentially prone to river floods and around 30% of people in southern Europe face permanent water stress.¹ In cities, built up areas characterised by soil sealing are increasingly impacted by floods. In Valencia, floods in October 2024 led to the deaths of 232 people, accounting for 70% of all deaths related to torrential rain in Europe for that year (WMO, 2025).

The economic impacts are equally significant. Climate-related extremes between 1980 and 2024 are estimated to have caused €822bn worth of economic losses in the European Union, of which over €208bn (25%) was caused between 2021 and 2024 (EEA, 2025b). Floods alone were estimated to account for 47% of these losses, with storms and heatwaves estimated to have accounted for 27% and 18% of losses, respectively (EEA, 2025b). What's more, economic losses have increased over time; between 2009 and 2024, economic losses increased by 54% (EEA, 2025b). By 2029, droughts, heatwaves and floods could cost European cities and regions €126bn (Usman et al., 2025). Against this background, effective adaptation to climate risks is essential to protect lives, and secure Europe's competitiveness.

1. Climate health risks posed by floods, droughts and water quality call for urgent action: <https://www.eea.europa.eu/en/newsroom/news/climate-health-risks-posed-by-floods>

It is no surprise that in 2025 climate action remained the top priority for mayors for the third year in a row.

As home to over 75% of the EU's population, with over half of the EU's GDP generated in urban regions,² cities face significant climate risks. It is no surprise then that in 2025 climate action remained the top priority for mayors for the third year in a row, with 63% naming it their main concern (Eurocities, 2025). Despite reduced political support from the EU institutions, mayors are keen to continue implementing actions related to both climate adaptation and climate mitigation, with nearly 90% of Eurocities members having adopted plans to protect their residents from the effects of climate change (Eurocities, 2024).

Local governments are assessing vulnerabilities, developing adaptation plans, redesigning public spaces to cope with heat, and investing in nature-based solutions that keep cities cooler and greener. But progress is rarely straightforward. Many cities face persistent challenges: limited technical capacity, fragmented governance and scarce or short-term financing that makes long-term adaptation hard to sustain. And they cannot do it alone. Cities are both limited and enabled by national adaptation plans and strategies, national regulations and national funding instruments (OECD, 2023). Financing the investment in adaptation measures – and the cost of climate impacts – often exceeds the capacities of local authorities (OECD, 2023). Similarly, developing the technical skills and capacity at local level needed to analysis climate data and hazard models – and translate these into effective adaptation policy actions – is costly (OECD, 2023).

Responsibility for action on climate adaptation is shared primarily between the European Union and member states, where European legislation sets the strategic direction, common objectives and provides a legal framework for adaptation.³ The Regulation on the Governance of the Energy Union and Climate Action requires reporting every two years on climate mitigation and adaptation actions.⁴ As part of the European Green Deal,⁵ the European Climate Law set a legally binding target for climate neutrality by 2050 and an intermediate target for 2030, aiming to ensure that all EU policies contribute to this goal (EC, 2021b). Similarly, the EU Adaptation Strategy – though it does not set a legally binding target for climate adaptation – promotes smarter, faster and more systemic adaptation, with stronger links to health, nature-based solutions, freshwater management and support for vulnerable groups (EC, 2021a). In 2024, the EU Nature Restoration Regulation entered into force, setting the first EU-wide framework with legally binding targets to restore degraded ecosystems, focusing in particular on those ecosystems with the most potential to store carbon and prevent and reduce the impact of natural disasters.⁶ At the same time, the EU carried out its first EU-wide climate risk assessment (as part of the EU Adaptation Strategy) which identified 36 major climate risks threatening key sectors and highlighted that many of these risks have already reached critical levels and can become catastrophic without urgent and decisive action (EEA, 2024). The commission's subsequent Communication on Managing Climate Risks emphasised the need for better coordination across governance levels, improved access to localised data, and mainstreaming adaptation into existing policies and standards to strengthen Europe's overall resilience (EC, 2024).

2. Urban-rural Europe – economy: <https://ec.europa.eu/eurostat/statistics-explained/SEPDF/cache/112341.pdf>

3. Treaty on European Union: https://eur-lex.europa.eu/eli/treaty/teu_2012/art_4/oj/eng.

4. Regulation on the Governance of the Energy Union and Climate Action: <https://eur-lex.europa.eu/eli/reg/2018/1999/oj/eng>.

5. European Green Deal: <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1596443911913&uri=CELEX:52019DC0640#document2>

6. Regulation on Nature Restoration: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32024R1991&qid=1722240349976>.

In order to improve the EU's ability to anticipate, prevent and respond to the increasing risk of natural hazards and climate change, as well as threats related to geopolitical tensions, cybersecurity and misinformation, the European Commission published an EU Preparedness Union Strategy last year (EC, 2025). This strategy outlines key actions including the development of an EU-wide risk and threats assessment and embedding of preparedness by design in all EU policies, as well as the establishment of a crisis dashboard for decision-makers and improvement of early warning systems. In this context, the European Commission has announced it will publish a proposal for an EU climate risk and resilience framework by the end of 2026.

While European legislation is crucial for setting the strategic direction on climate adaptation, climate risks are highly context specific.

While European legislation is crucial for setting the strategic direction on climate adaptation, climate risks are highly context specific (Cardona et al., 2012). They are determined by hazard, exposure and vulnerability: hazard refers to possible future extreme weather-related events or slow onset climate change (such as the increase in average temperature or precipitation) as a climate driver of risk and its adverse impacts; exposure refers to the presence of people, ecosystems and species, and assets in a location that could be affected by a hazard; while vulnerability refers to the tendency of people, ecosystems and species, and assets to be affected by climate-related hazards, including the degree to which these are affected (i.e. sensitivity) and their ability to adjust to potential damage (i.e. adaptive capacity) (Cardona et al., 2012; Smithers et al., 2023).

Against this background, building on their previous collaboration for the monograph *Urban Recovery Watch: Empowering Cities in the EU Green and Digital Transition* (Martinez & Reviglio, 2023), CIDOB and Eurocities have partnered to gather evidence as to the status, needs and challenges of adaptation planning and financing in cities, and provide policy analysis and recommendations for the upcoming EU Climate Resilience Framework. The CIDOB Monograph *Urban Climate Resilience in Europe* aims to fill the data gaps by providing a comparative assessment on the state of urban climate adaptation. It aims to explore the main barriers to improved urban resilience and provide insight into how cities can be supported through regulatory and fiscal programmes at the local, national and EU levels.

The CIDOB Monograph is built on an analysis of city data collected through a survey designed and carried out by Eurocities in collaboration with CIDOB in 2025. The survey was an initiative of the Eurocities Task Force on Climate Resilience, co-chaired by the cities of Cesena (Italy) and Guimaraes (Portugal). It received 54 responses from cities across 17 countries and featured 101 questions split across different topics – reflected in the chapters of this monograph. Responses were gathered from cities of varying population sizes and budgets. While the majority of responses came from cities with a population between 500,000 and 1 million inhabitants (35%), we received an almost equal split among cities with a population of between 50,000 and 250,000 (19%), between 250,000 and 500,000 (26%) and over 1 million inhabitants (20%). Similarly, while the majority (48%) of city respondents reported a budget size of between €1bn and €5bn, we received a range of responses from cities reporting a budget of less than €100m per year (7%), between €100m and €500m per year (13%), between €500m and €1bn per year (13%), between €5bn and €10bn (11%), and over €10bn per year (6%).

Each of the following chapters provides an overview of the specific topic, policies and actions cities are taking in this area, the gaps and barriers identified, emerging patterns and key messages. The chapters are authored by six experts in urban climate adaptation in Europe, who also contributed to the design of the survey.

Structure of the publication

The first chapter examines the actions cities are taking to adapt to climate change, with a focus on institutional capacities, key climate threats and prominent responses, including nature-based solutions (NbS), heat mitigation and flood management. Authored by Diana Reckien, the chapter explores some key challenges and requirements for improved climate risk management.

The second chapter provides an in-depth analysis of financing requirements for climate adaptation, authored by Diana Kupper and Stelios Grafakos. It explores the current state of and trends in embedding adaptation in budget rules and processes and building funder-ready pipelines on the basis of climate risk assessments. As Kupper and Grafakos highlight, the findings point to a consistent set of implications for scaling municipal adaptation finance: cities need better financial planning and management and stronger pipelines, while national and EU actors need to make public financial support for cities more predictable and accessible.

The third chapter provides an overview of existing access and use of climate data. The findings related to data and monitoring practices offer several lessons that can be applied by other cities, as noted by author Attila Buzási. One key message, he notes, is that strengthening climate adaptation does not always require new data sources or technological investments; it often involves a more intentional integration and institutionalisation of already available data.

The fourth chapter, authored by Lorenzo Chelleri, notes the need for more structured, horizontal, inclusive partnerships, supported by capacity building and ownership-related conditions. In this chapter focused on exploring how cities engage with different stakeholders, Chelleri stresses that communities' capacities are generally underestimated and should be better leveraged.

Monica Salvia, author of the fifth chapter, explores the importance of the built environment and capacity building in achieving climate resilience. The chapter analyses city experiences with mandatory codes regarding design requirements for the development of new buildings, as well as for the retrofitting of existing buildings in terms of mitigation and adaptation. The author notes that responses clearly reflect cities' extensive experience in energy planning and lack of experience in adaptation of the built environment. Indeed, the need for technical expertise is stressed throughout the second part of this chapter.

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ON THE STATE OF CLIMATE ADAPTATION IN EUROPEAN CITIES: INSTITUTIONAL CAPACITIES AND STRATEGIC RESPONSES TO KEY CLIMATE RISKS

Diana Reckien

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1. Introduction

Effective adaptation to climate impacts and risks is necessary to safeguard people's lives, maintain the functioning of infrastructure, and safely manage assets and livelihoods in European cities and regions. European cities and their populations already face unprecedented risks due to their morphology and location, as well as to their dense, ageing, and tele-connected infrastructure. Large-scale surface sealing has already increased the runoff during storms and heavy precipitation, making cities prone to flooding. Elevated heat absorption of surface materials and buildings has intensified the urban heat island effect, leading to extended heatwaves. Additional and growing risks in urban areas include droughts and related water scarcity and reduced water quality, wildfires, landslides, and coastal flooding due to sea-level rise (Reckien et al., 2025a; EEA, 2023). The sectors most impacted by climate change in larger urban areas are water, buildings, health, and transport (EEA, 2023). If smaller municipalities are taken into account, major impacts are also reported in the agriculture and forestry, environment and biodiversity, and civil protection and emergency sectors (EEA, 2023).

This chapter focuses on the actions that European cities can take and are taking to adapt to climate change, i.e., the state of adaptation activities in general. This involves, first, unpacking institutional and organisational aspects, such as the form, type, and embeddedness of adaptation activities within urban governance structures. Second, we look at the number of staff available and working on adaptation in urban municipal bodies. Third, we explore the main municipal climate-related threats. Finally, we lay out the extent of adaptation activities across the three most prominent forms of adaptation actions found across European cities: nature-based solutions, responses to heat, and responses to flooding.

Highlighting how European cities adapt to climate change provides not only an overview of what cities are already doing, but also points out their needs and challenges, and whether on-the-ground actions are in line with EU directives and goals. Comparing actions of European cities also helps in benchmarking, monitoring and evaluation, and peer learning. The underlying information is elicited from 54 large, medium, and small cities across 17 European countries, which, as part of the Eurocities network, answered a survey on their climate adaptation and resilience efforts.

2. What cities are doing

2.1 Institutional and organisational aspects of climate adaptation

European cities and their populations already face unprecedented risks due to their morphology and location, as well as to their dense, ageing, and tele-connected infrastructure.

Adaptation in European cities and urban areas is undertaken through formal local adaptation plans and policies/strategies, as well as through informal adaptation and resilience efforts in communities, neighbourhoods, and households. Formal local adaptation is pursued as part of dedicated climate adaptation or resilience plans/policies, sector policies with adaptation relevance, and broader sustainability strategies that integrate adaptation and mitigation. Those formal local efforts and processes can be supported by international, national, and regional climate networks or developed independently, outside such networks (Reckien et al., 2018).

Survey respondents reported that more than half of the cities (54%; 29 cities) prepare an integrated adaptation-mitigation plan. Only about a third of cities have a separate adaptation and mitigation plan or strategy (30%; 16 cities). Although both strategies are found across cities of all sizes, integration is more common in mid-sized cities (34% of integrated strategies are in cities of 250,000–500,000), and separation is more common in larger cities (56% of separated plans are in cities of 500,000–1 million). There are advantages to separating adaptation, as it allows for a strong, clear focus on adaptation with dedicated, targeted responses. There are also advantages to integrating adaptation and mitigation, such as addressing budgetary constraints, complexity issues, and side effects, trade-offs, and synergies of adaptation measures (Grafakos et al., 2020). Additionally, some cities are working towards a subsequent strategy, complementing their existing plan with either a separate or an integrated strategy. Although these cases are rare, there are more examples of a separate adaptation strategy or plan being complemented by an integrated strategy, allowing a move from a focused approach to a broader, all-encompassing, and complex climate and sustainability strategy. We see this in Brussels, Helsinki and Zaragoza.

2.2 Municipal staff working on climate adaptation

There is a growing ambition to deliver on climate adaptation, but the resources needed are unevenly distributed. On average, cities employ 4.3 staff members to work on adaptation issues. This average is driven by a large fraction of cities, i.e., over half of cities, which employ 2–4 staff members (33% of cities) or 5–10 staff members (28% of cities) for adaptation tasks. A small fraction of about 10% of cities even employ more than 10 people working on adaptation. This is, for example, the case for Florence, Guimaraes, and Amsterdam.

On the other hand, nearly 20% of cities (10) do not employ any dedicated staff for adaptation. However, it is unclear whether these cities have no staff working on adaptation at all, or no staff that exclusively works on adaptation (and nothing else). Nonetheless, the key point is that about 20% of cities have no dedicated staff for climate adaptation, and 77% have pretty large teams.

Such a disparity clearly indicates a lack of capacity, such as staff or financial resources, in some cities, particularly the smaller ones. Correlation analyses show that smaller cities lack dedicated adaptation staff (Kendall's tau-b $\tau_b(53) = -0.265$, $p = 0.036$), whereas larger cities have significantly more, often 5–10 people for that role ($\tau_b(53) = -0.268$, $p = 0.034$).

The climate adaptation teams either sit within cities' climate or environment departments (37%; 20 cities) or are distributed across several departments (33%; 18 cities). Separating staff across several departments is frequently done in mid-sized cities (57% of cities with 250,000–500,000 inhabitants) and can be considered a form of mainstreaming, i.e., the integration of policies and measures to address climate change into ongoing sectoral and development planning and decision-making. Larger cities (21% of cities with 500,000–1 million inhabitants and 18% of cities with over 1 million inhabitants) as well as smaller cities (40% of cities with 250,000–500,000 inhabitants) distribute their adaptation teams less frequently. Mainstreaming climate adaptation is important, as it allows approaching adaptation in a systemic way (Reckien et al., 2019), considering potential side effects, trade-offs, and conflicts – thereby reducing the potential for maladaptation (Reckien et al., 2023a), and harnessing the co-benefits and synergies of adaptation with other policy goals. However, given the limited resources in smaller cities, the distribution of adaptation staff across several departments is likely due to staff shortages rather than the goal of mainstreaming per se.

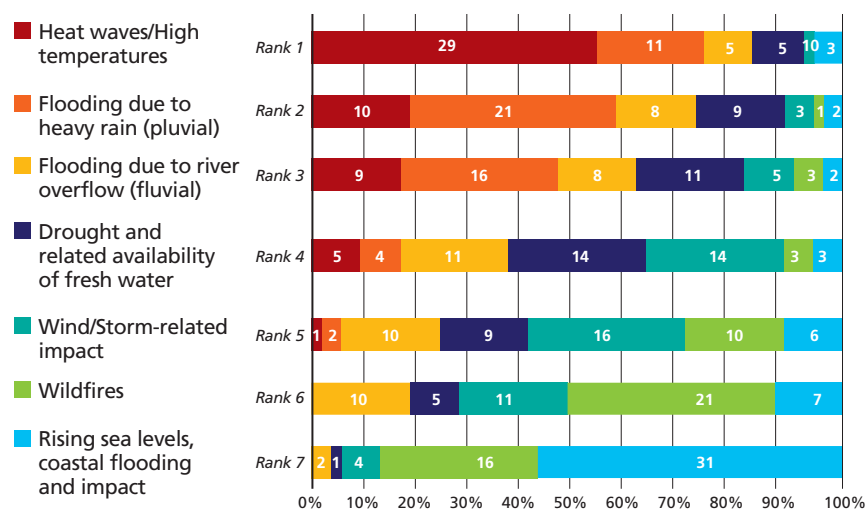
Climate adaptation teams that are housed within the mayor's office are usually found in the larger cities, such as in Rome and Budapest, as well as in Debrecen – signifying statements of climate change adaptation being a top priority. In the cities of Lisbon, Budapest, Florence, Vienna, and Bruges, the climate adaptation team is located in the city administrations' head offices; similarly, a sign that climate change is among the top urban priorities.

Heatwaves and temperature-related extremes are ranked as the largest climate-related risk. Floods rank second.

2.3 Experienced climate impacts and risks

Cities face different climate risks depending on their topography, orography, and proximity to the sea. The largest climate-related risk that cities face is heatwaves and temperature-related extremes. For 54% of cities, these are rated as risk number one (Fig. 1). Floods, particularly pluvial flooding (due to heavy precipitation), rank second (for 39% of cities) and third (for 30% of cities), respectively. Fluvial flooding is rated as a lower risk, indicating that either river embankments and flood protection measures are in place or that cities are not located on larger rivers. Drought and wind/storm-related challenges are tied as the fourth-most-cited risks. Wildfires rank sixth, and rising sea levels rank seventh among the most cited risks. Risks are related to the topographic and/or orographic context of cities, which means that not all cities are located near larger rivers or the coast. Still, the fact that heat and temperature-related threats is the most frequently cited climate risk in our city sample is noteworthy. This is in line with previous surveys of mayors, such as the "Eurocities Pulse" (Eurocities Monitor 2024), or overview reports of the scientific literature (EEA report, 2023). However, some studies (e.g., Reckien et al., 2023b), using a different sample of cities, have found flooding to be the largest climate risk in European cities. The reported findings from the more recent sample of 54 European cities reported here suggest that either heat-related impacts are increasing or that this sample is dominated by inland cities far from major rivers.

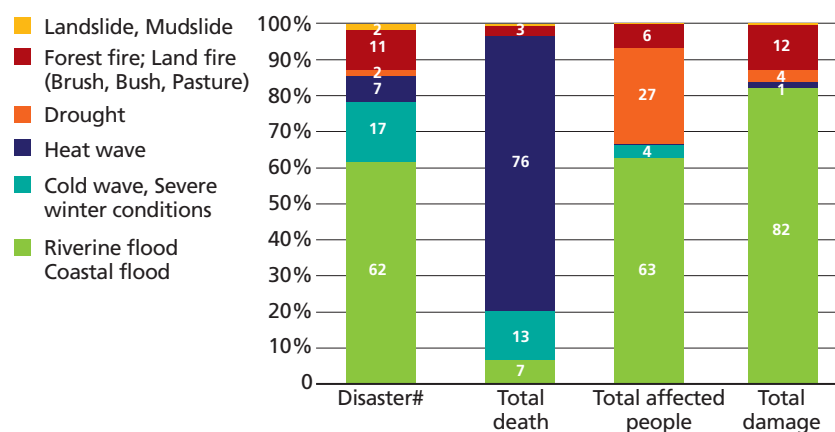
Figure 1. Ranking of main climate-related threats and risks



Source: Author's elaboration based on Eurocities Pulse

A related question concerns how cities understand “risk” – or “threats”, as phrased in the survey. Data from the International Disaster Database (EM-DAT, 2023) shows that the impacts of hazards differ when measured by different risk metrics or damage categories, such as the number of hazards, fatalities/deaths, affected people, or monetary damage (Fig. 2).

Figure 2. Impact of hazards on European cities depending on the risk/ threat metric, or damage category used



Source: Author's elaboration based on data from EM-Dat using disaster incidents in cities of Europe from 1980-2023, as reported in Reckien et al., 2025a.

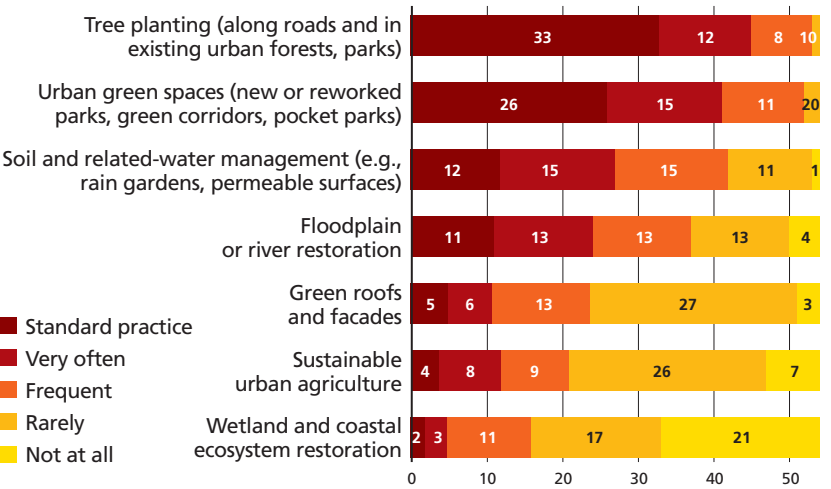
European cities have adopted a range of adaptation actions in response to climate risks. Among the most common and frequently reported are nature-based solutions (NbS), responses to heat, and responses to flooding.

2.4 Implementing nature-based solutions

Nearly all cities (96%; 52 cities) design and plan for nature-based solutions (NbS), harnessing their multifunctional values or a specific value among the many that are attributed to urban greening and urban infrastructure. Seeing the implementation of NbS as a top priority for cities in Europe is a recurring finding and in line with previous surveys under the Eurocities Pulse (Eurocities Monitor, 2024).

Tree planting is a common practice in most cities (61%; 33 cities). Planting and implementing urban green spaces, such as reworking parks, green corridors, and pocket parks, is a common practice in almost half (48%) of cities (26). Planting and implementing soil- and water-related management practices (such as de-sealing permeable surfaces), floodplain and river restoration, green roofs and green facades, sustainable urban agriculture, and wetland and coastal ecosystem restoration are less common (see Fig. 3).

Figure 3. Prioritisation of nature-based solutions as part of policies and measures for climate adaptation

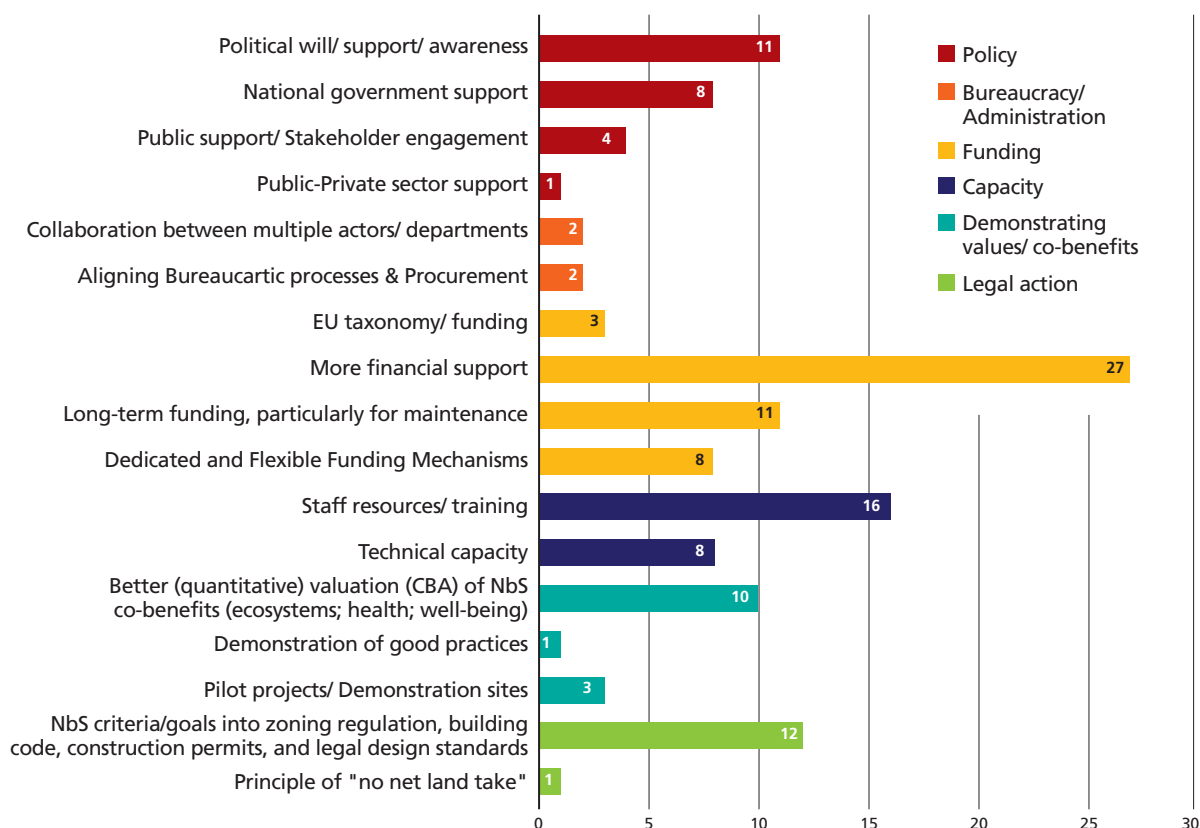


Source: Author's elaboration based on Eurocities Pulse

For all planned and implemented NbS, about 60% of cities (32) have specific targets, such as "hectares restored" and "trees planted", or plan to set targets in the near future (16; 32% of cities). This is a good sign, as target and goal setting are vitally important for implementation and monitoring and evaluation (M&E).

However, securing a dedicated budget for NbS or incorporating it into the financial planning for the climate adaptation strategy poses a greater challenge (Fig. 4). About 35% of cities (20) have a general budget for all mitigation and adaptation actions; 24% of cities (13) have a general budget for adaptation; and only 11% of cities (5) have a dedicated budget within the climate adaptation budget earmarked for NbS. On the contrary, a quarter of cities (24%; 13) have no funding for NbS, and thus risk meeting obstacles during implementation.

Figure 4. Support needed to accelerate the use of NbS and greening for adaptation cities



Source: Author's elaboration based on Eurocities Pulse

The largest challenges for securing funding for NbS are competing priorities for funding (42 cities; 78%), an overall lack of funding (41 cities; 76%), the difficulty of securing funding for long-term maintenance (37 cities; 69%), and complex regulatory or bureaucratic processes (31 cities; 57%). In particular, smaller cities report greater challenges in finding helpful resources/information/updated handbooks on the process of nature restoration and climate adaptation ($\tau_b(53) = -0.276$, $p = 0.029$). In particular, for cities with smaller budgets, there is also the challenge of securing funding over long project durations ($\tau_b(53) = -0.318$, $p = 0.012$) and finding helpful resources ($\tau_b(53) = -0.332$, $p = 0.009$).

Some cities also cite the lack of necessary space for NbS, the counterargument to densification/urbanisation, and the lack of staff and expertise. A point of discussion is whether joint cross-departmental responsibilities for NbS implementation are perceived as a challenge or a driver for enhancing NbS implementation in cities. What cities need in order to accelerate NbS and urban greening for adaptation are hence related to these challenges (Fig. 4).

- As an innovative example, Oslo will develop tools to enable «no net land take» as a premise for spatial planning.
- Another example is Valongo. In Portugal's case, clarifying the methodology for implementing green public procurement criteria could

help increase the frequency with which this type of solution is utilised. The city also suggests that a medium- and long-term cost comparison between grey and green solutions would be useful, highlighting that NbS durability and costs make them a more attractive option.

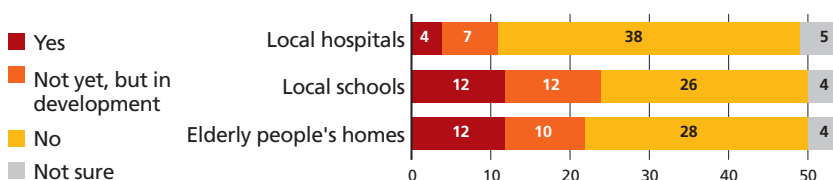
- One city mentions that NbS are currently financed through the city's core budget – rather than as separate climate change mitigation measures, while applying the EU taxonomy for investments exceeding €1m. However, the EU taxonomy's adaptation criteria do not currently recognise investments in stormwater management. In other words, the taxonomy's criteria only cover investments related to wastewater and measures to prevent sewer network overflows. It would be important to also make green financing available for nature-based stormwater solutions that address both the quantity and quality challenges of stormwater.

2.5 Implementing responses to heat

Given that heatwaves and temperature-related impacts and risks are the number one threat and cause most fatalities from climate-related hazards in European cities, additional measures are often needed to prepare for heat. Cities are actively preparing heat exposure maps, as well as demographic, economic, and other social data alongside heat exposure. Among the 54 cities in our sample, 37% of cities (20) map heat exposure in combination with demographic data, 31% (17 cities) with other social data, and 9% (5 cities) with economic data. Another 19% (10 cities) map heat exposure, but without a specific focus on overlaying it with other data; 24% (13) are in the process of mapping it; and 9% of cities (5) have no heat exposure map.

If available, heat exposure maps are most often accessible to all municipal departments (84% of cases, 38 out of 45 cities with a heat exposure map), and hence could be used for cross-departmental planning. However, addressing heat exposure among vulnerable populations and related institutions is rarely done in a dedicated manner. In the sample, most cities do not address potential heat exposure in hospitals (38 cities, or 70%; while 5 cities, or 9%, are unsure); in schools (26 cities, or 48%; while four cities, 7%, are unsure); or among the elderly population (28 cities, or 52%; while four cities, 7%, are unsure) (Fig. 5). Notably, though, heat exposure mapping is in development for schools, the elderly population, and hospitals in approximately 22%, 19%, and 13% of cities, respectively.

Figure 5. Climate adaptation plans that dedicatedly address heat exposure of vulnerable people in social institutions



Source: Author's elaboration based on Eurocities Pulse

Targeting heatwave responses towards vulnerable populations, institutions, and facilities appears to be a significant challenge for cities. This finding aligns with recent research on a representative sample of European cities, which has also shown that the proportion of adaptation responses focused on those in need has decreased over time (Reckien et al., 2023b, 2025b). In particular, this meant that newer plans became less consistent in aligning the risks to vulnerable groups identified in the adaptation plans with the anticipated adaptation measures. Two-thirds of plans (111 plans; 67%) mentioned risks to vulnerable groups, while fewer than half (74 plans; 44%) included corresponding adaptation measures. The elderly and infants are mentioned most often, both in terms of impacts (elderly: 76, or 46%; infants: 57, or 34%) and planned adaptation measures (elderly: 49, or 29%; infants: 35, or 21%).

2.6 Implementing responses to flooding

Next to heatwaves and temperature-related risks, flooding is a major challenge for cities, particularly when pluvial (precipitation-related) and fluvial (river flow-related) flooding are considered as one category. Riverine floods are most numerous, cause the greatest damage, and affect the most people in European cities. Responses to flooding and drought involve developing a comprehensive water management strategy or a system for water recycling and greywater use. Regarding water management strategies, 48% of cities (26 cities) have a separate, comprehensive strategy that addresses multiple aspects related to excessive or insufficient water availability, including floods and drought. A third of cities (18 cities; 33%) have a separate strategy that addresses either the particular aspects of heavy rain and related drainage and sewage challenges, or the particular aspects of drought and related drinking water supply challenges. Fewer cities have a water management strategy (either as a comprehensive strategy, or related to floods or droughts) integrated into other urban policies, such as the climate adaptation policy/strategy (9, 6, and 9 cities; 17%, 11%, and 17% of cities, respectively).

As another adaptation response to water challenges, cities may either restrict, minimise, or manage urban development in flood-prone areas. The largest fraction of cities with flood-prone areas (50 cities), i.e., 46% (23 cities), sometimes restrict urban developments in these areas (in contrast to always or never). Usually, in these cities, urban development in flood-prone areas and floodplains is managed to minimise the risk.

- For example, Nantes Métropole authorises, via its Local Urban Development Plan, construction in areas with a low risk of flooding from rainwater runoff, recommending that buildings be raised 20 cm above the natural ground level (e.g. on pillars) in order to limit water infiltration even in the event of a hundred-year flood.

However, in 32% of cases, urban development in flood-prone areas is always restricted (16 cities), and in 11% (6 cities), never. This shows that cities employ diverse and sometimes very different approaches to managing water levels, floods, and droughts. In particular, where there are no restrictions on development and no management of development in floodplains, there is a clear need for risk analyses and a long-term perspective on housing and development.

Several cities, such as those in the Netherlands, France, and Germany, have also noted that flood regulation at the municipal level is linked to policies at higher administrative levels, including national and international levels (for example, the European Flood Directive 2007/60/EC). Moreover, in the past few years, flood management has shifted from pure flood protection to integrated flood risk management. In Europe, this shift is reflected in the EU Flood Directive to be implemented in coordination with the EU Water Framework Directive (WFD). This means that traditional flood (grey) protection solutions – including dams, dikes, channels, and storm surge defences and barriers in general – are now increasingly mixed with the promotion of green measures, such as sustainable land use practices, managed retreat from flood-prone areas, improvement of water retention through preservation and requalification of floodplains and wetlands, as well as controlled flooding of certain areas in the case of a flood event (Reckien et al., 2023b; Climate Adapt, 2019).

Another water management practice involves water reuse and recycling. However, only 7% of cities (4) report having water recycling in place across the entire city. The largest share, 37% of cities (20), have neither water recycling nor grey-water reuse facilities in place. This highlights a particularly low rate of water reuse in European cities, which is particularly alarming considering the increasing pressure on freshwater resources. Some cities (11; 20%) have these systems in place in parts of the city (e.g., certain neighbourhoods). Examples typically relate to rainwater use for public facilities (watering of public plants and trees and cleaning of streets) or to greywater use in selected pilot projects, such as specific office buildings or newly constructed buildings.

- In Bologna, the collection and recycling of rainwater are mandatory requirements for all urban and building transformations, required by regulation.
- Also, in Ghent, Flemish legislation requires rainwater reuse in new developments with exceptions requiring extensive justification attached to the building permit request. In addition to this, Ghent requires new developments bigger than 1000m² to be completely rainwater-neutral (no rainwater leaves the project site, all rainwater up to a 20-yearly rain event is captured, re-used, infiltrated or evaporated).

3. Needs and challenges: why adaptation gaps persist

Despite growing awareness of climate risks and substantial progress in adaptation planning, European cities continue to face substantial challenges in implementing effective adaptation measures (EEA, 2020). Challenges mainly relate to structural, technical/capacity-related, and operational/financial barriers to implementing adaptation.

Regarding structural challenges and governance arrangements, the analysis identified challenges arising from shared or unclear cross-departmental responsibilities. Climate adaptation inherently spans sectors – urban planning, parks and recreation, public health, infrastructure, emergency services – yet most municipalities still operate in departmental

silos. The weak integration among planning, environment, public works, and social services hinders successful adaptation that considers potential side effects and trade-offs as well as synergies between different adaptation measures or between adaptation and mitigation (Reckien et al., 2023b). There is a clear need to develop shared frameworks, institutional guidance (e.g., via adaptation steering committees), and shared data facilities, including common risk assessment tools, to enable better cross-departmental cooperation.

However, cross-departmental, cross-municipal, or cross-sectoral cooperation carries the risk of fragmented responsibilities and related governance and coherence challenges –both horizontally and vertically. Unclear mandates, regulatory limits, and diffused accountability, for example, when it comes to flood management, leave adaptation to stall or being reactive rather than proactive. There is a need for clear roles in adaptation across government levels and related support through legal frameworks, to enable cities to act effectively and strategically on adaptation.

Regarding technical and capacity-related challenges, the analysis has clearly identified large disparities in staff resources across cities. Smaller cities, especially, struggle with limited resources and staff availability. Shortages of technical expertise are also mentioned. There is often limited in-house expertise in climate risk and impact assessments, the economic evaluation of measures, or the deployment of specific adaptation solutions. For example, cities frequently cite limited availability of urban space, and related tensions between the deployment of adaptation measures and pressures for urban densification. A related technical challenge is the insufficient articulation of clear, measurable, and spatially explicit targets for adaptation, and particularly for NbS. In the absence of well-defined targets, cities have limited capacity to assess whether adaptation is adequate in scale, speed, and depth. Hence, there is an urgent need for training and more dedicated climate adaptation staff, particularly in smaller cities.

Regarding financial constraints, the analysis has shown that constrained, bundled and fragmented funding structures pose a challenge for adaptation. Dedicated financing of specific adaptation remains limited; often broader adaptation or combined adaptation-mitigation budgets are present, leading to competition with other climate policy priorities. Next to competing demands for financial resources and insufficient funding, difficulties securing financing for long-term projects or project maintenance, and complex regulatory and administrative frameworks are mentioned. Moreover, the EU taxonomy's adaptation criteria do not currently recognise investments in stormwater management, which should be urgently revised.

Finally, it must be noted that the social dimension of climate adaptation remains insufficiently addressed. Many cities give insufficient and inconsistent consideration to vulnerable populations, places, and institutions (Reckien et al., 2023b). Adaptation is about risk reduction, so people and places at risk should be targeted first. Inconsistent heat adaptation in social institutions, as well as flood risk management in flood-prone areas, are key examples. In these cases and places, comprehensive risk assessments and long-term, strategic adaptation approaches are needed, underscoring the need for targeted training and capacity building.

4. Emerging directions: what looks promising

Across the Eurocities survey, examples of NbS deployment, heat and flood risk reduction, as well as governance arrangements, highlight innovations in urban adaptation.

First, the extension of NbS in cities - Regarding NbS deployment, it is promising that nearly all cities in Europe are considering NbS for climate adaptation. Multiple co-benefits and multifunctional values – for example, regarding climate mitigation and other societal goals (air quality, health and well-being outcomes) – paint a promising picture for the climate and sustainability agendas of European cities. Innovative examples to foster NbS in cities include implementing green public procurement criteria, adopting legal standards for urban greening, using medium- and long-term cost comparisons between grey and green infrastructure solutions, and dedicating and prominently placing the adaptation budget in the city's core budget.

Second, the continuation of adaptation to temperature-related threats, which, however, needs a stronger focus on vulnerable people and places - Heat is consistently identified as one of the largest threats across analyses of European cities. This highlights the significant risk that heatwaves pose with regard to fatalities from climate hazards in European cities. Despite this large-scale awareness, however, the analysis shows that adaptation largely fails to consider heat impacts on vulnerable populations and places –which is an aspect for improvement.

Third, the development of comprehensive water management strategies that address periods of both too much and too little water - The largest fraction of cities has such strategies that simultaneously address flood and drought situations. Cities can support smart water management by installing or expanding rainwater harvesting systems across many urban facilities and mandating them for all new buildings and developments, as seen in Bologna and Ghent.

Fourth, investment in the combination of grey and green infrastructures to minimize risk in floodplains - Some uncertainty remains regarding national and EU mandates and responsibilities regarding flood management at the local levels. However, the application of the EU Flood and Water Framework Directives, combining green and grey infrastructure, is promising. Given space constraints in cities, managing floodplain development is understandable, but cities should ensure that flood-sensitive building codes and infrastructure (e.g., building on pillars, as in Nantes) are in place and that minimising flood risk has priority.

Fifth, the expansion of adaptation mainstreaming and governance innovations - More than half of cities have prepared an integrated adaptation-mitigation plan, a first step toward enabling cross-checking of synergies and trade-offs. Spreading the adaptation team across municipal departments (as is often the case in small and mid-sized cities) creates yet another opportunity for cross-departmental interaction, cooperation, and mainstreaming. Other innovative governance examples relate to the adoption of “no net land take” laws, and the principle of “land neutrality”, which are believed to reduce construction in green areas.

There is a need for clear roles in adaptation across government levels and related support through legal frameworks, to enable cities to act effectively and strategically on adaptation.

Regarding NbS deployment, multiple co-benefits and multifunctional values paint a promising picture for the climate and sustainability agendas of European cities.

5. Implications and key messages

The survey highlights rich experiences with adaptation planning and implementation, as well as struggles with financing, prioritisation, and novel approaches. The analysis provides rich insights into lessons learned for other cities.

There is near-universal deployment of NbS in European cities, which enables the harnessing of the multifunctional benefits of NbS. However, the lack of targets for green infrastructure deployment and the shortage of funding, particularly for long-term projects and maintenance, jeopardise meeting the full potential of NbS. Setting clear, measurable targets for implementing NbS helps cities operationalise them, monitor progress, and potentially generate funding by providing clarity, transparency, and limits on the financial resources required. Innovative examples to foster NbS in cities include implementing green public procurement criteria, adopting legal standards for urban greening, using medium- and long-term cost comparisons between grey and green infrastructure solutions, and dedicating a separate budget to urban greening. There is also a need for a standardised way to assess the multifunctional benefits of ecosystems and NbS. There is a perceived discrepancy between the lack of necessary space for NbS in cities, and the goal of densification/urbanisation. Innovative approaches are needed to reduce this conflict.

The risk of heatwaves is the top adaptation priority for European mayors, but the elevated vulnerability of certain populations to heat demands more attention. Heatwaves and heat-related risks rank as the number one threat to European cities and cause most fatalities. Whereas such elevated awareness is a prerequisite for adaptation, a lack of focus on vulnerable populations and institutions reveals limited capacity to consider them for heatwave adaptation. More training and resources are needed in that regard, with a particular focus on the upcoming EU Integrated Climate Resilience Framework, which needs to include training and capacity building to target adaptation on vulnerable populations and social institutions.

Pluvial and fluvial flooding rank second and third, respectively, among climate threats and need careful, climate-adapted, and long-term visionary management. Floodplains are vulnerable areas that require a high level of flood-adapted infrastructure, including a combination with NbS. If cities are not restricting or carefully managing development in flood-prone areas and floodplains, they must conduct risk analyses and adopt a long-term perspective on housing and development. This is particularly important given the increased focus on housing across EU cities and the recent publication of the EU Affordable Housing plan. Moreover, there is significant potential to increase rainwater harvesting and water reuse facilities in cities, thereby reducing pressure on water availability during pluvial floods and drought.

Implementing adaptation needs well-trained staff, who are often unavailable in smaller municipalities. Dedicated, multifaceted adaptation training, more adaptation staff in smaller cities, and cooperation between less and well-resourced cities can help progress. There are significant discrepancies between cities with large teams working

(fully or in part) on adaptation and those without any dedicated staff working on adaptation, particularly in smaller cities. If resources cannot be found, smaller municipalities could ask surrounding larger municipalities to work in tandem. As many climate risks extend across municipal boundaries and are regional in nature, cross-municipal cooperation is key.

However, the survey also highlights the lack of capacity and technical knowledge, for example, with regard to conducting climate risk assessments, goal setting, prioritising measures, budgeting for adaptation, and evaluating (economic) benefits of adaptation measures. The lack of well-defined adaptation targets, in turn, complicates monitoring and evaluation. Hence, there is an urgent need for dedicated, multifaceted adaptation training and more climate adaptation staff, particularly in smaller cities.

Reducing complex regulatory and bureaucratic processes for adaptation and increasing horizontal and vertical mainstreaming can support adaptation, harness co-benefits and synergies, and facilitate early identification of trade-offs and conflicts. Increasing horizontal and vertical cooperation can be facilitated by common risk assessment tools, shared frameworks, and institutional guidance (e.g., via adaptation steering committees), as well as shared data facilities.

These implications and key messages, drawn from the survey of European mayors, will foster adaptation and help set related priorities by highlighting the enabling factors and “no regret” actions to strengthen adaptation across all cities and regions of Europe.

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1. Introduction: the adaptation finance challenge in cities

Climate adaptation has become a frontline issue for European cities, as weather- and climate-related extremes in Europe have already led to large and rising economic costs. The European Environment Agency estimates €208bn in economic losses from weather- and climate-related extremes between 2021 and 2024, with annual losses increasing over time (EEA, 2025). The adaptation finance gap is commonly described as the difference between the estimated costs of meeting agreed adaptation targets and the amount of finance actually mobilised for adaptation (UNEP, 2016). In practice, both sides of this equation are difficult to measure, but a simple way to approximate the gap is to compare indicative investment needs with the adaptation finance that is visible in EU and national tracking systems. For the EU-27, the World Bank (2024) derives indicative “no-regret” adaptation cost benchmarks of €15bn–64bn per year until 2030 (central estimate ~€21bn), while the European Court of Auditors estimates that at least €26bn was budgeted for climate adaptation in 2021–2027 at EU level (ECA, 2024), and the European Investment Bank reports signed adaptation financing of €4.6bn in 2024 (EIB, 2025). Even these partial figures suggest that visible EU-level adaptation finance is well below the lower-bound annual needs estimates, but a precise “gap” cannot be calculated credibly because adaptation spending is often embedded within wider investments, datasets can overlap, and reporting remains uneven. The gap identified underscores that scaling up is required even before considering distribution across levels of government and local interventions. For European cities – where much of the exposed infrastructure and built environment is long-lived – these orders of magnitude reinforce a simple point: adaptation finance is no longer a marginal add-on to municipal policy, but a central determinant of whether resilience will be delivered at the pace and scale required.

Bridging this gap will require not only scaling up adaptation finance, but also addressing structural constraints that limit cities’ ability to plan, prioritise and access funding. As later sections show, cities face fiscal,

Cities face fiscal, pipeline and enabling-environment constraints that make it difficult to turn adaptation plans into funded programmes.

pipeline and enabling-environment constraints that make it difficult to turn adaptation plans into funded programmes. These barriers are particularly salient in multilevel governance settings, where many of the levers shaping their revenue capacities and access to funding sit at national or EU levels.

This chapter combines that wider evidence base with targeted empirical insights from the Eurocities Pulse survey (n=54) to identify key messages in urban adaptation finance, develop recommendations for city, EU and national government institutions, and inform future capacity-building support for Eurocities members. The survey results point to three recurring patterns that help explain why adaptation remains difficult to finance at city level: a persistent gap between adaptation planning and financing strategies; frequent budget invisibility; and a material “evidence and prioritisation” gap, with many cities not using tools to assess costs, benefits and co-benefits or to prioritise measures, often due to complexity, data gaps and limited capacity.

2. What cities are doing: how adaptation is currently financed and operationalised

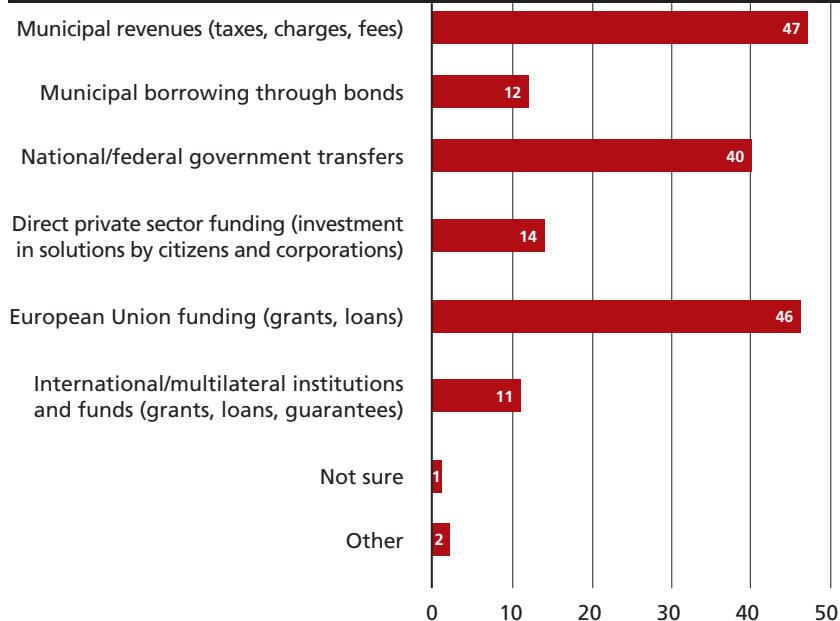
European cities have expanded adaptation planning and are increasingly expected to deliver on resilience, yet the way adaptation is financed and operationalised remains uneven. Comparative evidence from Europe suggests that adaptation planning has increased over time, but plan quality and implementation-oriented components remain uneven, with plans often weak on quantitative costing and funding arrangements (Reckien et al., 2023; Grafakos et al., 2020). Against this backdrop, the Eurocities Pulse survey provides timely evidence on how cities currently link adaptation to finance, highlighting the practical approaches and tools cities use, as well as persistent gaps in budgeting, appraisal, and instrument choice.

2.1 Current funding mix and instruments (what is actually financing adaptation)

The adaptation state of play depends on how cities finance adaptation in practice, through which sources and instruments, and what constraints choices. The survey confirms that adaptation finance is predominantly public. The most commonly used sources are municipal revenue (47 cities – 87%) and EU funding (46 cities – 85%), followed by national grants and transfers. This largely aligns with earlier assessments of climate finance flows, which find that adaptation measures often lack direct revenue streams and face persistent challenges in measuring and verifying adaptation benefits – reducing the scope for private finance to play a leading role (CCFLA, 2024; Ulpiani et al., 2023; UNEP, 2016).

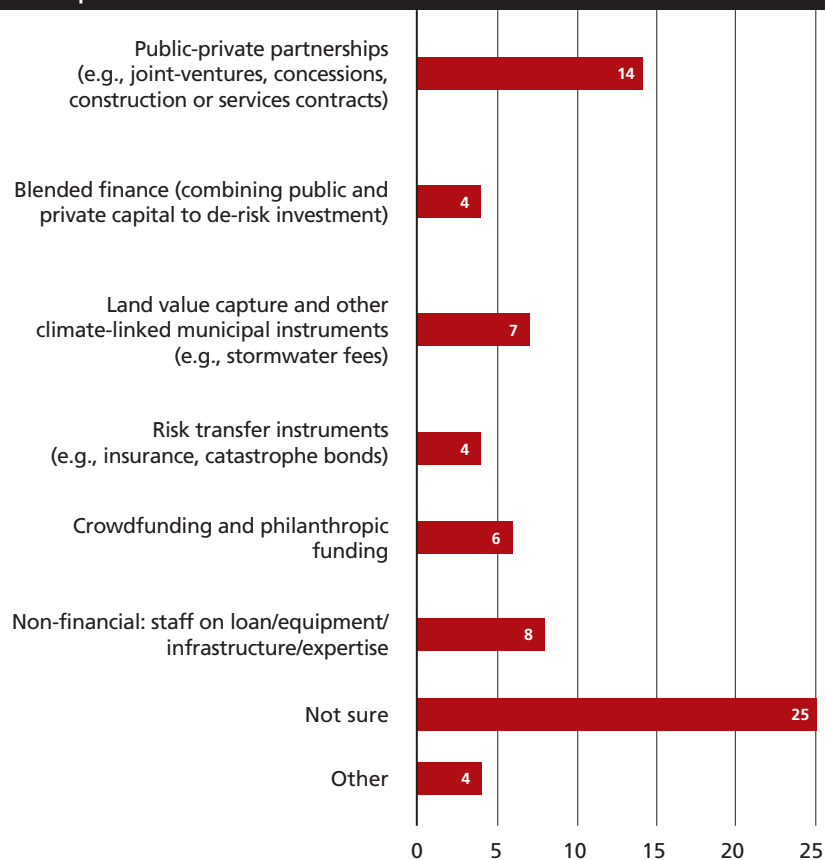
Non-traditional sources are less frequent and less visible. Public-private partnerships are the most frequently reported instrument (14 cities – 26%) while other approaches (land value capture, risk transfer instruments, bonds or international finance) appear less frequently used.

Figure 1. Survey answers to traditional financing for adaptation measures in cities



Source: Eurocities Pulse

Figure 2. Survey answers to innovative and non-traditional sources of finance for adaptation measures in cities



Source: Eurocities Pulse

If the city's budget is already strained with a high debt, loans do not always offer much of a solution.

The many “not sure” responses in the survey on innovative instruments may reflect low uptake, low visibility, or maturity of these instruments within municipalities. Qualitative comments reinforce this picture. Several cities highlight that loans and private finance are not always a good fit for adaptation measures in some contexts, for example as highlighted by one city: “If the city's budget is already strained with a high debt, loans do not always offer much of a solution.”

Overall, the funding mix described by cities is consistent with wider evidence that urban adaptation is still largely funded from municipal and higher-level public budgets, with private finance playing a complementary role only under specific enabling conditions, such as supportive legal frameworks, institutional capacity, and availability of bankable projects that can be packaged for financing.

Second, the visibility challenge noted in the literature remains central: adaptation finance is often counted only as an incremental component of wider investments.

2.2 Institutionalising adaptation finance: from plans to finance strategies

A first signal of operationalisation is whether cities translate adaptation priorities into explicit investment plans and financing strategies. The survey shows that adaptation planning is widespread: 85% report having an adaptation plan (integrated or standalone), with others under development. Yet it also demonstrates a pronounced “strategy-to-finance” gap: only three cities (6%) report having a dedicated adaptation finance strategy and seven (13%) report one under development, while 18 (33%) indicate there is no finance strategy or dedicated financing section; 15 (28%) report that financing considerations are included in an adaptation plan or related strategy.

This “strategy-to-finance” gap is consistent with the literature showing that local climate action plans often lack robust costing, funding schemes or clear allocation of responsibilities, which limits delivery readiness. In practice, many cities rely on project-by-project approaches, identifying possible funding sources only when specific investments are prepared for approval. Some respondents also note that adaptation responsibilities and financing are split across external entities (e.g., utilities, public enterprises, private actors), making it harder to consolidate a city-wide view.

2.3 Budget integration and tracking (a visibility problem)

A second, often constraining, aspect of operationalisation is whether adaptation is visible in municipal budgets and financial reporting. Public financial management literature emphasises that climate budget tagging (or related classification approaches) can help align spending with climate objectives, improve transparency and create accountability – particularly when climate-related expenditures are dispersed across multiple departments and programmes (Aydin et al., 2022).

Survey responses illustrate this challenge. Ten out of 54 cities (19%) report that climate adaptation is not considered in budgeting decisions, and several indicate that adaptation spending is not explicitly identified because it is distributed across services that manage climate risks (e.g., infrastructure, emergency services). For example, one city highlighted that “not all activities are necessarily identified as climate adaptation efforts in the budget”. This “budget invisibility” is not only a tracking issue; it also affects strategic allocation. If adaptation expenditures cannot be identified, it becomes difficult to assess whether spending matches risk exposure, or to monitor investments over time. This invisibility also makes adaptation finance more vulnerable in budget negotiations and fiscal tightening, whilst undermining efforts to build credible co-financing narratives for international funders.

At the same time, the survey results point to emerging practices consistent with recommendations on tagging and green budgeting. Cities report experimenting with approaches linked to environmental, social and governance (ESG) reporting or EU taxonomy-related thinking. Others introduced more institutionalised solutions, such as the “fully integrated” approach in Oslo and a central adaptation fund in Stockholm that departments can access. While these practices are not yet widespread, they illustrate feasible ways to make adaptation more visible and defensible within existing public financial management systems.

2.4 Risk-informed and evidence-based programming and prioritisation (tools, data, decision practices)

Beyond budget tagging, robust operationalisation depends on how cities translate risk information into prioritised, fundable programmes. The literature positions climate risk and vulnerability assessments as a foundation for adaptation planning and investment prioritisation, because they connect climate hazards to sector- and place-specific impacts and help identify where action is most urgent (Wilby et al., 2009).

The survey suggests that risk assessment is present but not universal: 52% of cities regularly or occasionally conduct climate risk and vulnerability assessments, while 31% do not. Among those undertaking assessments, 45% report using them primarily to inform prioritisation of adaptation projects in budgets.

A more visible constraint is the limited use of systematic appraisal and prioritisation tools. While cost-benefit analysis (CBA) can be challenging for adaptation, because benefits take the form of avoided losses and depend on uncertain hazard trajectories, many frameworks recommend “fit-for-purpose” approaches that combine economic evaluation with multi-criteria decision analysis and distributional considerations (OECD, 2008). Yet 25 out of 54 (46%) cities report not using any tool or method to evaluate costs, benefits, or co-benefits and prioritise measures.

Reasons cited by cities include complexity, insufficient data, limited internal capacity and scepticism that CBA “rarely gives positive results”. At the same time, empirical syntheses of adaptation measures often find positive and sometimes high benefit-to-cost ratios. A recent analysis by the European Environment Agency identified several climate measures

where long-term benefits clearly exceed costs (EEA, 2026). Where tools are used, the survey indicates varying maturity: some cities describe piloting methods, drawing on national masterplans, or relying on expert judgement and consultants to support prioritisation.

Cities primarily draw on traditional public sources to finance adaptation – municipal revenues, EU funding and national transfers.

3. Needs and challenges: why the gap persists

Across Europe, the adaptation finance challenge is not only a question of “making more money available”, but also of how adaptation priorities are translated into the development of credible, fundable programmes through defined responsibilities, prioritisation and appraisal, and practical access to various sources of funding and finance. Survey results confirm findings in the literature: planning is ahead of financing. Most cities report having an approved adaptation plan or strategy, however with limited quantification of costs and benefits, and only a few having or developing a dedicated adaptation finance strategy, which constrains pipeline readiness and bankability for funding (Grafakos et al., 2020; CCFLA, 2024). Across the survey responses and the wider adaptation finance literature, three interlinked constraints emerge as the key reasons why cities struggle to scale from adaptation planning to sustained delivery.

3.1 The “public budget dependence” trap and competing mandates

A central challenge is heavy dependence on public budgets combined with intense competition from mandated and politically salient spending. The survey shows that cities primarily draw on traditional public sources to finance adaptation – municipal revenues, EU funding and national transfers – reinforcing that adaptation is largely pursued within public finance envelopes. At the same time cities also identify “lack of municipal budget and internal funds” as the top barrier, coupled with “competing projects and agendas at different government levels”.

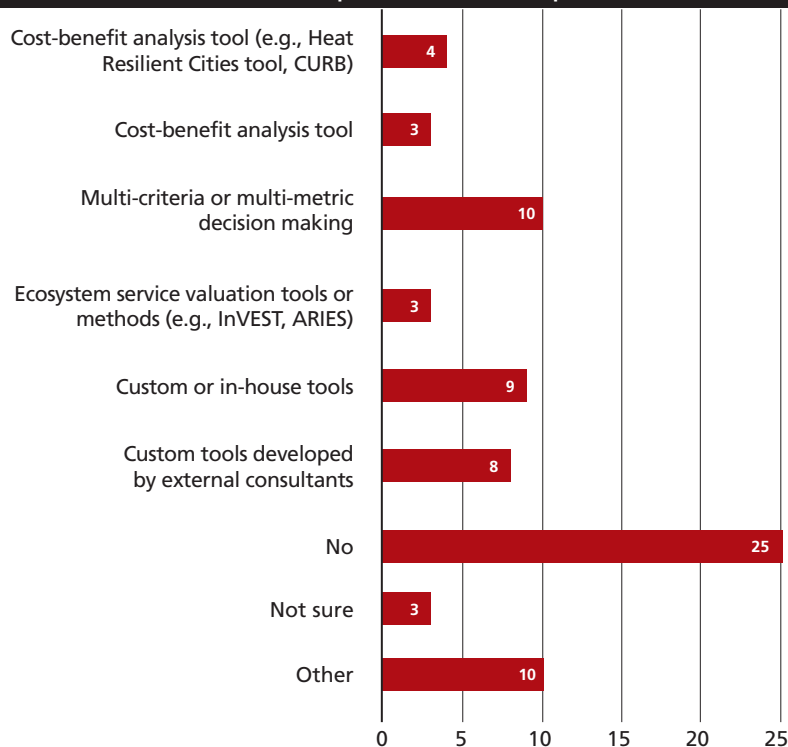
This reflects classic public finance dynamics. Many adaptation measures deliver public benefits as avoided losses and service continuity, rather than direct project revenues, and therefore compete poorly in annual budget cycles. Cities’ comments in the survey reflect this reality and underline the preference for grant-based support over debt-based solutions for many adaptation investments, especially where fiscal space is already tight. The broader literature echoes these constraints, emphasising that municipalities frequently face limited fiscal space and weak revenue frameworks and investment planning (UNEP, 2016; UN-Habitat, 2021). In practice, funding outcomes are based on available opportunities, where actions proceed when EU/national windows align, rather than through predictable multi-year programming that matches the adaptation needs of cities.

3.2 The pipeline/capacity/evidence gap (including valuation, prioritisation and financial integration)

A second widely reported barrier is the difficulty of converting adaptation priorities into a credible, prioritised and finance-ready pipeline. In the survey,

“difficulty quantifying adaptation benefits” is consistently flagged among key constraints. This challenge is well-documented: adaptation benefits are often probabilistic, long-term and context-specific, and uncertainty complicates both cost and benefit estimation (OECD, 2008). When cities cannot credibly quantify benefits and co-benefits, or articulate a robust, evidence-based decision rationale, they struggle to prioritise measures to justify multi-year budget allocations and to meet funder requirements.

Figure 3. Survey responses to tools or methods used to evaluate adaptation costs, benefits and co-benefits, and prioritise climate adaptation measures



Source: Eurocities Pulse

The survey gives a concrete signal of this “decision” gap. Nearly half of cities – 25 (46%) – report not using any tool or method to evaluate adaptation costs/benefits/co-benefits or to prioritise measures, citing constraints such as tools being “too complex”, “lack of data (or lack in granularity)”, and the perception that “CBA rarely gives positive result”. Even where cities undertake climate risk and vulnerability assessments, the translation into budgeting choices appears uneven (52% report conducting assessments regularly/occasionally and, among those, 45% report using them to inform budget prioritisation). In other words, risk information exists in many cities, but it does not consistently become budgeting rationale.

This capacity/pipeline constraint also helps explain why budget integration remains weak in many municipalities: if adaptation actions are not packaged as a coherent programme with costed measures and clear objectives, they are more likely to be dispersed across departments and absorbed into conventional line items, reducing visibility and strategic allocation.

A key emerging direction is to treat adaptation as a normal part of budgeting, rather than as a separate, discretionary agenda.

3.3 Access and enabling-environment constraints (rules, transaction costs and limited instrument diversification)

A third constraint is that even where available funding exists, cities face access and enabling-environment barriers (i.e., legal constraints, high transaction costs to secure external funding and limited feasibility of diversifying instruments) that raise costs and prevent cities from using it effectively. In the survey, around 30% of cities report regulations that restrict access to certain types of financing, including borrowing rules and reliance on central approvals. Moreover, the survey respondents also highlighted limited fiscal autonomy and limits on private partnership models. Others highlight that responsibility for adaptation may lie partly with private owners (e.g., building upgrades), while municipalities lack mechanisms to mandate or recover costs. Access to funding depends not only on the availability of instruments, but also on regulatory frameworks, institutional capacity to prepare/manage projects and the ability to meet co-financing, procurement and reporting requirements (CCFLA, 2024). These factors help explain why cities in the survey strongly prioritise earmarked adaptation funding (43, or 80%) and simpler access to EU grants (42, or 78%) alongside calls for improved data, guidance and capacity-building. Limited instrument diversification is the symptom of these systemic constraints. The implication is not that cities should “replace” public finance with private capital, but that diversification typically requires enabling conditions (see section 4.4.).

4. Emerging directions: what looks promising (and under what conditions)

The survey and wider practice literature suggest that the most promising directions for scaling urban adaptation finance are not radical innovations, but consistent application of good public finance practice to adaptation. Where cities report progress, it is usually because they have: (i) embedded adaptation in routine public financial management; (ii) built more funder-ready pipelines; (iii) reduced access and transaction costs for available funding; and (iv) diversified instruments pragmatically where conditions allow. The examples emerging from the survey illustrate that these shifts are feasible even under tight fiscal and capacity constraints.

4.1 Embedding adaptation in budget rules and processes

A key emerging direction is to treat adaptation as a normal part of budgeting, rather than as a separate, discretionary agenda. In practical terms, this means that adaptation priorities are brought into annual and medium-term budget processes, with at least a basic mechanism for identifying, classifying and tracking adaptation-relevant spending. Survey responses point to different models for doing this (for example Oslo’s “fully integrated budget”), demonstrating that adaptation has a recognised place in the budget process and is not left to ad hoc, project-by-project funding.

Cities also report early steps with budget tagging and ESG-style reporting, sometimes informed by EU taxonomy thinking. Even when limited to major investment lines (e.g., flood protection, heat-health measures, green-

blue infrastructure), such tagging can help make adaptation spending visible during negotiations, support medium-term planning and feed into co-financing discussions with national governments and EU institutions (OECD, 2024). These experiences suggest that full “climate budgeting” is not a prerequisite; partial but deliberate integration can already improve the stability and defensibility of adaptation investments.

4.2 Building funder-ready pipelines from risk assessments

A second direction is to move from risk assessments and strategy documents to a concrete, prioritised and costed pipeline of measures that funders can engage with. Many cities now conduct climate risk and vulnerability assessments, but the survey indicates that these are not always linked systematically to budgeting and project preparation, with risk assessments often remaining in technical reports rather than as a basis for investment decisions.

Emerging practice points towards adaptation investment planning as a bridge. This typically involves: (i) using risk and vulnerability assessments to identify priority measures; (ii) grouping responses into a number of coherent packages (for example nature-based stormwater measures); (iii) developing indicative costs-benefit analysis and prioritisation criteria (risk reduction potential, equity, feasibility, co-benefits); and (iv) bundling measures into investment pipelines, aligned with relevant national and EU funding windows. Investment planning does not have to be complex; a “minimum approach” can already improve the connection between risk evidence, project preparation and finance.

4.3 Reducing access barriers

A third emerging direction is to reduce barriers that stand between cities and available funding. The survey indicates that cities are as concerned about how they access funding as about the total volume. Cities clearly see access conditions as a bottleneck: 43 (80%) request earmarked adaptation funding and 42 (78%) request simplified access to EU grants. Municipalities face bottlenecks in accessing funding and finance, and enabling conditions (capacity, project preparation and financial management) are key to improving access and implementation.

4.4 Diversification of instruments

Finally, there is scope for selective diversification of instruments, but only where underlying conditions are favourable. Survey evidence suggests limited visibility of non-traditional instruments: public-private partnerships are reported by 14 (26%) with other instruments only used sparingly, accompanied by “not sure” responses, signalling low maturity or visibility rather than broad uptake. This is aligned with current views on adaptation finance: private finance can complement public budgets where there are clear cashflows or risk-reduction arrangements (e.g., utilities, targeted fee models, guarantees), but most adaptation will remain predominantly public. Diversification succeeds when investment planning, local revenue frameworks and access mechanisms are strengthened (UN-Habitat,

2021). Several cities also pointed out key constraints behind limited diversification, such as limited expertise to structure blended mechanisms and limited private sector engagement for nature-based or resilience projects, implying that instrument innovation depends on project preparation and enabling frameworks as much as on market availability. Where these conditions are weak, adaptation remains predominantly publicly financed, and scaling depends heavily on predictable grants, national transfers and municipal budgets.

These experiences suggest that instrument diversification should be problem-driven rather than instrument-driven. For most cities, the priority remains improving predictability, accessibility and strategic use of public funding – municipal budgets, national transfers, EU and concessional finance. PPPs and other non-traditional instruments can play a complementary role where there is a clear economic rationale, sufficient institutional capacity, and a supportive national framework for borrowing, risk-sharing and partnership models, but they are not a substitute for strong public finance foundations.

Taken together, emerging directions suggest that success is often less about novelty and more about implementing existing good practice effectively: embedding adaptation in budget rules and routines; strengthening the pipeline from risk evidence to prioritised investment portfolio; and reducing transaction costs for accessing external finance. Transferability depends on enabling conditions, particularly overcoming silos between departments, improving project-preparation capacities, and supportive national rules on fiscal space, borrowing and partnership models.

5. Implications and key messages

Findings point to a consistent set of implications for scaling municipal adaptation finance: cities need better financial planning and management, and stronger pipelines, while national and EU actors need to make public financial support for cities more predictable and accessible.

5.1 What cities can do

1. Close the “strategy-to-finance” gap with operationalisation. Cities can strengthen delivery by making adaptation a default consideration in annual and medium-term planning and budgeting, rather than a discretionary add-on. A practical starting point is a short finance section/annex to the adaptation or climate plan that: (i) groups priority measures into packages; (ii) provides indicative cost ranges and basic prioritisation; and (iii) assigns responsible owners. This should be linked to a defined annual budget process for adaptation priorities and supported by basic tagging/classification of the largest adaptation-related investment lines, so that allocations can be tracked over time and are less likely to be lost across departments.

2. Strengthen project preparation and prioritisation. Cities should start introducing project preparation functions and tools to evaluate costs/benefits/co-benefits or prioritise measures. A practical step is to standardise how projects are scoped, costed and ranked using transparent criteria

(risk reduction, equity, feasibility, co-benefits). This improves credibility and helps package projects into funder-ready programmes.

3. Bundle projects into coherent programmes. Bundling reduces transaction costs and helps cities maintain continuity across funding and political cycles. Where possible, group measures into programmatic packages with shared governance and a multi-year investment plan, aligning them with adaptation investment planning and available funding windows.

4. Diversify instruments pragmatically where conditions allow. Where there are clear cashflows or risk-sharing arrangements, cities can explore using PPPs, concessional loans or blended structures to complement grants and municipal budgets.

5.2 What national frameworks should change/support

1. Improve municipal fiscal and regulatory space for adaptation delivery. Survey responses indicate that legal and regulatory constraints still restrict financing options for a significant minority of cities. Addressing these constraints can unlock use of both domestic resources and EU-origin finance.

2. Provide sustained pipeline support, not only competitive calls. Project preparation support (standard templates, advisory services and technical assistance) can help cities translate adaptation priorities into investable programmes and strengthen their ability to absorb EU and national funding.

5.3 What EU frameworks and international financiers should change/support

1. Prioritise predictable, earmarked adaptation funding and simpler access routes. This will ensure adequate grant and concessional funding is available, moving from fragmented, short-term project funding toward more predictable, programmatic support.

2. Reduce transaction costs and support programmatic financing. Developing clearer pipelines of calls, simplified documentation, harmonised templates, and staged funding from preparation to implementation can greatly improve access to finance, especially for smaller municipalities with limited staff capacity and experience.

3. Target technical support to the capacity gaps cities actually report. Beyond funding, cities require focused technical support on the gaps cities themselves report: quantification and appraisal, PPP and blended-structure development where appropriate, municipal HR/capacity, better data and practical examples, and stronger inter-municipal cooperation.

5.4 Five key highlights

- Plans are widespread, but finance strategies are still the exception: 85% of cities report an adaptation plan, but only three (6%) have a dedicated adaptation finance strategy. Seven (13%) are developing one.

- Adaptation is often “invisible” in practice: ten (19%) say adaptation is not considered in budgeting decisions, and spending is frequently dispersed across departments.
- The pipeline/appraisal gap is real: almost half do not use tools to assess costs/benefits/co-benefits or prioritise measures, commonly citing complexity and data constraints.
- Finance is still mostly public: cities rely primarily on municipal revenue (47, or 87%) and EU funding (46, or 85%), while uptake of non-traditional instruments remains limited (PPPs: 14, or 26%).
- Cities want predictable funding, easier access and practical support: the top requests are earmarked adaptation funding (43, or 80%) and simplified EU grant access (42, or 78%), alongside technical support on quantification, PPP development, municipal capacity, better data/examples and inter-municipal cooperation.

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1. Introduction

Urban areas gather large populations, valuable assets, and critical infrastructure, making them highly vulnerable to climate impacts such as heatwaves, heavy rain, and drought. Many traditional municipal functions, including land-use regulation and infrastructure management, play important roles in climate adaptation. Over the past decade, an increasing number of cities have developed adaptation strategies and action plans (Van Der Berg, 2023). However, evidence shows a significant “implementation gap” between the ambitions cities declare and the effective measures that are actually put into practice. Recent research indicates that this gap is often linked to limitations in how climate-relevant data are generated, integrated, and evaluated within urban planning and governance (Liss et al., 2025). The foundation of any effective adaptation strategy is a comprehensive understanding of the specific climate risks faced by a city. Data plays a crucial role in this initial phase. Most studies conceptualise adaptation as an iterative policy cycle that includes at least four key steps: assessing climate risks, planning and designing adaptation policies, implementing measures, and revisiting plans based on new information (Bonnett & Birchall, 2025). Each of these steps relies heavily on data. Once risks are identified, data is essential for developing and integrating adaptation strategies into the overall framework of urban governance, a process known as “mainstreaming” (Uittenbroek et al., 2013). This involves incorporating climate considerations into all relevant sectors, such as transportation, housing, and land-use planning, to ensure policy coherence and prevent maladaptation. The role of data extends beyond the planning phase, as cities must continuously monitor their progress to ensure that adaptation strategies are effective (Singh et al., 2022). Urban climate adaptation indicators are quantitative metrics used to track the implementation and impact of adaptation measures over time. Despite the clear importance of data, numerous barriers impede its effective use in many municipalities (Rogers et al., 2023). A survey of 72 municipal staff members in Constance, Germany, found that the main obstacles are not a lack of data but rather institutional and capacity-related challenges. These challenges include a shortage of technical expertise, difficulties in integrating data into existing workflows, unclear responsibilities, and insufficient staffing and financial resources (Harris et al., 2024).

Once risks are identified, data is essential for developing and integrating adaptation strategies into the overall framework of urban governance, a process known as "mainstreaming".

The aim of this chapter is to present the responses of the members of the Eurocities Taskforce on Climate Resilience regarding the data and monitoring dimensions of climate adaptation planning. In addition to providing a descriptive overview of the answers supplied by the cities, a key objective is to explore the relationships between the different aspects, define causal linkages, and develop regional and statistical clusters to support the development of further policy recommendations.

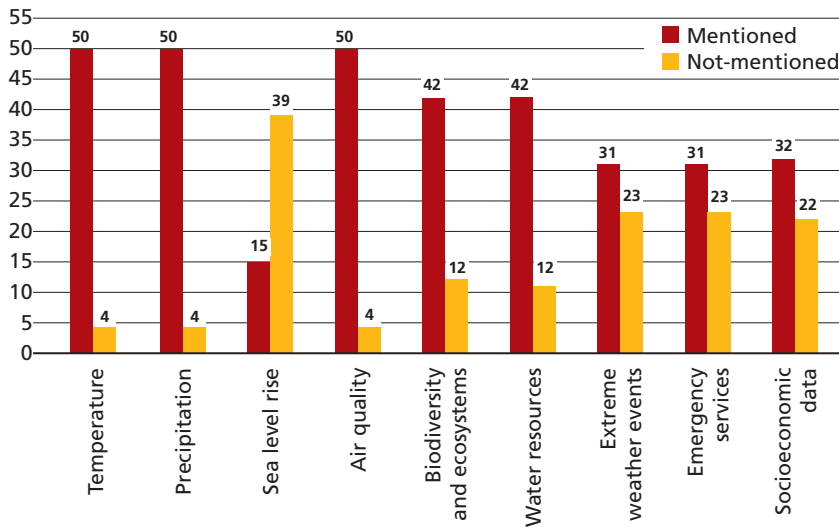
2. What cities are doing

The first data-related question was a multiple-choice question asking: "What types of climate-related data does a city collect for climate adaptation?" Three areas – temperature, precipitation and air quality – show increased frequencies of mention, as these topics and their related information are used in the vast majority of the cities analysed (see Figure 1). An above-average number of mentions also characterised the areas of water resources and biodiversity, thereby identifying the five climatic impacts that are monitored most intensively by the European cities included in the interviews. In Figure 1, sea level rise stands out with a notably high number of non-mentions, which is, of course, dependent on geographical location; however, it is noteworthy that extreme weather events appeared in only 57% of the cities. Examining the individual categories by city population size, the following conclusions can be drawn: 1) All cities with populations between 50,000 and 250,000 collected data on temperature and precipitation, and 90% of them also did so for biodiversity and air quality. At the same time, extreme weather events appeared in only about 40% of the cities in this category; 2) Among cities with populations between 250,000 and 500,000, 100% collected data on precipitation, while 93% did so for temperature and air quality as well. In this city size category, the rate of data collection on socioeconomic indicators was above average at 64%, compared to only 59% in the full sample; 3) In cities with populations between 500,000 and 1,000,000, a previously unmentioned category – water resources – reached a 95% mention rate; however, in contrast to the previously observed values above 90%, only 84% of the surveyed cities collected data on temperature and precipitation; 4) Finally, in cities with populations above 1 million, both temperature and air quality appear in 100% of cases. The former is inherently related to the intensity of the urban heat island effect, which is strongly correlated with city size, while the latter can be explained by the similarly positive relationship with the level of air pollution. It can therefore be stated that data-collection priorities change according to city size and, in almost all cases, reflect the characteristic climatic impacts. Among the interviewed cities, Istanbul, The Hague, Stockholm, and Amsterdam collected data across all categories. If the highly location-specific sea level rise is excluded, Bologna, Budapest, Espoo, Kadıköy, Madrid, and Sant Boi de Llobregat can also be considered leaders in monitoring climatic impacts, resulting in a highly diverse picture with regard to both settlement size and municipal budget. In general, it can be stated that cities that collect social vulnerability data tend to have more inclusive early warning systems. Data collection tends to be hazard-focused, although it is not always comprehensive.

In urban climate adaptation planning, it is not only the availability of climatic data that is crucial, but also how such data are produced and collected.

For this reason, the questionnaire explicitly addressed the question: “How does a city collect data on climate risks and vulnerabilities?” The response most frequently cited by cities was the use of local weather stations and monitoring equipment (90.74%), followed by collaborations with national (74.07%), external (70.37%), and regional (68.52%) experts. Commissioning was mentioned the least often (12.96%), which is causally linked to both the widespread presence of local weather stations and the limited financial resources repeatedly reported by cities.

Figure 1. What types of climate-related data does your city collect for climate adaptation?



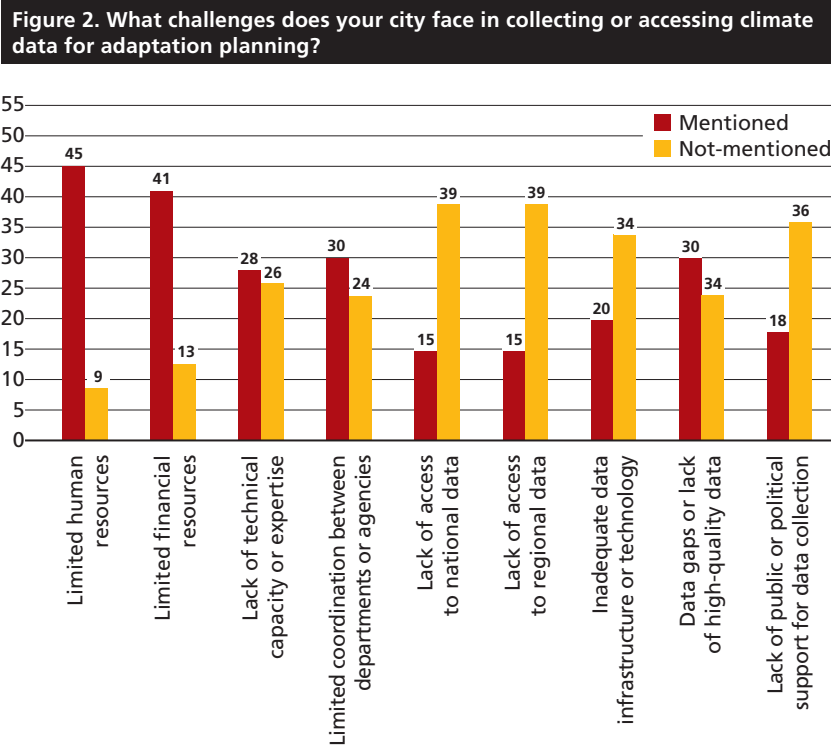
Source: Author's elaboration based on Eurocities Pulse

The cities demonstrate notable differences in their data collection practices, largely influenced by their population size, level of international integration, and financial resources. All cities with populations of up to 250,000 rely on local weather stations for data, and 90% collaborate with regional experts to gather information. The use of international experts, remote sensing data, and commissioned studies is very limited, accounting for only 20% and 10% of data sources, respectively. These findings are linked to the financial constraints faced by these cities, as 60% reported a lack of funding as a significant barrier to climate adaptation efforts. From a regional perspective, the preference for regional experts over international ones can be explained by the stronger integration of smaller cities into local cooperation frameworks. In cities with populations ranging from 250,000 to 500,000, there is no single data collection method that is consistently used across the entire sample. Local weather stations were used by 85.71% of the surveyed cities, while external and national experts were involved in 71.43% of the cases, highlighting the expanding networks of these cities and their increasing influence at the national level. The use of commissioned studies and remote sensing data appears at the lower end of the list; however, the percentage of positive responses exceeds 21%. This figure is somewhat higher compared to smaller cities, although 9 out of the 14 cities in this category reported a lack of funding. Cities with populations between 500,000 and 1,000,000 exhibit a pattern similar to that of their smaller counterparts discussed

previously. The reliance on local weather stations is prominent, with 84.21% of these cities utilising them. Additionally, the involvement of external experts and national experts is notable, with rates of 78.95% and 68.42%, respectively, both exceeding the average. A new aspect in larger cities is the use of remote sensing data, which stands at 52.63%. This should be understood in the context of economies of scale and the spatial limitations of remote sensing methods. While the resolution of remote sensing imagery may not provide detailed information for smaller cities, the larger spatial extent of cities nearing a population of 1 million mitigates this limitation. Interestingly, as in smaller urban areas, cities in this population range use commissioned services to obtain climatic data only minimally, at just 10.53%. Cities with populations exceeding 1 million reported the use of local weather stations and national experts in all cases. This reflects the significant role that the largest cities play at the national level. Additionally, the involvement of external and regional experts, along with the use of remote sensing data, was noted in over 60% of instances for this category of cities.

It is noteworthy that approximately one-third of the responding cities reported having a centralised platform or database for storing climate-related data, while another third indicated that they do not have such a platform. The remaining third reported that one is in development. Thus, the extensive data collection observed earlier is only rarely accompanied by already existing, mature data-storage solutions. For example, in Malmö a data-storing platform is already in place, whereas other cities leading in terms of diversity of data-collection methods are still in the process of developing a data-storing platform. In addition to the questions related to data management, cities were asked to rank which departments work with climate data the most in planning adaptation policies or measures. By far the most frequently mentioned in first place were water management (19 mentions, 35.18%) and urban design and land-use planning (17 mentions, 31.48%), which suggests that climate adaptation is predominantly approached from an engineering perspective. Although strengthening the resilience of vulnerable social groups is of particular importance in the field of climate adaptation, none of the responding cities identified a social and economic resilience department as the organisational unit most involved in climate planning. During the adaptation planning process, local governments encounter a range of challenges, particularly in collecting and accessing climate data. For the thematic question included in the survey, nine possible response options were provided. Among these, limited human resources (45 mentions, 83.33%) and limited financial resources (41 mentions, 75.93%) were most frequently selected. A second major group comprised challenges mentioned almost 30 times: lack of technical capacity or expertise, limited coordination between departments or agencies, and data gaps or lack of high-quality data (see Figure 2). Within the entire sample, cities representing a diverse regional and size pattern, each indicated a large majority of the listed challenges. These areas highlight the most significant shortcomings of effective local adaptation planning, reinforcing the earlier observation regarding the limited involvement of social departments. Successful adaptation is inconceivable without a broad and in-depth understanding of the needs of the most vulnerable societal groups, the professional processing of data, and continuous communication among the departments and agencies involved in

planning. It is, however, encouraging that only a small number of cities referred to a lack of access to national or regional data, and that, according to two-thirds of the sample, a lack of public and political support is not perceived.



Source: Author's elaboration based on Eurocities Pulse

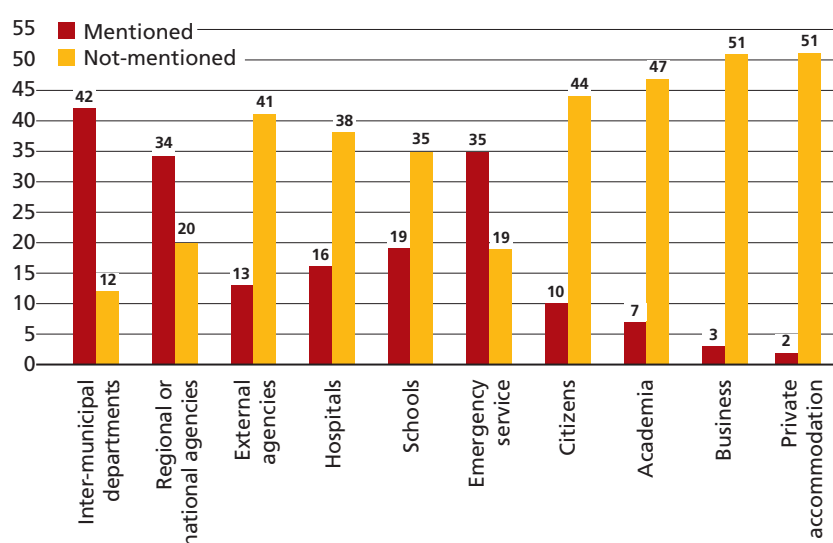
The cities that participated in the study reported a range of challenges in using climate data, with a notable emphasis on limited human resources, which was mentioned by more than 40 cities, representing almost 76% of the total pool. Unlike the previously discussed challenge categories, the other challenges were identified by cities with almost equal frequency. This suggests that cities experience significant deficiencies at various stages of climate adaptation planning, particularly in the initial phases, which severely impact the identification of appropriate objectives and interventions. Seven cities acknowledged every challenge category, highlighting substantial gaps in planning capacities in these areas. Moreover, three cities reported a higher-than-average number of challenges in response to the previous question, further emphasising this conclusion. The analysis of settlement size reveals notable differences among city clusters, indicating that regional patterns are not easily identifiable for this question. In the sample, the smallest cities reported a significant lack of human resources, with 80% identifying this as one of the primary challenges they face. Additionally, 70% highlighted limited coordination between departments, data gaps, and inadequate data infrastructure as significant limiting factors. This clearly shows that smaller cities experience substantial deficits not only in human resources but also in data management. In cities with a population between 250,000 and 500,000, over 90% report

Successful adaptation is inconceivable without a broad and in-depth understanding of the needs of the most vulnerable societal groups.

HR-related problems. However, this is accompanied by data gaps that fall below 70%, along with a previously less frequently noted lack of technical expertise in analysis. This emerging issue raises the question of whether medium-sized and smaller cities are facing similar challenges and institutional barriers in effectively adapting to local climate conditions. In cities with populations between 500,000 and 1,000,000, we see notable differences in the challenges mentioned compared to previous categories. While the lack of human resources was reported with a frequency of 80–90% earlier, it was mentioned by only 57.89% of respondents in this category. Additionally, data gaps were cited in just over 15% of responses. In contrast, 42.11% of the cities identified a lack of expertise in data analysis, inadequate data infrastructure, and poor coordination between departments as the primary challenges they face. In cities with over 1 million people, human resources challenges are very common, affecting 81.82% of these cities. Data gaps follow at 63.64%, and limited coordination between departments affects 54.55%. The large size of urban administrations and the high demand for data likely cause these challenges to be more noticeable in these cities.

In addition to the challenges associated with data management, cities were asked to identify the stakeholders involved in developing their emergency preparedness plans for climate-related events. The most common responses indicated collaboration with inter-municipal departments, regional or national agencies, and emergency services. However, it is important to note that several key stakeholders, who could have played a role at various stages of the planning process, were largely overlooked. These include external agencies, hospitals, schools, citizens, academia, businesses, and private accommodation providers (see Figure 3). This trend aligns with the findings of Reckien et al. (2025), which identified significant adaptation gaps related to so-called “soft” factors and the insufficient involvement of these crucial stakeholders.

Figure 3. Stakeholders involved in drafting emergency preparedness plans



Source: Author's elaboration based on Eurocities Pulse

Cities have encountered significant challenges in the area of enhancing emergency preparedness plans, with the frequency of specific issues cited reflecting trends similar to those in previous discussions. The most frequently mentioned problems include a lack of human resources, insufficient funding, and poor coordination between agencies. These align with the broader challenges related to human resources, finances, and organisational issues addressed previously.

Interestingly, while over 50% of the responding cities identified a lack of technical expertise as a major obstacle in data processing, only seven cities (13%) linked this challenge to the improvement of their emergency preparedness plans. Additionally, restrictive regulations at the national and regional levels, limited political commitment, inadequate data, and the minimal involvement of vulnerable social groups were not reported as significant barriers. The responses indicate that once a city initiates the development of a climate adaptation strategy, technical difficulties tend to become less relevant in later stages. In contrast, challenges related to human resources, finances, and organisational issues remain persistent aspects of climate adaptation planning.

Adaptation is often viewed solely as the responsibility of environmental or water management departments, which undermines its integration across the entire system.

3. Needs and challenges

The “implementation gap” observed in urban climate adaptation arises primarily from the conflict between strategic intent and practical execution. This is a key finding based on the responses gathered in the data and monitoring section. A targeted analysis of the database reveals that the main challenges are limited human resource capacity and constrained financial frameworks, which affect over three-quarters of respondents. From an urban development perspective, there is an important relationship between the type of data collected and the effectiveness of decision-making. While most cities systematically collect technical data – such as changes in temperature or precipitation – the integration of socioeconomic data and the participation of vulnerable groups are significantly lacking. This shortcoming directly impedes planning efforts that rely on social participation and may undermine the public’s acceptance of policies.

The greatest challenge lies in the horizontal integration of adaptation considerations. Data indicates that a lack of coordination, especially in large cities with complex administrative structures, hampers the incorporation of climate objectives into daily budget planning and urban management tasks. A common problem is that adaptation is often viewed solely as the responsibility of environmental or water management departments, which undermines its integration across the entire system. For decision-makers, the key takeaway is that, in addition to technical data shortages, the most significant obstacles are institutional silos and the resulting negative lock-ins and path dependencies. Making meaningful progress requires more than simply developing monitoring systems; existing data must be transformed into political and financial priorities and connected to long-term investment plans. Furthermore, it can be asserted that only through closer interdepartmental cooperation, and by combining technical preparedness with social resilience, can we bridge the current gap between strategies and the actual resilience of urban spaces and societies.

Cities that regularly collect temperature data while also using socioeconomic or demographic information tend to report more operational or advanced early warning systems.

4. Emerging directions

Based on the cities' responses, several interconnected emerging directions can be identified in the field of data- and monitoring-based climate adaptation. These trends primarily rely not on new technologies but on innovative combinations of existing tools and their applications. One of the most notable trends is the increasing integration of physical climate impacts with social vulnerability aspects. Cities that regularly collect temperature data while also using socioeconomic or demographic information tend to report more operational or advanced early warning systems. Examples include Budapest, Kadıköy, Madrid, and Sant Boi de Llobregat, where heat stress is framed in planning not just as an environmental issue but explicitly as a social risk. This approach contrasts with traditional, engineering-focused adaptation, as the prioritisation of interventions is based not only on climatic risks but also on the vulnerability of the affected population.

An emerging trend is the collaborative and structured use of multiple data sources among cities. The data suggests that cities that engage in partnerships with national, regional, or external experts – beyond relying solely on local monitoring stations – tend to utilise a wider variety of data types. This includes information related to water management, biodiversity, and extreme events. Cities like Istanbul, Amsterdam, Stockholm, and The Hague exemplify this complex approach to data collection, often accompanied by a central data platform or initiatives to develop one. From the sample examined, it can be inferred that the sophistication of data management is influenced more by organisational coordination and the presence of clearly defined, dedicated responsibilities than by the size of the city.

In addition to the relationships mentioned earlier, distinct patterns based on city size also emerge. Larger cities tend to utilise remote sensing data and more sophisticated data management systems, while small and medium-sized cities often depend on local measurement capabilities and regional partnerships. These models can be adapted to other contexts, as long as there is stable institutional responsibility, interdisciplinary collaboration, and dedicated human resources. Overall, the data indicate that the success of adaptation does not hinge on the availability of "innovative" tools, but rather on their consistent application within a governance framework.

5. Implications and key messages

The findings related to data and monitoring practices offer several lessons that can be applied by other cities. One of the key messages is that strengthening climate adaptation does not always require new data sources or technological investments. Instead, it often involves a more intentional integration and institutionalisation of already available data. For instance, a straightforward and cost-effective approach is to connect the regular collection of temperature and precipitation data with basic indicators of social vulnerability. This connection can significantly enhance the effectiveness of interventions and contribute to a transition towards equitable resilience. Cities such as Budapest, Madrid, and Kadıköy, which have taken this approach, have less identified new risks but rather made existing problems more visible and manageable for decision-making.

The effectiveness of data collection is influenced more by organisational and governance conditions than by the size of the city. Evidence from various cities shows that those that integrate multiple data sources – such as local monitoring stations, national collaborations, and in some instances, remote sensing – tend to advance more effectively towards strategic data use. Key enabling factors for this progress include having dedicated personnel, clearly defined responsibilities, and at least a basic central data platform. These measures can be implemented gradually, even as pilot projects, and are adaptable to different institutional settings. The findings also reveal certain shortcomings in both EU and national frameworks. While data availability is generally not an issue, many cities still face challenges related to capacity constraints, coordination across municipality departments, and a lack of attention to social factors. Current support structures often focus on the technical aspects of data collection, neglecting the importance of institutionalising the data, fostering collaborative learning processes, and integrating social considerations.

Based on the chapter's most relevant insights, five key messages emerge:

1. Data alone are insufficient – integrating different elements is essential - Data on temperature, precipitation or air quality are often available well enough, yet their practical value is limited due to the low level of combination with planning processes, sectoral policies, and monitoring systems within municipal governance, contributing to implementation gaps. Therefore, cities must transform raw technical information into urban planning, infrastructure management and decision-making routines that can support long-term resilience strategies.

2. Considering social vulnerability enhances the effectiveness of adaptation efforts - By integrating social information with climate impacts, cities can develop more inclusive actions and ensure that climate strategies become equitable. Prioritising actions based on social risk rather than just environmental metrics contributes to fostering public acceptance and ensuring that no group is left behind in the transition of a resilient urban environment and an inclusive urban governance.

3. Organisational capacity is more crucial than the size of the city - Cities with clearly defined responsibilities, dedicated staff and coordinated workflows are better able to translate data into planning decisions and operational measures. Therefore, strengthening institutional capacity represents a key enabling factor for a successful adaptation.

4. Collecting data from multiple sources offers a strategic advantage - The multi-source approach of combining information from local monitoring systems, national institutions, research organisations and experts allows cities to monitor a wider range of impacts. Collaborative data ecosystems are recommended to foster knowledge exchange and improve the credibility of climate-related decision-making and the cities' ability to cope with the adverse effects of climate change.

5. The success of adaptation largely hinges on effective governance rather than just technology – Embedding adaptation goals into budgeting, infrastructure planning and long-term urban development strategies is essential for translating climate knowledge into concrete action. Therefore, policy frameworks should prioritise strengthening

governance capacities that enable the systematic integration of climate adaptation across municipal departments and planning processes.

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1. Introduction: bridging climate plans and people's capacities

In this chapter we explore the topic of how institutions relate and collaborate with non-institutional partners and the broader civil society. A recent special issue published in the journal *Frontiers in Sustainable Cities* (2026) explored barriers and enablers to effective climate governance implementation in European cities. It gathered contributions that all pointed to the elephant in the room being the missing mechanisms to truly involve stakeholders and civil society in a deep behavioral, socioeconomic transition toward sustainability.¹ This need for a longer term transformational adaptation (Kates et al., 2012) reinforces the call for systemic changes, where climate plans and policies cannot be “project-driven” nor fragmented and siloed in their implementation (Huovila et al., 2022).

Unfortunately, notwithstanding the recent policy developments raising institutional awareness around the need for inclusive participation, citizen engagement, and empowerment (Hügel & Davies, 2020) – as could be found in the EU Missions² – implementation of these principles is still falling short (Pickard et al., 2026). On the other hand, there is a proliferation of solutions and online tools supporting societal and community engagement, promoted through different knowledge-sharing platforms, including the European Climate-ADAPT or the global weADAPT. Despite the effort, siloed information, over-theoretical models, and communication differences between platforms create a lack of coherent knowledge, which can overwhelm users and limit platforms' effectiveness (Hürlimann et al., 2022). Mees recently pointed out how successful citizen engagement relies not on tools but on the policies and political capacity to integrate motivational, capacity-related, and ownership-related conditions (Mees, 2022). Those conditions are the root of community resilience and community-based adaptation, conferring on societies the skills to overcome stresses and shocks, while learning and evolving (Mulligan et al., 2016).

The latest evolutions of community-based adaptations are to be found in climate adaptation co-design, citizen science, and capacity-building approaches, which should better link civil society and stakeholders to

1. See papers published at <https://www.frontiersin.org/research-topics/67717/barriers-and-enablers-to-effective-climate-governance-in-cities/articles>

2. See the statement “Citizens' engagement is a key element for the EU Missions” at <https://www.euresearch.ch/en/horizon-europe/global-challenges/missions-117.html>

Successful citizen engagement relies not on tools but on the policies and political capacity to integrate motivational, capacity-related, and ownership-related conditions.

planning and policy processes (McNamara & Buggy, 2017). Indeed, the scientific literature studying the limitations of participation suggests that the next phase of engagement is not about more meetings and involvement but about climate assemblies giving residents actual power, responsibility, and budget for adaptation (Pickard et al., 2026). Far removed from these latest engagement methods, looking back more than 20 years, community-led movements for sustainability (such as Transition Towns, with thousands of cities and communities joining it; or ecovillages, also spanning northern and southern countries) were already adopting very effective transformative adaptation approaches to simply spark new sustainable and resilient lifestyles, relying on self-sufficiency, mutual support, and circularity as the main pillars of development. With no plan nor national or regional funding available for these successful examples. This should make us think of planning fallacies, and Mees' reminder of the motivational, capacity-oriented, and ownership characteristics of effective citizen involvement, conditions which plans are missing through most of the participatory practices. Nowadays, climate plans are indeed failing to bridge these communities' successful experiences and existing capacities, with an almost business-as-usual planning and policy mechanism. Recent scientific literature proved how many European climate plans are failing to be either consistent, especially when declaring to leave no one behind but demonstrating little action to deliver this promise (Reckien et al., 2025), or credible, because of poor linkage of their goals to budget and implementation roadmaps (Olazabal et al., 2019).

Beyond plans, in the next sections we will explore how European cities frame and value partnership and collaboration with stakeholders and civil society to deep dive into these opportunities and challenges.

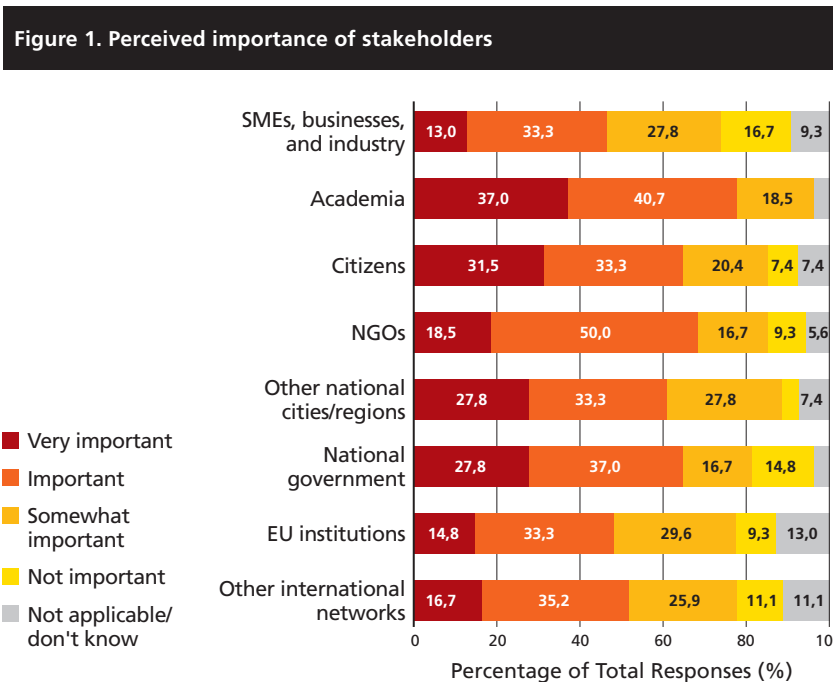
2. What are cities doing?

2.1 Which are the most valuable partnerships, and why?

When trying to understand how cities value partnerships and the contributions from a variety of local and transnational actors, most responses fall within the "important" range, indicating that cities widely acknowledge collaborations as a core component of policy design and implementation. However, clear hierarchies emerge regarding which actors are perceived as most valuable partners (as shown in Table 1). Partnerships with academia and citizens stand out as the most highly valued across the whole spectrum, while a second tier of partners includes other cities and NGOs, which, surprisingly, are mentioned as important, but not often as very important, compared to academia and citizens. At the lower end of cities' partnership preferences rank EU institutions and international networks (showing a more heterogeneous evaluation) and, surprisingly, the small and medium enterprises, business, and industry cluster is the one considered the least important. This last result is surprising since public-private partnerships are usual mechanisms for plan implementations, thus relevant partners for the cities.

These results seem to rest on a "proximity" value: actors that are closer to cities in functional, spatial, or social terms (such as citizens, local businesses) are consistently valued more highly than distant institutional

actors. From another side, results also suggest how there could be a preference for horizontal, collaborative relationships over vertical or hierarchical ones, with non-governmental and local partners often rated more highly than national authorities or international networks. However, it is difficult at this stage to deduce any logic behind the preferences, and there could be a normative dimension in these responses, suggesting aspirational commitments rather than empirical evidence. Science and civil society are always politically valued, although, in practice, meaningful participatory or co-design and co-implementation processes are difficult to find. Using science and cities networks, unfortunately, is also far from being the regular way of driving governance implementation (Haupt et al., 2020).



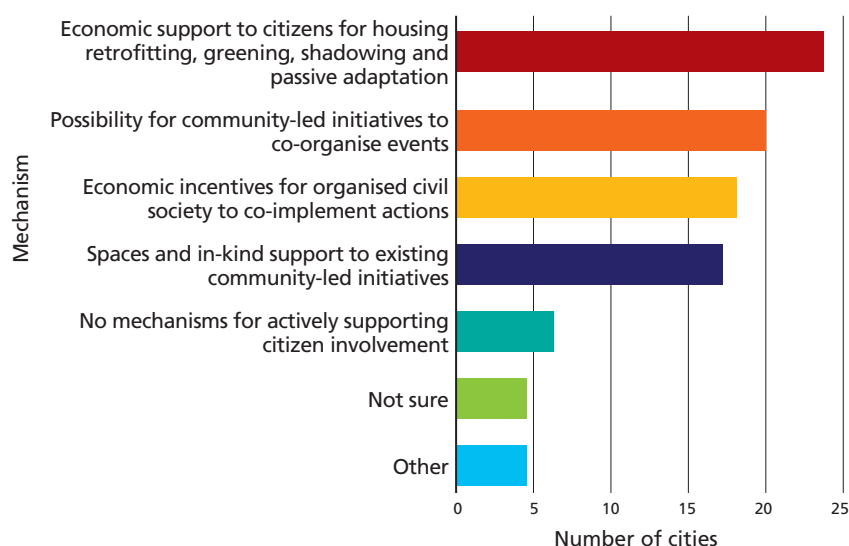
Source: Author's elaboration based on Eurocities Pulse

2.2 From valuing contributions to sharing data, knowledge, and potential actions.

Cities were asked whether they promote awareness-raising communication campaigns addressing climate change risks, solutions, both, or neither. The findings indicate that the vast majority of cities actively engage in climate-related communication, with 47 cities (87%) reporting communication happening about both climate change risks and solutions. This suggests that cities largely recognize the importance of coupling problem awareness with actionable responses, thereby avoiding alarmist narratives and instead promoting informed and solution-oriented public engagement.

Only a very small number of cities (3) reported not carrying out any citizen awareness-raising campaigns related to climate change, which may point to internal fragmentation across departments or to a lack of formalized, city-wide communication strategies, highlighting governance and coordination challenges rather than a deliberate policy stance.

Figure 2. Support to active involvement of citizens or community initiatives in climate adaptation solutions



Source: Eurocities Pulse

A limited number of cities adopt more selective communication strategies reporting to communicate only about climate change risks, without explicitly addressing solutions. This approach may reflect an emphasis on raising awareness of vulnerability and urgency, possibly as a precursor to future action-oriented campaigns. Even more distinctive is the case of Helsinki, reporting communication focused primarily on solutions. This strategy is particularly noteworthy, as it reverses the conventional sequence of risk-first communication. A solutions-first approach emphasizes opportunities rather than threats and aligns with emerging literature on positive climate communication and solution framing .

Moving beyond the binary question of whether cities communicate risks and solutions, it is worth exploring how cities communicate about them. Most of the cities rely primarily on established municipal channels (social media, official websites, newsletters), which are typical “awareness-raising” communication activities. A subset of cities reported a more targeted and participatory communication strategy, explicitly tailoring specific audiences, such as schools, vulnerable populations, businesses, or neighborhood groups. Participatory formats are also emerging as an important innovation: organizing workshops, public events, and collaborative initiatives where communication is embedded within collective activities. For instance, Sant Boi de Llobregat refers to “events like the Economic Forum and CityMob” as platforms where climate issues are discussed alongside broader urban development topics. In these cases, communication functions not merely as information transfer, but as a component of social interaction, leveraging opportunities and co-creation. This reflects a gradual transition toward communication as engagement, where awareness raising is linked to dialogue and shared responsibility. This evolution mirrors the high importance attributed to citizens as partners in earlier survey results, suggesting growing coherence between stated partnership values and communicative practices.

2.3 From communication to engagement and co-implementation?

This is a sensitive part of the results, since it explores how and if municipalities rely on civil society partnerships to actually support and incentivize climate plans and policy co-implementation. The most widespread community engagement strategies involve consultative and facilitative collaborations, in which cities engage communities primarily through dialogue-oriented mechanisms. Some cities describe collaboration through public consultations, workshops, and participatory events where community members are invited to contribute ideas, local knowledge, or feedback on proposed climate actions. In these cases, cities maintain responsibility for implementation, while communities play an advisory role. This model represents a clear step beyond one-way communication yet remains embedded within conventional top-down governance structures.

Only a smaller but notable group of cities reports providing practical support aimed at enabling community action. Cities such as Lisbon and Sant Boi de Llobregat highlighted forms of collaboration that include technical assistance, capacity building, and ongoing cooperation with local organizations. In these contexts, municipalities support communities not only by listening, but by equipping them with the skills, guidance, and institutional backing necessary to engage in climate initiatives. This shift toward enabling roles reflects an understanding of communities as potential co-implementers rather than passive stakeholders. One step along this, training and capacity building are particularly relevant mechanisms in cities such as Valongo municipality, where collaboration with communities is closely linked to educational programs and learning-oriented initiatives. These cities emphasize workshops, advisory services, or partnerships with schools and civil society organizations as ways to strengthen community capacity to act on climate risks or crises, paradoxically neglected in the “whole-of-society response approach” of the latest EU Preparedness Union Strategy.³

The results also suggest an important distinction between project-based collaboration and institutionalized co-implementation mechanisms. In several cities, community collaboration is primarily tied to specific projects, pilot initiatives, or externally funded programs. While these arrangements can be effective in delivering tangible outcomes, they often remain temporary and dependent on project cycles. By contrast, cities such as Lisbon describe more structured and ongoing collaboration frameworks, where community engagement is embedded within broader climate strategies and governance processes. This speaks to the paramount need for structural and longer term funding to support co-implementation mechanisms and meaningful citizen engagement.

A solutions-first approach emphasizes opportunities rather than threats and aligns with emerging literature on positive climate communication and solution framing.

3. Needs and challenges: skills and knowledge gaps

3.1 How to move toward co-implementation?

The absence of extensive co-implementation mechanisms should not be interpreted as a lack of commitment and willingness toward community engagement and support. In some cities, responses suggest that collaboration requires strengthened institutional capacities. These

3. https://commission.europa.eu/topics/preparedness_en

Rather than seeking one-off project support, cities appear to prioritize long-term institutional strengthening, including training, peer learning, and staff empowerment.

observations align with earlier findings showing that differences between cities are often driven more by operational capacity than by divergent policy values, as largely supported by the literature stating that at the core of the climate implementation gaps there are capacities gaps within local institutions (OECD EPP 38, 2023, among others).

Even if there is a high value within the political recognition of a city to be part of international cities networks and European initiatives, from this survey results what cities value most are capacity-oriented and policy-support functions, rather than symbolic representation or generic networking. The most frequently selected form of support is capacity building for municipal staff, followed closely by support for political agendas and policy actions and support through the development of methodologies. These three categories dominate the responses, indicating that cities primarily view international networks as enablers of internal capacity, policy coherence, and methodological guidance.

The prominence of capacity building suggests that cities face persistent skills, knowledge, and organizational gaps when addressing complex challenges such as climate adaptation. Rather than seeking one-off project support, cities appear to prioritize long-term institutional strengthening, including training, peer learning, and staff empowerment. The new Agenda for Cities 2025⁴ and the forthcoming EU Climate Resilience Framework should build around these pillars of co-development.

Similarly, the high evaluation of support for political agendas and policy actions indicates that cities expect networks to play a legitimizing and coordinating role, helping them align local strategies with broader European or international frameworks and reinforce political commitment at the local level.

Methodological support ranks at a comparable level, highlighting the demand for standardized approaches, shared frameworks, and practical guidance for planning, monitoring, and evaluation. This finding aligns with earlier results showing a strong preference for knowledge-based partnerships, particularly with academia. International networks thus seem to be perceived as complementary knowledge brokers, translating abstract policy goals into actionable tools.

A second tier of support needs includes technical tools and support for physical implementation in city areas. While still frequently selected, these options are less dominant than capacity and policy support. This suggests that cities do not primarily expect international networks to act as direct implementers or technology providers. Instead, implementation support is viewed as useful but secondary, possibly because physical interventions are often context-specific and dependent on local regulatory and financial conditions. Smaller and lower-budget cities tend to emphasize capacity building and methodological support more strongly. This reflects their greater reliance on external knowledge and learning opportunities to compensate for limited internal resources. For these cities, international networks function as amplifiers of capacity and access, enabling them to engage with complex policy domains that might otherwise exceed their administrative reach. Larger and higher-budget cities, while still valuing capacity building, show relatively greater interest in support for political agendas and strategic alignment. This suggests that well-resourced cities

4. https://ec.europa.eu/regional_policy/information-sources/publications/communications/2025/eu-agenda-for-cities-2025_en

use international networks less as sources of basic capacity and more as platforms for coordination, agenda-setting, and policy leadership. In these contexts, networks contribute to positioning cities within broader governance frameworks and reinforcing their role as innovators or frontrunners.

Last but not least, there is one further need that almost all cities share: almost all rely on a solid partnership with an insurance company for their climate threats. Indeed, while from one side insurance companies are exploring which business models and packages to offer related to climate risks (AXA, Zurich among others), cities are still far for collaborating with these companies in this sector. It would be worth exploring the challenges embedded in these collaborations, surely dealing with specific quantitative data availability but also within the need to change their business models from the insurance companies' side, from responsive to proactive resilience co-building models (Meyer et al., 2025).

3.2 From skills and gaps to community pushback and behavioral challenges

If from one side municipalities' implementation challenges are related to their lack of capacities and resources, the other elephant in the room of implementation challenges is about communities' need for behavioral changes, and pushback against climate actions. Within the survey, we explored these pushbacks reported by most of the cities.

A first, more generic insight from the responses concerns distributional fairness, affordability, and trust. This resistance is not necessarily directed at the climate goal itself, but at perceived unequal burdens, unclear funding mechanisms, or insufficient support for households. A second, and more prevalent, class is measure-specific pushback linked to spatial trade-offs and everyday mobility. Two clusters dominate the reported resistance: Land-use conflicts and nature-based solutions. Many cities report objections when green infrastructure competes with other uses of scarce urban space. One city illustrates this clearly through resistance to using public space for NBS instead of creating public parking spots. This form of pushback reflects not climate skepticism, but contestation over who loses access to what (parking, road space, convenience) when adaptation measures reallocate public space. Resistance was indeed frequently associated with measures that reduce car priority, restrict circulation, or reassign road capacity. Another reports pushback related to restriction of circulation of cars. Similarly, another highlights resistance around measures affecting mobility and public space, while emphasizing that early engagement and clear communication can improve acceptance. References to "bike lanes", reduced road sections, or altered traffic routes appear repeatedly, indicating that decarbonization and adaptation interventions become politically salient when they affect commuting routines and perceived accessibility. A third, less common class concerns implementation disruption and "project fatigue". Cities describe resistance rooted in construction impacts, delays, and inconvenience. One city points to pushback connected to extensive construction required for infrastructure transitions (e.g., heating networks), suggesting that even when goals are supported, the process of implementation can generate opposition.

Emerging practices suggest a gradual reframing of communication: from a unidirectional transfer of information to an enabling infrastructure that supports awareness, agency, and collective action.

Finally, a small set of responses reflect cultural or lifestyle-related resistance and risk perception dynamics. Some cities note that some initiatives are perceived as restrictive (including car-related priorities), and references how dietary choices can become politicized (e.g., perceptions around meat options). One distinctive example of resistance to NBS on experiential grounds – concerns that certain nature-based measures may attract mosquitoes or pose hazards to children – highlighting that community acceptance can hinge on perceived local side effects rather than abstract climate reasoning.

A key question and reflection proposed here is whether pushback is less likely to happen where cities communicate more effectively and support community actions. The survey results indicate a nuanced relationship: most cities communicate both risks and solutions, and pushback is still reported by a substantial share. More intriguingly, cities that report having concrete support mechanisms for community involvement (e.g., economic support for retrofitting/greening, in-kind spaces, incentives for organized civil society, co-organized events) also report pushback at relatively high rates. This likely reflects exposure and visibility effects: cities that implement more measures and actively mobilize communities may encounter more points of contestation, not because engagement causes resistance, but because ambitious action makes trade-offs tangible and invites scrutiny. In this light, pushback is not simply a failure of communication but a predictable feature of transformative urban change – especially where space, mobility, and costs are implicated. Thus, as we will discuss in the last section, a behavioral change is needed not only to support climate action but to embrace it and make urban transformations possible.

4. Emerging directions: responding to people's resistance to change

When dealing with communication and citizen engagement activities, municipalities can truly support and enable a paradigm shift. From the survey, while climate information dissemination remains the most widespread communication approach, there is growing evidence of a transition toward more integrated, participatory, and capacity-building citizen engagement models. Emerging practices suggest a gradual reframing of communication: from a unidirectional transfer of information to an enabling infrastructure that supports awareness, agency, and collective action .

Among the cities responding to the survey, many reported the use of structured educational programs, training initiatives, and collaborations with schools and universities. These activities aim not only to inform citizens about climate risks, but also to equip them with practical knowledge and skills. For instance, Bologna moved beyond conventional awareness campaigns by establishing a “citizens’ assembly for climate” in 2023, institutionalizing deliberative participation as part of its climate governance. Similarly, Toulouse has experimented with gamified approaches, such as climate-themed “escape-games” designed to enhance preparedness for flooding scenarios. These examples illustrate a shift toward experiential and participatory learning, where communication is embedded in interactive formats that foster understanding and engagement.

A smaller subset of cities that are part of the European Missions⁵ stands out for articulating comprehensive and strategically integrated communication frameworks. Rather than enumerating isolated tools or channels, these municipalities describe coherent approaches that explicitly link communication, education, participation, and policy implementation. Lisbon provides a particularly illustrative case. The city reports developing “various strategies combining public awareness campaigns, educational programs, stakeholder engagement and partnerships,” positioning communication as a cross-cutting governance function. This approach is operationalized through strategic documents such as the Lisbon Climate City Contract 2030 and the Municipal Strategy for Adaptation to Climate Change, complemented by civic participation mechanisms, school education programs, and an urban resilience portal offering information on climate and natural risks. Communication in this context supports behavioral change, preparedness, and institutional coordination, rather than functioning as a standalone activity. A comparable strategic orientation is reported by Warsaw, which actively promotes citizen awareness through campaigns, educational activities, and cooperation with local stakeholders. Warsaw’s Climate Adaptation Guide translates climate risks into actionable measures for residents, housing cooperatives, and businesses, while events such as the “Climate Picnic” and “Warsaw Energy Days” foster public dialogue and peer learning. These initiatives underscore the role of partnerships and cross-sectoral collaboration in extending the reach and effectiveness of municipal communication efforts.

Beyond these more comprehensive cases, several cities demonstrate innovative sectoral or thematic approaches. Kadıköy exemplifies a multi-channel communication ecosystem that combines social media campaigns, public events, education, and volunteering. Initiatives such as the “Kadıköy Environment Festival”, workshops at the Ecological Life Center, and the Climate Ambassadors Program aim to raise awareness of both climate risks – such as heatwaves and floods – and solutions, including nature-based practices and energy saving. The explicit focus on citizen volunteers as intermediaries highlights an effort to decentralize communication and embed climate action within communities.

Similarly, Valongo emphasizes environmental education through creative and place-based formats. Giant board games, exhibitions at the Environmental and Roman Mining Interpretation Center, and annual participation in European Mobility Week are used to connect climate adaptation to biodiversity, mobility, and everyday choices. Social media channels complement these activities by disseminating information, issuing warnings during extreme events, and reinforcing thematic campaigns.

Other municipalities, including Guimarães and Genoa, highlight the diversification of communication channels. Genoa, for instance, combines social media platforms, podcasts, websites, variable message signs, and an online “one-stop shop academy” on climate adaptation, alongside training courses for teachers and open public events. This multiplicity of formats reflects an understanding that different audiences require tailored communication strategies.

Last but not least, education-focused approaches are also evident in Bursa, where nearly 8,800 students received climate change training in schools in

5. https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/eu-missions-horizon-europe/climate-neutral-and-smart-cities_en

a single year. This large-scale investment in youth education reflects a long-term perspective on climate literacy as a foundation for future resilience. Other cities, such as Cologne and Poznań, have developed dedicated online portals providing information, tips, and behavioral guidance. Cologne's "heat etiquette" campaign, for example, translates abstract climate risks into concrete advice for everyday life during heatwaves.

Taken together, these examples suggest that while information-based communication remains dominant, cities are increasingly experimenting with approaches that integrate education, participation, and capacity building. However, the distribution of such practices is uneven. Only a limited number of responses articulate communication as a strategic governance tool embedded within climate policy frameworks, indicating that this shift remains aspirational for many municipalities. This pattern aligns with broader findings on the role of international networks and capacity building: cities often share similar ambitions but differ significantly in their institutional capacity to operationalize them.

A particularly salient finding to discuss concerns the relationship between these emerging innovative best practices and the cities' elaboration of first local stakeholder mapping to better understand current and potential partners for climate actions. Cities that report having already mapped, or being in the process of mapping, key local stakeholders for climate action tend to describe more advanced and integrated support strategies. These municipalities more frequently mention economic incentives for civil society, in-kind support such as access to spaces or technical assistance, and opportunities for communities to co-organize events or co-implement actions. Stakeholder mapping, then, is emerging as an enabling governance tool, allowing cities to identify relevant actors, tailor support instruments, and move beyond ad hoc consultation toward structured collaboration and co-implementation. Conversely, cities that report never having mapped stakeholders are overrepresented among those indicating the absence of mechanisms – or uncertainty – regarding support for community action. In these cases, engagement tends to remain fragmented and limited to consultation or awareness-raising, with fewer pathways for citizens and local organizations to actively contribute to implementation. This contrast underscores the importance of institutional knowledge and governance infrastructure in translating communication into sustained collective action.

5. Implications and key messages

In the light of the survey results, navigating the challenges but also the way forward cities are adopting to accelerate citizen engagement, there are a few final considerations that could be made, especially regarding partnership, funding, and capacity building toward behavioral change.

1. There is a need for **more structured, horizontal, inclusive partnerships, supported by a strategy of motivation, capacity building, and ownership-related conditions** (Mees, 2022). Science and research, especially, could help in better understanding how to embed those conditions within existing participatory and stakeholder engagement models and tools.

2. Municipalities need **structured investments for stakeholders and civil society engagement over time**, to build trust along the process, and avoid project-led communications and engagement (because as the literature suggested, success is driven by the quality and persistence of the process, not more meetings or better tools).

3. Cities should **partner more and lobby toward a structured working program with insurance companies**, finding new schemes for shifting business models and working together on new scenario and data generation (and sharing).

4. The future EU Climate Resilience Framework and the Cities Agenda 2025 should focus on the central aspects of education and capacity building as **mechanisms to facilitate a societal transformation to cope with behavioral resistance to change**, which now is hampering transformation.

5. Cities generally underestimate communities' capacities, and both municipalities and the European frameworks should **support and better leverage existing capacities from Transition Town movements, regenerative communities, and other successful evidence of local community-led urban transformation**.

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1A. Introduction: climate resilience and the built environment

Cities face a number of interconnected challenges relating to housing and buildings, including land use priorities and governance issues arising from inefficiency or poor coordination. Energy poverty is another challenge, caused by factors such as limited financial resources, poor housing quality and inadequate infrastructure. The recent EU Agenda for Cities (European Commission, 2025a) highlights that housing is a shared responsibility at the national, regional and local levels, and recognises the unique position of cities in addressing housing challenges in collaboration with communities.

Buildings also play a crucial role in building resilience to climate change, in terms of both mitigation and adaptation.

Decarbonising buildings

Buildings are central to the decarbonisation efforts set out in the European Green Deal and supported by the Fit for 55 package, accounting for 40% of total energy consumption and 36% of energy-related greenhouse gas emissions (European Commission, 2025b). The revised EU Directive on Energy Performance of Buildings (the recast EPBD, adopted in 2024) establishes the legal and technical basis for reducing emissions from buildings, and member states must transpose it by the end of May 2026 (BPIE, 2025). Under the new rules, all new buildings must be zero-emission by 2030, and the entire EU building stock must be transformed into zero-emission buildings by 2050. While new construction has received a lot of attention for its potential to incorporate low-carbon solutions from the outset, research into Net-Zero Emissions Buildings (NZEBs) has increased over the past few decades (Ohene et al., 2022). However, the most urgent challenge lies in retrofitting existing buildings: 85% of buildings were constructed before 2000, 75% of which perform poorly in terms of energy efficiency, and many of these buildings will remain in use for many years to come.

78% of the 54 cities surveyed have at least one type of building code available.

Adapting buildings to climate change

Buildings also play an important role in terms of resilience to the impacts of climate change. Both private (e.g. households) and public (e.g. schools and offices) buildings are at risk from increasingly extreme weather events, which can have an even more devastating impact on lower-income populations. To boost the regeneration and resilience of neighbourhoods and protect inhabitants from heatwaves, floods and storms, the EU Agenda for Cities (European Commission, 2025a) advises member states to harmonise the quality of architecture and living environments, promote sustainable practices through integrated urban strategies and incorporate innovative techniques and materials in line with the New European Bauhaus principles. This involves promoting sustainable drainage systems and nature-based solutions, such as green roofs and green spaces.

Are we moving towards a more holistic approach to making buildings climate-resilient?

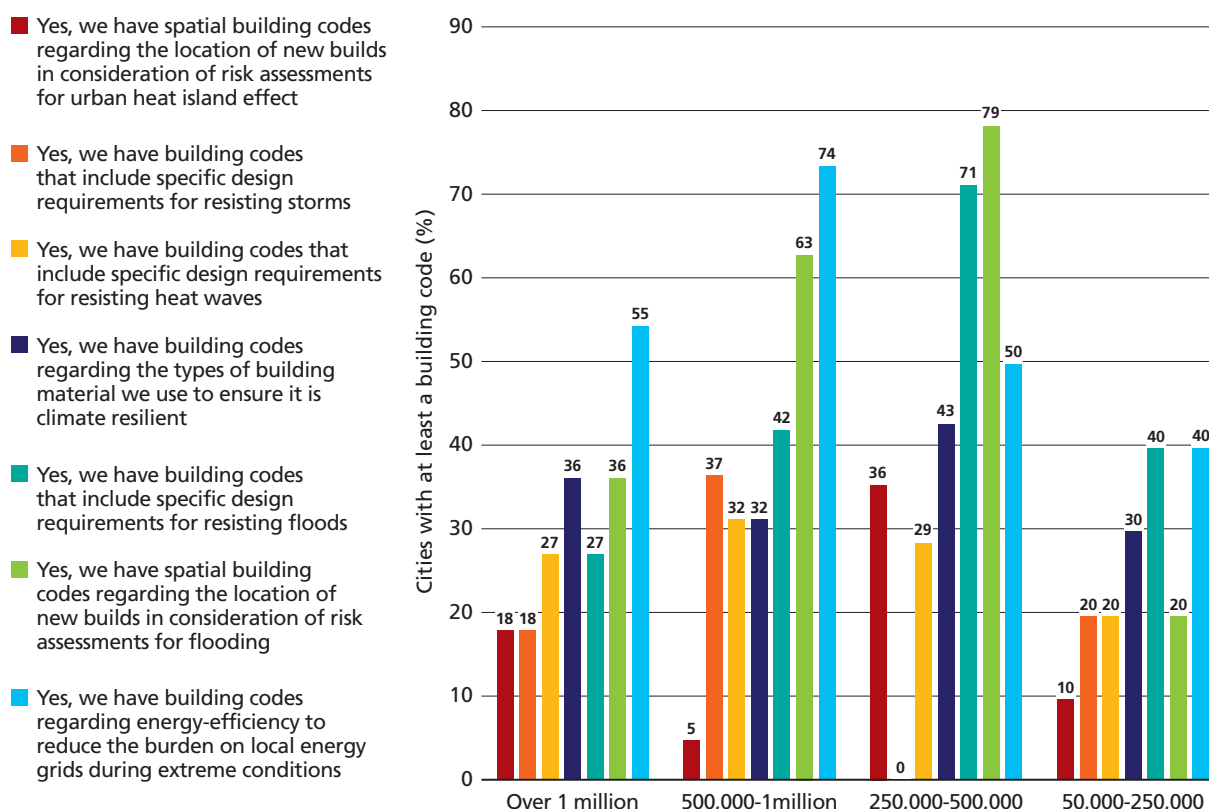
Numerous solutions can contribute synergistically to achieving this with an integrated approach to adaptation and mitigation. These include passive cooling, flexible design, local materials, nature-based solutions and water management conservation (PEEB Briefing, 2021). However, national policies often fail to mandate specific adaptation measures for new constructions or the renovation of existing buildings (Eurocities, 2025b). Furthermore, only some National Adaptation Plans include initiatives relating to the built environment (European Commission: Directorate-General for Climate Action, 2023). Eurocodes and national regulations (such as building codes), which are adopted in each European country, provide normative guidance incorporating climate action in structural design. Traditionally, these have responded to past weather events and have not frequently been updated in light of changing conditions and future climatic scenarios (European Commission: Directorate-General for Climate Action, 2023).

This chapter aims to analyse the empirical findings of the Eurocities Taskforce on Climate Resilience survey with regard to improving the climate resilience of buildings. In particular, cities were asked if they have mandatory building codes in place related to the climate resilience of new buildings, as well as retrofitting existing buildings towards flood resilience, energy efficiency, heat resilience and so on.

2A. What cities are doing

Regarding new buildings, the survey asked cities to share their experiences of the current mandatory codes regarding design requirements for buildings to resist floods (1), storms (2) and heatwaves (3), codes covering the types of building material (4) and energy efficiency to reduce the burden on local energy grids during extreme conditions (5), as well as spatial building codes taking into account risk assessments for flooding (6) and the urban heat island effect when considering the location of new builds (7).

Figure 1. Percentage of cities in the sample with mandatory building codes for climate-resilient new buildings, classified by city size



Source: Author's elaboration based on Eurocities Pulse

The results show that, of the 54 cities surveyed, 42 (78%) have at least one type of building code available. Only 2 cities (Bologna and Leipzig) have six codes in place, and 4 cities (Toulouse, Valongo Municipality, Espoo and Warsaw) have five. Meanwhile, of the 12 cities that have declared there are no building codes available, one-third are in the process of implementing them.

The results also show that issues related to mitigation are the most commonly addressed with regard to new buildings. Of the cities sampled, 31 (57%) have building regulations aimed at improving energy efficiency.

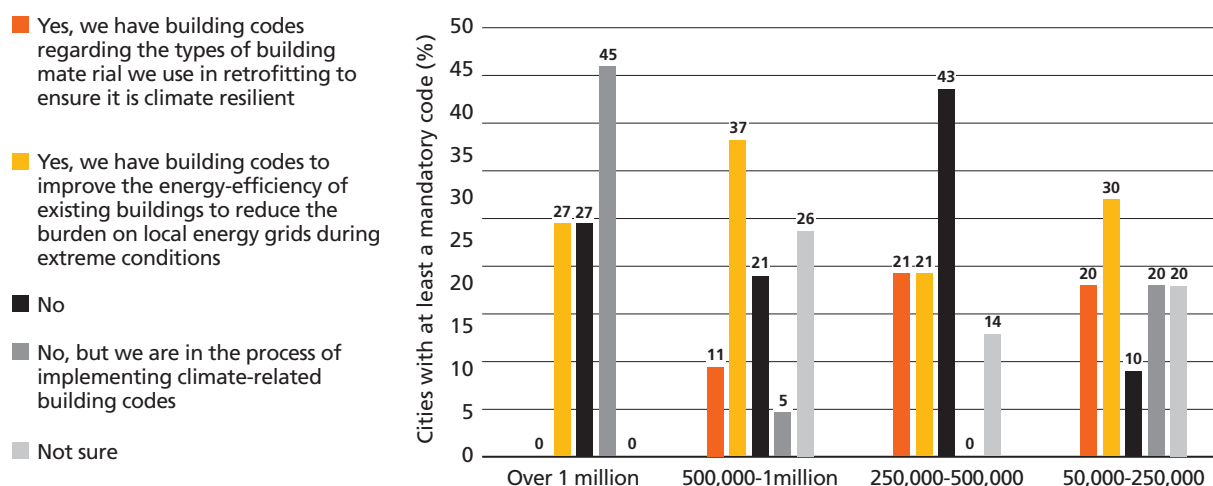
In terms of adaptation, the risk of flooding is the issues that is most frequently addressed. Indeed, 29 cities (54%) have spatial building codes that consider flood risk assessments when deciding where to build new structures, and 25 of these cities (46%) include specific design requirements for flood resistance. The situation is different when considering other climate risks. Building codes for withstanding heatwaves are in place in slightly more than a quarter of cities (15 cities, 28%), while specific design requirements for withstanding storms are in place in a fifth of cities (11 cities, 20%). Even fewer cities (9 cities, 17%) have measures in place to address the urban heat island effect. This is particularly striking given that Europe is the world's fastest-warming continent and climate risks threaten its ecosystems, infrastructure and people's health.

Figure 1 shows that cities in the sample with 250,000–500,000 inhabitants have the highest proportion of mandatory codes (44% on average). Surprisingly, only 31% of the larger cities (over 1 million inhabitants) have produced these mandatory codes, while smaller cities (<250,000 inhabitants) are in last place with 26%. This suggests that smaller cities need guidance and support on adaptation issues, but larger cities need help too. This calls for effective national adaptation plans that focus more on the built environment.

A total of 70% of German cities, the most represented country in the sample, have at least one mandatory code (more than three per city on average). In all, 80% of Finnish and Italian cities have an average of three mandatory building codes per city, while none of the Estonian and Greek cities included in our sample have any, and a Hungarian city noted that only energy efficiency is covered by building codes.

Retrofitting involves modifying existing buildings to improve their performance, energy efficiency and sustainability (Yang et al., 2025). With regard to the retrofitting of buildings, the survey asked cities to share their experiences of current mandatory climate resilience codes. Results showed that 23 cities (41%) have such codes in place. Of these, 16 cities (28%) aim to improve energy efficiency, while 7 (13%) address building material types. Of the remaining 31 cities (59%), 9 (17%) were unsure about this issue and 22 (42%) did not have building codes. However, 8 (15%) of these cities are in the process of implementing climate-related building codes.

Figure 2. Percentage of cities in the sample with and without mandatory building codes for climate-resilient targets for retrofitting buildings, classified by city size



Source: Author's elaboration based on Eurocities Pulse

Figure 2 shows the percentage of cities in the sample with and without mandatory building codes, categorised by city size. The building codes considered include those regarding the types of building material used in retrofitting to ensure climate resilience, as well as those to improve the energy efficiency of existing buildings and reduce the burden on local energy grids during extreme conditions. On average, the smallest cities with mandatory building codes (those with populations of 50,000–250,000) have the highest

percentage (25%), whereas the largest cities (those with populations of over 1 million) have the lowest percentage (14%). While large cities may have more resources for extensive projects, as well as more staff and expertise in terms of buildings and climate, small cities often have a higher percentage of older buildings, thanks to historical development patterns, as well as a slower rate of large-scale demolition and new construction than larger urban centres, which may explain the greater importance they give to retrofitting existing buildings.

Once again, we observed a varied situation among countries: none of the cities in the sample from Estonia, Greece, Hungary or the United Kingdom have both of the mandatory building codes considered for retrofitting buildings.

Making buildings climate-resilient poses significant challenges, especially when retrofitting vulnerable existing structures.

3A. Needs and challenges

European cities are experiencing a widespread housing crisis, with housing costs outpacing incomes and threatening urban affordability and accessibility, especially for young adults and low-income households (Eurocities, 2025a).

Making buildings climate-resilient poses significant challenges, especially when retrofitting vulnerable existing structures. These include the types of building materials used, energy efficiency measures to reduce the burden on local energy grids during extreme conditions, and solutions for heat islands, which are intensified by dense construction and a lack of green space. Other issues include flooding, caused by frequent heavy rainfall overwhelming traditional drainage systems, and structural damage due to high winds and changing climate conditions. Available solutions include nature-based approaches, such as green and blue infrastructure (e.g. green roofs and walls, rain gardens, permeable paving and urban greening), which collectively mitigate the urban heat island effect and reduce flood risk.

Cities generally require support to enhance their adoption and implementation of building codes, thereby making buildings more resilient. Specifically, more support is needed from higher levels of government. National adaptation strategies should incorporate climate vulnerability and risk assessments for buildings; currently, only some national adaptation plans include building-related initiatives, albeit with varying levels of detail. National governments should also offer technical and financial guidance to assist cities and private owners in integrating green, blue and solar roofs into their adaptation and nature restoration strategies. Regions are also crucial in building climate resilience and can provide region-specific building codes and standards based on local climate risks, as well as targeted incentives and financial mechanisms.

In this multilevel governance framework, participatory processes involving civic panels and expert consultations play a key role as they serve as both a regulatory and an educational purpose.

4A. Emerging directions

Building codes (including energy codes) are a highly effective way of reducing building-related emissions and enhancing resilience, and are increasingly reflected in EU policy.

The main barriers to be overcome are the extensive processes required to update building codes.

The empirical findings of the Eurocities Taskforce on Climate Resilience survey indicate that cities primarily struggle to improve the energy efficiency of new and existing buildings and enhance their summer thermal comfort. Indeed, over half (57%) of the respondent cities have building regulations aimed at improving the energy efficiency of new buildings. While this reflects their longer experience of city-level energy planning, adaptation of the built environment is lagging behind in practice. The EU-level technical guidance for adapting buildings to climate change (European Commission: Directorate-General for Climate Action, 2023) also states that, overall, progress in incorporating climate change adaptation into structural design codes and standards has been poor. The main barriers to be overcome are the extensive processes required to update building codes and the need to improve understanding of the relationship between building lifespan and the impact of increasingly severe natural hazards and multiple future climatic scenarios in various European locations.

Taking a closer look at the adaptation solutions, it is encouraging that the surveyed cities have shown greater awareness of the risk of flooding. In fact, around half of the cities considered this in terms of both risk assessment (54%) and specific design requirements for flood resistance (46%). However, only 41% of cities had building codes that included mandatory climate resilience targets when it came to retrofitting buildings, despite this being essential to maintaining property value and safety. These codes were primarily found in smaller cities, which typically have a higher proportion of older buildings.

5A. Implications and key messages

While European cities have extensive experience in energy planning and some have dedicated energy teams, they often need support with adaptation (Reckien et al., 2018), particularly with regard to the built environment (PEEB Briefing, 2021).

The findings of this study highlight the urgent need to strengthen national policies by mandating specific adaptation measures for new constructions and renovations of existing buildings. This normative guidance should incorporate climate actions into structural design and respond not only to past weather events, but also to future climatic scenarios in various building codes.

However, the recast EPBD has failed to fully integrate climate adaptation measures, specifically nature-based solutions (NbS), as it focuses heavily on decarbonisation and energy efficiency.

In brief, the following key messages emerged from the Eurocities Taskforce on Climate Resilience survey on the role of buildings in climate resilience:

1. **Limited integration of climate adaptation in building codes.** While 57% of cities have energy-efficiency regulations for new buildings, the incorporation of climate-change adaptation into design codes remains poor across the EU.
2. **Slow progress due to complex processes.** Updating building codes is challenging as it requires extensive procedures and better

knowledge of how buildings will be affected by future climate hazards across Europe.

3. **Flood resilience is the main exception.** About half of the cities consider flooding in risk assessments (54%) and specific design requirements (46%), making it the strongest area of adaptation. Major efforts should be made to ensure that buildings can withstand all other forms of risk related to extreme weather events.
4. **Retrofit resilience is insufficient.** Only 41% of cities have mandatory climate-resilience targets for retrofitting, mainly in smaller cities with older building stock.
5. **There is a need for stronger multilevel support and national mandates.** Cities require technical, financial and regulatory support from national and regional levels. National policies should mandate adaptation measures for new and existing buildings that are aligned with future climate scenarios.

1B. Introduction: the role of capacity building for climate resilience

Taking effective action on climate change requires more than just acquiring knowledge and skills; it requires developing competence (Raven et al., 2025). To address the complexities of urban climate resilience, cities require multifaceted capabilities, including knowledge and practical skills, governance structures, awareness-raising and communication capabilities, and collaborative networks.

Capacity building for urban climate mitigation and adaptation

Capacity building is essential for addressing urban climate mitigation. It empowers cities to develop, implement and maintain effective, comprehensive strategies for reducing greenhouse gas emissions as part of urban planning and policy (Wretling & Balfors, 2021a). These strategies address issues such as energy efficiency, sustainable transport and low-carbon infrastructure. Capacity building is also crucial for urban climate adaptation as it enables cities to plan, manage and implement adaptation strategies in the face of complex and uncertain climate risks (Wieszczeczynska et al., 2024).

Horizontal and vertical cooperation

Building capacity is also crucial for achieving effective cooperation across sectors and government levels and between municipalities (Carter et al., 2015). This is because capacity building can promote stakeholder engagement, helping to share best practices, mobilise political support and coordinate large-scale actions. It enables integrated, cross-sectoral responses to climate challenges and is also essential for obtaining finance and resources for sustainable energy and climate projects. It allows cities to demonstrate their creditworthiness, transparency and internal capacity to develop bankable projects (Spyridaki et al., 2020).

According to 63% of the surveyed cities, the leadership and commitment of the mayor/elected leader are key factors in building capacity for climate adaptation.

Community resilience and citizen initiatives

Community resilience is a multifaceted concept encompassing a community's ability to prepare for, withstand, recover from and adapt to various hazards and shocks (Daniel & Fernandes, 2024). Capacity building involves empowering communities to implement adaptation measures that are specific to the local context, inclusive, and address the needs of the most vulnerable populations (Dushkova & Ivlieva, 2024). Citizen initiatives can contribute significantly to strengthen community capacity and provide shared knowledge on local climate impacts, interventions, synergies and trade-offs with other socially desirable outcomes (Oliver et al., 2023). This enhances the effectiveness of overall resilience-building strategies (Daniel & Fernandes, 2024).

This chapter focuses on the empirical findings of the Eurocities Taskforce on Climate Resilience survey in relation to capacity building. First, cities were asked to rate the usefulness of various factors in developing climate adaptation capacity. They were then asked to select the main challenges they face in integrating climate adaptation into urban planning and governance, and to indicate the types from which they would most benefit.

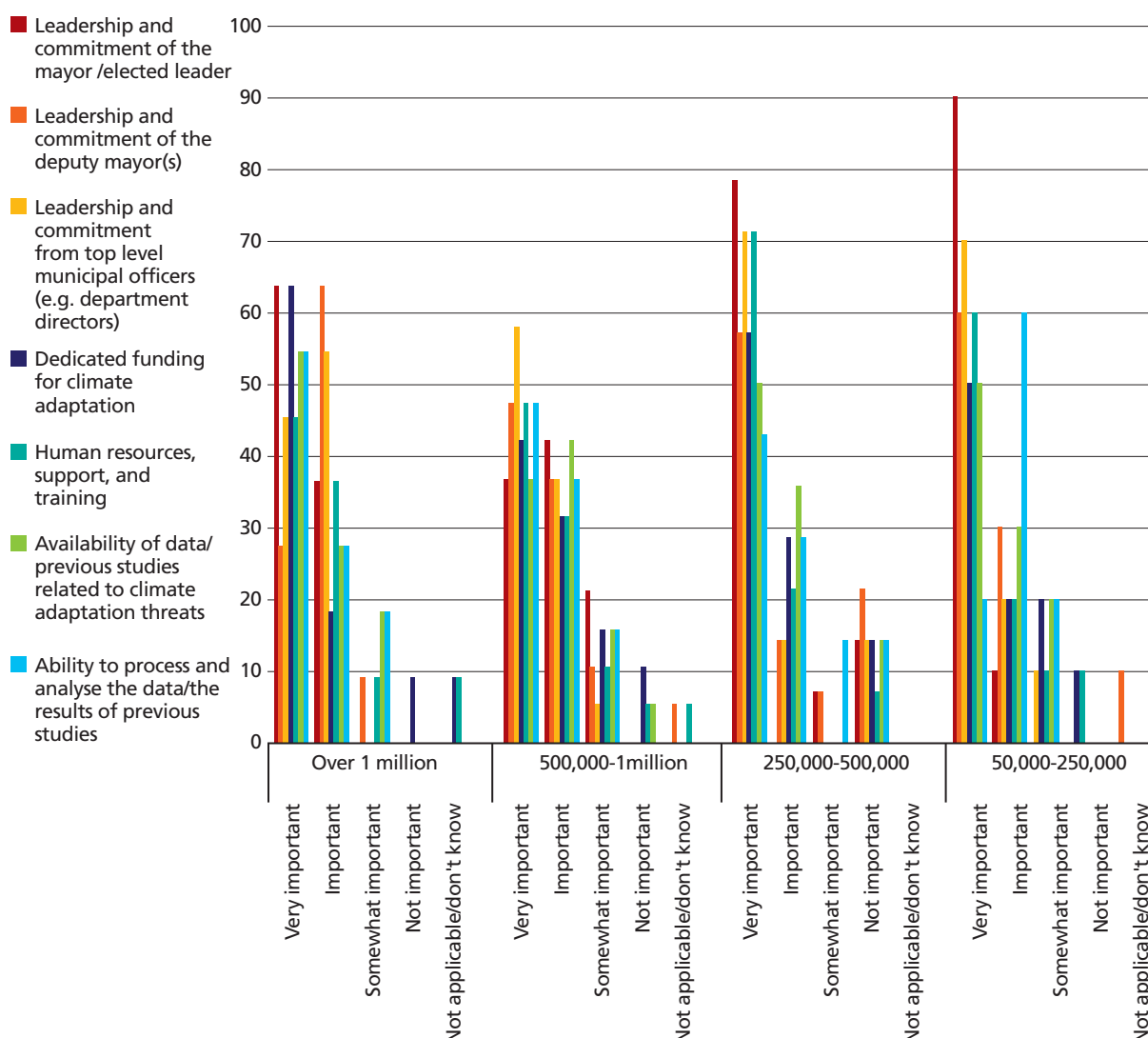
2B. What cities are doing in terms of capacity building

According to 34 cities (63%), the leadership and commitment of the mayor/elected leader are key factors in building capacity for climate adaptation. This was particularly the case for 9 out of 10 (90%) smaller cities (with 50,000–250,000 inhabitants) and 11 out of 14 (79%) cities with 250,000–500,000 inhabitants (Figure 3). Although the impact of city size on leadership policy is a complex topic studied within urban politics and political science, this finding seems to suggest that the smaller the city, the greater the impact on the elected leader's policy orientations and political commitment to climate.

The second key factor is leadership and commitment from the top-level municipal officers, such as department directors. This was highlighted by 33 cities (61.1%), particularly by 70% of those with fewer than 500,000 inhabitants.

Third place goes to human resources, support and training, indicated by 30 cities (55.6%). Around 65% of cities with populations lower than 500,000 considered this to be "very important".

Figure 3. Distribution of responses from cities regarding the key factors in building capacity on climate adaptation, by city size



Source: Author's elaboration based on Eurocities Pulse

3B. Needs and challenges

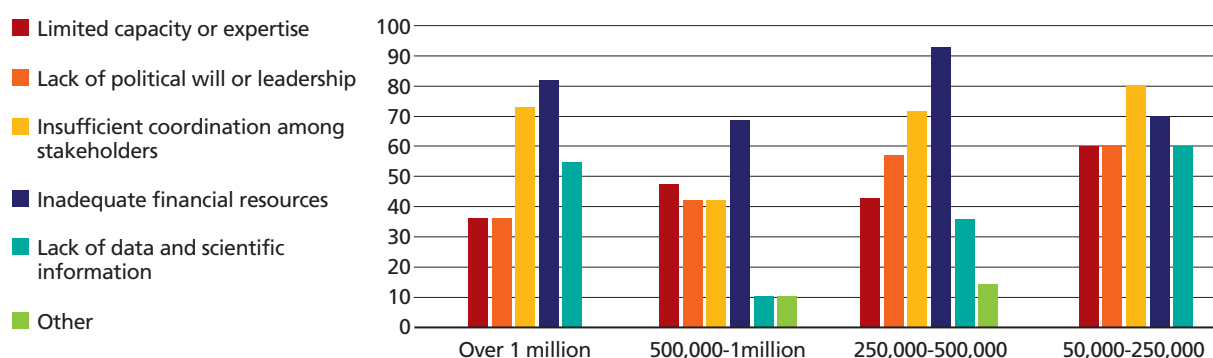
The survey response shows that the main challenge cities face in integrating climate adaptation into urban planning and governance is finding adequate financial resources, selected by 42 cities (78%). This shortage was particularly highlighted by 93% of cities in the sample with 250,000–500,000 inhabitants, and 82% of cities with over 1 million inhabitants (Figure 4). These results are consistent with the broad consensus of recent research, which identifies insufficient funding as the most significant barrier to effective climate adaptation in cities (Venner et al., 2025).

The second most popular choice was insufficient coordination among stakeholders (34 cities, 63%), particularly among smaller cities with 50,000–250,000 inhabitants (80%). Smaller cities face unique barriers

to coordinating stakeholders for climate adaptation and have insufficient knowledge-sharing mechanisms. This can be exacerbated by the absence of clear roles, trust and communication channels among stakeholders (Fünfgeld et al., 2023).

The list of main challenges identified by the survey includes lack of political will or leadership (48%), limited capacity or expertise (46%) and lack of data and scientific information (35%). Each of these is considered an important key factor by 60% of smaller cities with 50,000–250,000 inhabitants.

Figure 4. Distribution of responses from cities, classified by size, regarding the main challenges in integrating climate adaptation into urban planning and governance



Source: Author's elaboration based on Eurocities Pulse

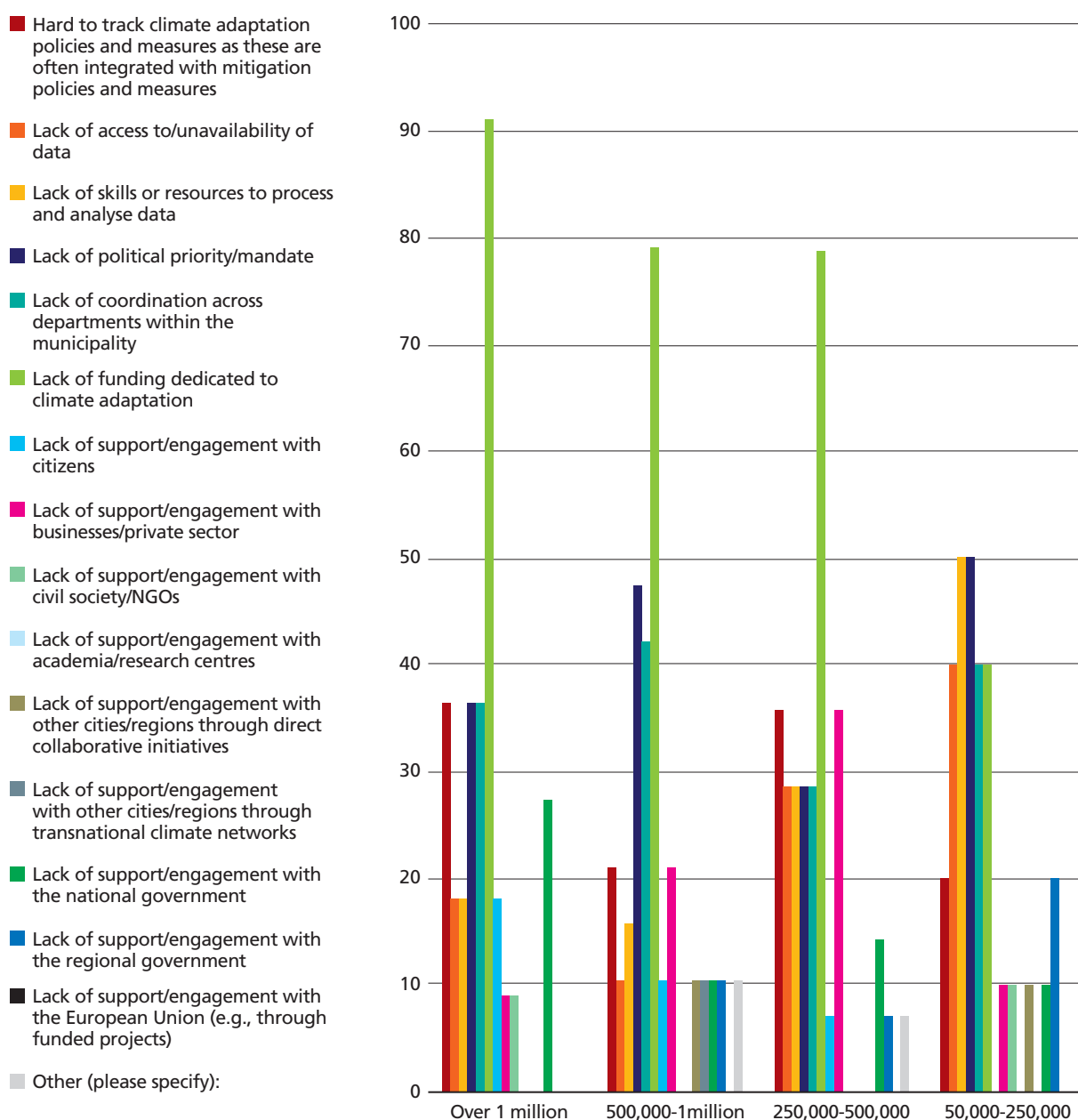
To investigate this issue further, cities were invited to select their top three challenges in building capacity to address climate adaptation. The results confirm that the biggest challenge is a lack of dedicated funding, as stated by 40 cities (74%). This issue is particularly acute for the 10 (91%) largest cities (those with over 1 million inhabitants), as shown in Figure 5.

According to 22 cities (41%), the second biggest challenge for capacity building is the lack of political priority or mandate. This is the top challenge for 50% of smaller cities (those with 50,000–250,000 inhabitants), alongside a lack of skills or resources for processing and analysing data.

The third top challenge is a lack of coordination between different municipal departments, which was selected by 20 cities (37%).

The lack of support and engagement with academia and research centres, as well as with the European Union (e.g. through funded projects), was not considered a significant challenge by any of the respondent cities. However, this lack of cooperation could hinder access to EU funding programmes, which support cities in promoting sustainable urban development (Salvia et al., 2023). Participation in international projects can encourage collaboration and co-creation between universities, research centres, city authorities and citizens, enabling the design and implementation of effective, targeted climate solutions (Liu et al., 2023).

Figure 5. Distribution of responses from cities, classified by size, regarding the top three challenges for building capacity to address climate adaptation



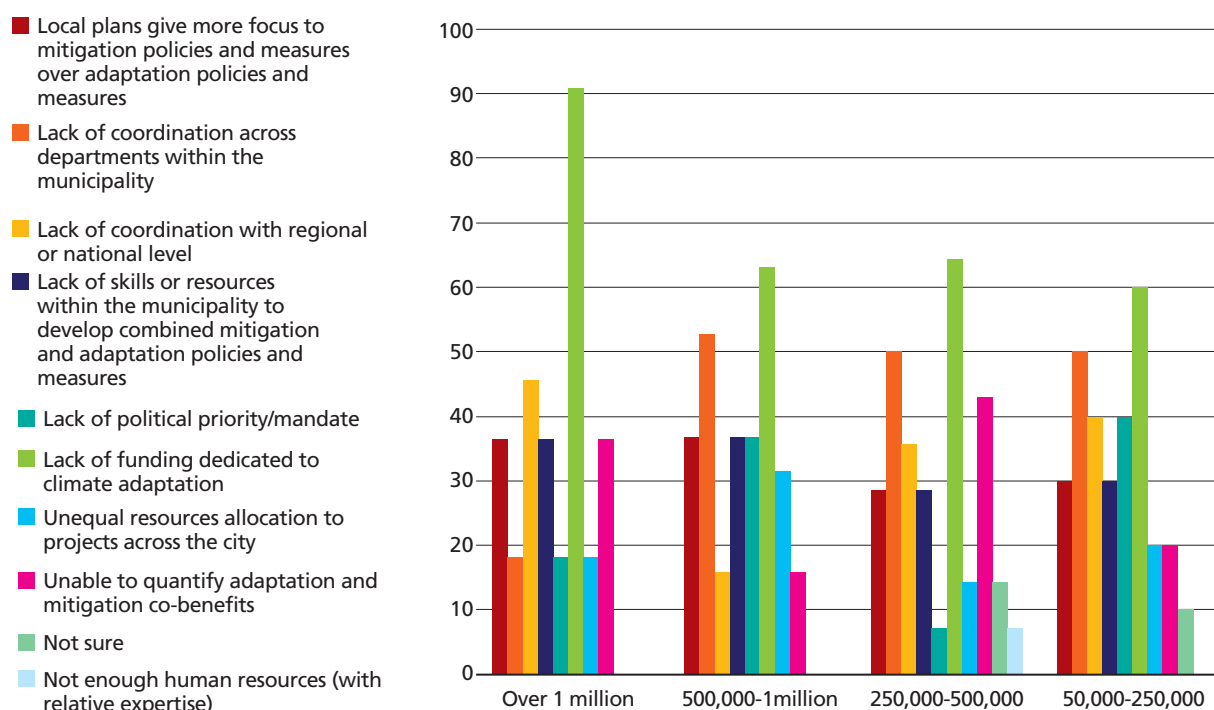
Source: Author's elaboration based on Eurocities Pulse

Only 2 cities (4%) mentioned the lack of support and engagement with civil society, NGOs and other cities/regions through transnational climate networks. Scholars argue that these networks can influence the development of local climate plans (Reckien et al., 2018) and support the adaptation process by attracting active cities.

Support and engagement with other cities and regions through direct collaborative initiatives was considered slightly more important by only 2 cities (6%). Support and engagement with citizens was indicated by 5 cities (9%).

The responses to the questionnaire also indicate low expectations of support from multilevel governance, particularly from regional (9%) and national (15%) governments. Nevertheless, scholars argue that cities' climate adaptation efforts are most effective when integrated with higher-level policies and frameworks, in order to avoid discrepancies between local action plans and national policy frameworks (Cities, Climate Change and Multilevel Governance, 2009).

Figure 6. Distribution of responses from cities, classified by size, regarding the biggest challenges for building capacity in climate adaptation



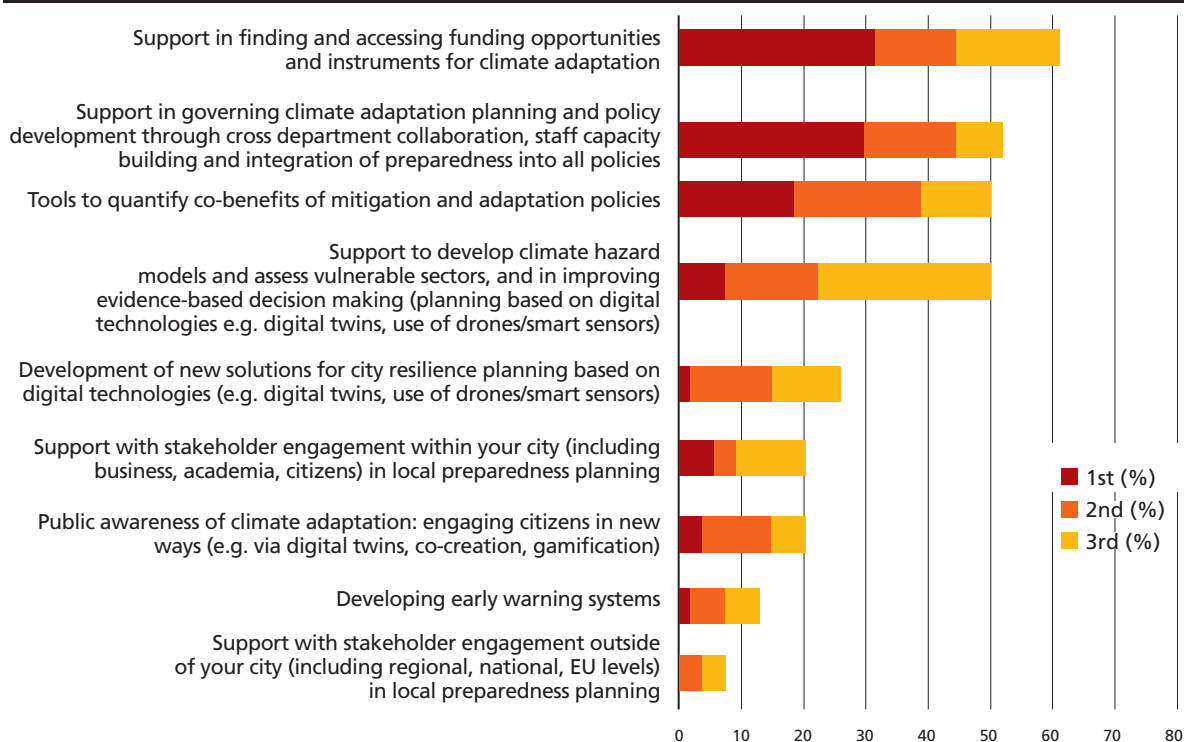
Source: Author's elaboration based on Eurocities Pulse

We took an in-depth look at the biggest challenges cities face when it comes to building capacity to address climate resilience, as defined by the IPCC.

The results show that 37 cities (69%) need to find and acquire climate adaptation funding. This is particularly true of all the cities in the sample, where the percentage ranges from 91% (10 out of 11 cities) to 60% (6 out of 10 cities) when moving from the largest to the smallest (Figure 6).

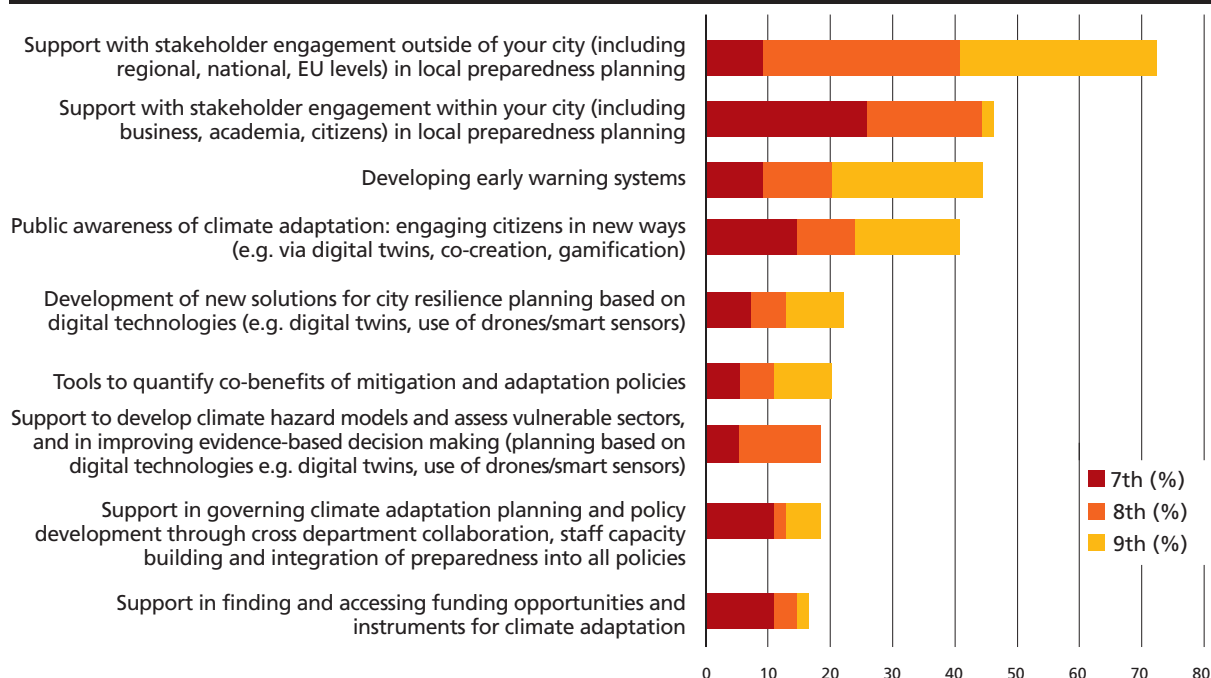
Twenty-four cities (44%) need to improve coordination across departments within the municipality. This is an important challenge for approximately half of all the cities in the sample, except for the largest ones (with over 1 million inhabitants), where the percentage drops to 18%. This suggests that the governing structure of larger cities is better coordinated and more systematic.

Figure 7. Distribution of the first three top choices for capacity building among the available options



Source: Author's elaboration based on Eurocities Pulse

Figure 8. Distribution of the bottom three choices for capacity building among the available options



Source: Author's elaboration based on Eurocities Pulse

The main challenge cities face in integrating climate adaptation into urban planning and governance is finding adequate financial resources.

One-third of the cities consider three types of support equally important. The first is to increase the focus of local plans on adaptation policies and measures, which tend to be less prominent than those for mitigation. The second is coordination with regional or national levels. This is particularly important for 45% of cities with over 1 million inhabitants and 40% of cities with 50,000–250,000 inhabitants. Thirdly, municipalities generally need to enhance their skills and resources in order to develop integrated mitigation and adaptation policies and measures.

Furthermore, 40% of smaller cities particularly feel the lack of political priority/mandate.

Lastly, cities were asked to organise the different types of capacity building they would most benefit from in order of importance, in order to increase their adaptability and resilience to climate change.

Figure 7 shows that the most popular choice was support in finding and accessing funding opportunities and instruments for climate adaptation, selected by 17 cities (31%). This was closely followed by support in governing climate adaptation planning and policy development through cross-departmental collaboration, staff capacity building and integrating preparedness into all policies, selected by 16 cities (30%). The request for support in adopting tools to quantify the co-benefits of mitigation and adaptation policies was chosen by 10 cities (19%).

Examining the three least popular options (Figure 8) reveals some interesting insights. Firstly, there is a widespread lack of confidence in the role that interactions with higher levels of governance can play in local preparedness planning. This is evident from the fact that 39 respondent cities (72%) ranked supporting stakeholder engagement at regional, national and EU levels as one of the three least important actions they need to take. There is also a tendency to avoid seeking support through stakeholder engagement within the city (including businesses, academic institutions and citizens): 25 cities (46%) ranked this option as their least preferred. Other lower-priority actions include the development of early warning systems (24 cities, 44%) and increasing public awareness of climate adaptation by engaging citizens in new ways, such as via digital twins, co-creation and gamification (22 cities, 41%).

4B. Emerging directions

Some emerging directions arise from the responses to the common issues that these cities face when addressing climate resilience. These confirm several points raised by the new EU Agenda for Cities (European Commission, 2025a). Firstly, the agenda highlights the particular challenges cities face in accessing expertise and knowledge, and in developing the necessary administrative capacity. Small and medium-sized cities in particular are heavily influenced by the policy orientations of elected leaders; weak or absent leadership can undermine partnerships and shared vision-building. This needs to be improved.

Secondly, there is a strong need to provide cities with tailored technical assistance to help them achieve a sustainable urban transition. This should certainly include the design and implementation of comprehensive, integrated strategies, with a stronger focus on adaptation, as these are less well-established than mitigation policies and measures. However, the capacity-building support from which the surveyed cities would benefit most is help in overcoming the common barrier of insufficient funding. This would involve assisting them with the financial structuring of strategic investments, as well as the preparation and implementation of concrete investment projects and procurement actions.

There is a strong need to provide cities with tailored technical assistance to help them achieve a sustainable urban transition

Thirdly, it is evident that there are difficulties in promoting structural dialogue with intra-municipal, local, regional and national stakeholders in order to engage them. The main coordination barriers among stakeholders can be due to institutional fragmentation in terms of separate mandates and misaligned plans, silo-based planning and weak cross-sector communication, as well as governance and political barriers related mainly to short electoral cycles and competing priorities. Of particular relevance are organisational and capacity constraints: cities, particularly small ones, have limited staff, skills and time, which hinder collaboration internally across departments, and externally with stakeholders at all levels. This may also explain the low expectations of support from multilevel governance that arose from this survey, and which must be overcome to make cities' climate adaptation efforts more effective.

5B. Implications and key messages

Effective climate change planning requires robust evidence of urban hazards and vulnerabilities, as well as appropriate approaches to building adaptive capacity in environmental and spatial planning. Effective responses also necessitate the establishment of suitable governance structures and multilevel governance frameworks, through which information and resources can be exchanged at various levels (Carter et al., 2015).

Previous research has emphasised that smaller and medium-sized cities have greater knowledge gaps regarding the potential local consequences of climate change and possible adaptation measures and strategies than larger cities (Fila et al., 2023). These cities' main barriers extend beyond financial constraints to encompass a lack of resources, knowledge and political will; limited access to sources of knowledge and scientific capacity; stakeholder coordination; inadequate knowledge-sharing mechanisms; and insufficient capacity for proactive planning and implementation of measures.

Although climate adaptation and mitigation planning could benefit from multilevel governance, this opportunity is often missed, particularly in countries where city-level climate action has preceded national directives (Reckien et al., 2018).

The following summary of common issues faced by cities when addressing climate resilience should be taken into account when developing the necessary administrative capacity, in line with the new EU Agenda for Cities (European Commission, 2025a):

1. **Governance and integration challenges.** Cities struggle with a lack of coordination through different levels of government (vertical) and across municipal departments (horizontal). Capacity building should be provided to cities in accessing and increasing expertise and knowledge to be able to adopt integrated planning frameworks, consistent legislative structures, and better data sharing mechanisms to streamline adaptation policies into existing spatial and land-use planning.
2. **Lack of financial and human resources.** Securing adequate funding is a widespread and primary challenge, particularly for small and medium-sized cities. This is exacerbated by a deficit of dedicated human resources and the need for specialised training programmes for municipal officers of several departments in complex areas like risk assessment, data analysis, geospatial analysis and nature-based solutions.
3. **Conflicting interests and public alignment.** Municipalities often face conflicts when allocating land for climate adaptation measures versus traditional development projects. Providing technical assistance to help align long-term climate resilience goals with the public's short-term expectations and immediate political cycles remains difficult, even with active citizen engagement efforts.
4. **Technical and strategic implementation hurdles.** Cities require enhanced technical capacities to meet specific implementation needs, including localised risk assessments, re-evaluation of existing infrastructure design, development of early warning systems, and the application of nature-based solutions (e.g., blue-green infrastructure) to mitigate the risks to urban populations posed by rising temperature and extreme heat (the urban heat island effect).
5. **Policy gaps and regulatory restrictions.** Issues arise from gaps in the scope of action, specifically that local adaptation efforts must be coupled with global mitigation policies to ensure long-term success. Additionally, rigid existing legal and technical regulations can sometimes hinder the effective implementation of innovative and sustainable adaptation measures.

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CONCLUSION: WHAT IS NEEDED FROM THE UPCOMING EUROPEAN CLIMATE RISK AND RESILIENCE INTEGRATED MANAGEMENT FRAMEWORK TO BUILD EFFECTIVE RESILIENCE IN CITIES?

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Introduction

The upcoming European Climate Risk and Resilience Integrated Management Framework (hereafter EU Climate Resilience Framework) provides a pivotal opportunity to respond to the growing urgency of more frequent, severe and persistent climate impacts. As the first proposed EU-wide legally binding framework to address climate adaptation, it has the potential to provide a more coherent approach to risk management and resilience by setting out policies to embed resilience-by-design in all legislation, harmonise risk assessments and address climate-related health impacts.

As such, the upcoming EU framework will have wide-reaching implications for all sectors, shaping the future skills workforce and redirecting investment towards embedding resilience. If successful, it should set Europe on a path to stronger climate resilience and preparedness. Cities – and collaboration with them – will play a defining role in the realisation of this.

Climate action – including both mitigation and adaptation – has long been a priority for cities. For three consecutive years from 2023 to 2025 that Eurocities has run its annual survey of mayors, climate action has topped the list of priorities. But cities do not have the capacity or competences to implement measures for resilience alone. The CIDOB Monograph “Urban Climate Resilience in Europe” builds upon data gathered through a thematic Eurocities Pulse Survey on Climate Resilience 2025¹ to analyse responses from 54 cities as to the status of long-term adaptation and emergency response planning, financing and stakeholder engagement.

It confirms previous findings that, while many cities are advancing adaptation planning, they continue to face significant gaps in human and technical capacity, regulatory clarity and – most critically – predictable, long-term financing. As we argue, a strong EU framework can help close these gaps by providing clear governance structures that support collaboration across governance levels, better access to localised risk data, and funding instruments that match the scale and urgency of urban climate risks.

1. <https://eurocities.eu/latest/european-cities-warn-without-more-support-urban-climate-resilience-plans-risk-collapse/>

While many cities are advancing adaptation planning, they continue to face significant gaps in human and technical capacity, regulatory clarity and – most critically – predictable, long-term financing.

Crucially, however, effective action will be determined by the quality of collaboration among all levels of governance, and particularly between the national and local levels. This chapter provides a summary of the main findings and offers recommendations for each of these key stakeholders – at local, national and EU level – with a view to supporting the design of the upcoming EU Climate Resilience Framework.

Findings, common trends and challenges

Our analysis highlights diversity in resilience preparedness and adaptation planning, reflective of differences in cities' capacities and progress, as well as differences in terms of climate change impacts. Despite this, there are clear trends and challenges to building resilience in cities.

Adaptation planning: building long-term resilience and embedding preparedness

European cities are moving forward on long-term planning for adaptation to climate threats, with most developing an integrated mitigation and adaptation plan and only around a third reporting having separate mitigation and adaptation strategies or plans (population size appears to correlate with larger cities opting for separate plans). Author of the chapter on adaptation planning, Diana Reckien, notes that there are of course advantages to integrated plans in being able to address synergies and trade-offs, as well as budgetary constraints, more clearly. However, many cities report a need for support in standardised tools to do so, suggesting this remains a key challenge to planning for policies and investment.

Cities are particularly focused on addressing heatwaves. However, vulnerability assessments and subsequent policy changes are lagging, a point reflected below in the analysis on climate data. While just over half of cities conduct regular climate risk and vulnerability assessments, others report conducting assessments as a one-off due largely to a lack of human resources. Strikingly, 19% of cities still lack dedicated staff for climate adaptation. This gap echoes throughout the findings, revealing a systemic barrier to effective local action. Sustained investment in municipal human resources is urgently needed; without it, cities cannot build the capacity to assess local climate hazards and impacts, design targeted responses, or deliver inclusive climate resilience across Europe.

As the number one threat and cause of climate-related hazards in European cities, it is not surprising that cities are advancing in the preparation of heat exposure maps, and many are working to combine demographic (37%), economic (5%) and other social data (31%) alongside heat exposure. However, while they are increasingly aware of the need for climate vulnerability assessments (with 67% of climate plans mentioning risks to vulnerable groups), Reckien notes that few are able to turn these into effective policy responses (only 44% included corresponding adaptation measures). This is despite evidence suggesting that heat exposure maps, when available within a city, are generally accessible to all municipal departments. In terms of external coordination, under half of cities report having a plan – either completed or in preparation – to address heat exposure in schools and elderly persons' homes (44% and

41%, respectively), and fewer are taking action for local hospitals (20%). Taken together, the above implies a systemic challenge in capacity and interdepartmental and external stakeholder coordination. This is confirmed by cities' responses that a lack of human resources and technical capacity are a key barrier to carrying out climate risk and vulnerability assessments. While planning for heat stress may be high on the political agenda, it is yet to be reflected in policies for new constructions. Only a quarter (28%) of cities report having specific building requirements for new developments to address heatwaves. This is most likely due to a lack of human resources and coordination across departments.

Similarly, flooding is a major challenge for cities. There seems to be an equal split as to how cities address water management, with around half (48%) developing or having a separate, comprehensive strategy that addresses multiple aspects related to excessive or insufficient water availability, including floods and drought (while other cities report having separate, dedicated strategies for heavy rainfall, for example). There is limited evidence, however, of the integration of water management strategies with climate adaptation plans. Surprisingly, under 10% of cities report having city-wide water-recycling schemes in place, a key area to focus on given the increasing pressure on water availability. There is also a clear split as to how cities manage flood risk, with some restricting developments in flood-prone areas and others taking alternative and less preventative approaches to managing this risk. In the case of new developments, the author analysing adaptation of buildings, Monica Salvia, notes that 54% of cities report having spatial codes that consider flood risk assessments for new constructions, and of these, 46% report also having specific design requirements for flood resistance. While many cities have adopted policies to address the climate resilience of new buildings (including heatwaves, storms and flooding), far fewer have equivalent strategies for the existing building stock. Given that roughly 80% of buildings standing today will still be in use in 2050,² this gap represents a key vulnerability that requires increased effort to renovate and adapt the existing building stock. Cities report insufficient human and financial support, alongside lack of technical skills, as major barriers to strengthening climate resilience. This challenge is particularly acute for the existing building stock, where progress depends on cooperation between various stakeholders, including private landlords. And as cities are not solely responsible, securing the resilience of new developments needs further regulation. Worryingly, 13% of cities report having no restrictions in place for developments in flood-prone areas (most but not all report managing these risks). This needs urgent attention. Salvia stresses a need to strengthen national policies by mandating specific adaptation measures for new constructions and the renovation of existing buildings – especially in light of the increased focus on new developments to address the housing crisis. Without swift action, there is a risk that new buildings will be located in areas that increasingly become uninsurable; this calls for policies to ensure that investments are based on common climate risk assessments and criteria.

Likewise, climate risk assessments should inform funding for nature-based solutions (NbS). We see a clear gap between the planning for nature as a means to address adaptation needs and its funding. While nearly all respondent cities mention the use of NbS for climate adaptation – with major trends visible in tree planting and the creation of pocket parks – almost a quarter of cities (24%) report having no budget for NbS linked

2. <https://www.weforum.org/stories/2022/11/net-zero-cities-retrofit-older-buildings-cop27/>

to their climate adaptation strategy (while only 11% report having a dedicated budget for adaptation that includes funding earmarked for NbS). Here, cities cite competing priorities, especially in terms of land use, a lack of overall funding and long-term maintenance as key challenges. Among possible ways to address this, some cities indicate that mandatory targets for NbS for adaptation, as well as standardised tools for cost-benefit analyses, would ensure better access to funding. The EU Nature Restoration Regulation and subsequent National Restoration Plans, and especially Article 8 on urban ecosystem restoration, have a crucial role to play in identifying and addressing financing gaps for urban nature, particularly for the long term. Indeed, National Restoration Plans require member states to map urban ecosystems, identify priority areas for restoration and consider financing options. This should support the aggregation of urban needs into national financing frameworks and align funding across national and local budgets. Given the targets for continued increase in urban green space and tree canopy cover beyond 2030, the regulation will help shift planning from short-term to long-term thinking.

Reflecting on the above, we can surmise that challenges arise from shared and unclear cross-departmental responsibilities. As Diana Reckien notes, weak integration among planning, environment, public works and social services hinders the successful embedding of resilience that considers potential side effects and trade-offs as well as synergies between different adaptation measures, and between adaptation and mitigation. This of course is the case for multilevel responsibilities and coordination too, especially between local and national governments. A lack of standard tools for assessing and tracking the benefits of adaptation measures – as well as combined mitigation and adaptation – further hinders policymaking and investments. There is a clear need to develop shared frameworks, a common understanding of responsibilities, institutional guidance, and harmonised risk assessment tools across levels of governance. As Monica Salvia notes, one of the most necessary types of capacity building identified by cities is support in governing climate adaptation planning. At the same time, cities require technical and financial support to translate these climate scenarios and hazard models into potential impacts and coherent cross-sectoral policies that underpin local planning and preparedness. This support must further address the current fragmentation between integrated and separate mitigation and adaptation local planning, which will be key to mainstreaming resilience-by-design in local policies and investment decisions.

Emergency response planning requires local assessments of vulnerability

Cities are equally focused on emergency response planning, with 80% reporting that they have developed or are developing an emergency response plan to climate threats, and 78% reporting that they have developed or are developing an early warning system (EWS). This is not surprising given that cities are on the front line of climate-related impacts. However, we see wide variation in terms of advancement. Under half of cities report they are developing or have developed a plan to address heat exposure. In addition, of the cities that responded, 20% have used the Copernicus Emergency Management Service (CEMS), while 13% have not heard of it. Increased awareness raising and support in the use of

this service is needed, yet the EU's Preparedness Union Strategy failed to account for cities in its proposal to foster the use and integration of the CEMS for natural hazards into planning, monitoring and early warning systems, focusing solely on the national level. This should be addressed to take into account local vulnerability assessments and support collaboration across governance levels in the development of EWSs.

Interestingly, Reckien notes that most cities collaborate internally with various departments on emergency planning, and externally with emergency services – something reported as a barrier in terms of long-term adaptation planning. Perhaps this is because responsibility for emergency response is more clearly defined than long-term planning for adaptation. Still, cities cite improved coordination between different departments and agencies as a key requirement. Furthermore, there is limited evidence of collaboration on emergency response with other key stakeholders such as hospitals, schools, citizens, academia or businesses. To advance emergency planning, cities need an increased number of staff on the ground, and (further) improved coordination between departments and agencies, including at the national level.

Data governance: a need for granular, interoperable and standardised data

An effective adaptation strategy needs to be based on an understanding of the specific climate risks faced and their impact; data plays a crucial role here. There are clear trends in the main types of climate-related data gathered by cities – temperature, precipitation and air quality – with biodiversity and water resources also widely mentioned, and with around a third of cities reporting having a centralised database. The author Attila Buzási notes that despite some advancement in data collection, established data storage and sharing capabilities are only gradually catching up. It seems that cities that engage in partnerships with national, regional or external experts, as opposed to relying only on local monitoring stations, use a wider variety of data types.

Interestingly, cities reported that the two departments that most use climate-related data in planning adaptation policies and measures are the water management, and urban design and land-use planning departments. Cities report that departments focused on social and economic vulnerabilities and public health are amongst those that least use climate data. As heatwaves in particular pose a growing health concern, this is a clear area to focus on for the integration of resilience-by-design and to ensure just resilience. It should be noted that, surprisingly, action on climate-related health impacts was also lacking from the EU's own recently published Cardiovascular Health Plan. At the same time, those that regularly collect temperature data while also using socioeconomic or demographic information tend to report more advanced early warning systems.

Challenges in data collection and use persist. Cities report limited human resources (83%) and limited financial resources (76%) as the main barriers but also limited coordination between departments or agencies, as noted as a challenge in the above chapter. The author notes that variation in how cities collect climate data appears to be largely influenced by financial capacity, population size and level of international integration. Importantly,

this could be due to a general perception within cities that adaptation is the responsibility of environment and water departments – and outside of cities, due to a lack of clarity on responsibility for adaptation between local, regional and national levels. The author notes that this siloed thinking hampers the use of climate data across departments and integration into political and financial priorities, highlighting how resilience mainstreaming is a clear need and should be accompanied by tools to support its local implementation. Interestingly, some cities are already experimenting with digital twins and other digital tools to test different policy options across departments, but this is costly, both in terms of staff required and funding for the technology.

Beyond simply number of staff, a lack of technical capacity or expertise is also clearly a barrier, as well as data gaps or lack of high-quality data. There is a clear need to address data gaps and granularity, and – in line with the above – to establish common, interoperable and accessible data that can be used by relevant internal and external stakeholders. Support and capacity building is needed to ensure cities have the expertise not only to gather and analyse this data, but also to understand the local implications and develop effective related policies. This links back to Diana Reckien's finding that while many cities are developing heat vulnerability maps – meaning they have the data – less than half report having established effective measures to address vulnerability – thus a failure to translate these maps into policy.

Financing: climate risk assessments should systematically inform investments

Most city budgets rely on political decision-making, but strategic allocation is influenced by budget visibility – i.e. whether adaptation is visible in city budgets or finance reporting. Some cities note that not all activities are necessarily identified as climate adaptation efforts in the budget, while several report that adaptation spending is not explicitly identified because it is distributed across departments and services that manage climate risks (e.g. emergency services, infrastructure). This makes it difficult to monitor investments and assess whether spending matches risk exposure. As the authors Diana Kupper and Stelios Grafakos note, this invisibility also makes adaptation finance more vulnerable in budget negotiations and fiscal tightening, whilst undermining efforts to build credible co-financing narratives for international funders. Though the authors do also note evidence of emerging practices in tagging and green budgeting, greater efforts are needed to upscale this. Intriguingly, finding and accessing funding opportunities is noted by Monica Salvia as the top requested type of capacity building needed to boost resilience.

Indeed, it is not surprising then that there is still a significant strategy-to-finance gap. While 85% of cities report having an adaptation plan – either integrated with mitigation or standalone – only 6% report having a dedicated adaptation finance strategy and 33% report that there is no finance strategy or dedicated section (while others report “finance considerations” included within adaptation plans or strategies, or in development). Most cities do not systematically link climate risk and vulnerability assessments to budgeting and project preparation, rather, these assessments often remain in technical reports. This is not surprising

given that almost a third of cities do not carry out regular or occasional risk assessments, but what is surprising is the reporting of how little cities use tools to prioritise funding for adaptation: nearly half (46%) of cities report not using any tool or method to evaluate costs, benefits or co-benefits, and prioritise measures. Some cities note that cost-benefit-analyses tools “rarely give positive results” – contrary to other literature findings – and cite complexity, insufficient data and limited internal capacity as reasons for not using tools. This demonstrates the need for tools that are more tailored to local climate action that can assess ecosystem services, avoided costs and co-benefits of climate adaptation. In addition, this confirms previous recommendations on the need for increased support for personnel and to develop skills to translate risk assessments into appropriate policies and bankable projects.

Findings further confirm previous assessments that most adaptation finance is public, with sources predominately coming from local budgets and EU funding, followed by national grants. At the same time, the main barriers to improved resilience are often cited as “lack of funding” and “competing priorities”. Cities in particular note that adaptation actions follow “windows of opportunity” from the national and EU level – usually project-based funding – rather than predictable multi-year programmes, another key barrier to sustained action to build resilience. For most, the priority remains predictable, accessible and strategic use of public funding. Some cities note that having a set of pre-defined project proposals helps them swiftly apply for funding when opportunities arise, but this does not address the cyclical issue and requires the time and skills to develop. Kupper and Grafakos highlight that while some cities are beginning to diversify their financing sources, this remains limited; most non-traditional sources come from public-private partnerships with blended finance and risk transfer instruments much less frequently reported – further evidence of the limited technical capacity of cities to use non-traditional financing tools. There is of course a broader challenge of demonstrating return on investment in terms of avoided losses (or, in other terms, the ability to assess the effectiveness of adaptation measures). Common tools and indicators for assessing adaptation – and combined adaptation and mitigation – measures would be beneficial. There is also a clear need for increased and predictable financial support to cities from both public and non-traditional sources to effectively build resilience; this applies to both local and national levels and should be considered when negotiating the next EU budget and determining the framework of the National and Regional Partnership Plans (NRPPs).

Partnerships: collaboration should be long-term as opposed to project-based

As noted in the introduction, responsibility for adaptation to climate change is inherently spread across multiple actors. This makes the development of partnerships with these actors crucial to achieving the objectives of adaptation plans and effectively building resilience. Logically, cities widely consider partnerships with different local and transnational stakeholders as “important”, though there are hierarchies as to the valuation of relationships with these different stakeholders; partnerships with citizens and academia, for example, appear to be very highly regarded. It is no surprise then that the vast majority of cities

(87%) are developing communication strategies focused on both risks and solutions to work with citizens on addressing climate adaptation. Some cities report targeted and participatory communication strategies, explicitly tailoring to specific audiences, such as schools, vulnerable populations, businesses or neighbourhood groups. The author Lorenzo Chelleri notes growing evidence of a transition towards more integrated, participatory and capacity-building citizen engagement models (in place of information dissemination models). Some trends can be seen in forms of collaboration that include technical assistance, capacity building and ongoing cooperation with local organisations. In these contexts, Chelleri notes, municipalities enable communities not only by listening, but by equipping them with the skills and guidance necessary to engage in climate initiatives, demonstrating an understanding of communities as potential co-implementers; he particularly cites Mission Cities as being frontrunners in this case. However, community engagement is often framed within projects, pilot initiatives or other externally funded programmes, rather than as permanent mechanisms for collaboration.

Trends in societal resistance indicate these are less directed at the climate goal itself, but at perceived unequal burdens, or measure-specific pushback linked to spatial trade-offs and everyday mobility. Notably, citizen pushback does not seem to be linked to whether cities have concrete support mechanisms for community engagement strategies, as these cities also report a relatively high rate of pushback. Chelleri concludes that pushback is a predictable feature of transformative change and highlights behavioural change as key to support and embrace urban transformations.

Delving a step further, differences between cities appear to be driven more by operational capacity than by divergent policy values, reflecting above analyses stressing capacity as a key challenge to planning, data use and funding. It is no surprise that cities show a clear preference for long-term institutional strengthening, including through staff training, over short-term one-off project support. This preference reflects the reality that effective resilience is not built through isolated interventions, but through lasting capacity, stable financing and organisational learning within city administrations. There is a fundamental need for structured and permanent horizontal and vertical partnerships bridging local ecosystems to national and international stakeholders. To be effective, this needs to be supported by long-term investment and a clear definition and understanding of responsibility for addressing climate adaptation – this will be a key point for the upcoming EU Climate Resilience Framework. Indeed, challenges to effective climate adaptation often relate to fragmented responsibilities, limited coordination and investment frameworks that do not fully account for long-term climate risks. In practice, cities are often expected to manage climate-related risks that lie beyond their actual authority, for example in relation to land owned by other actors, privately owned assets, water management and critical infrastructure. Without clear allocation of responsibilities, national-level support and adequate resources, this risks leading to a fragmented situation rather than increased resilience. To support this, the EU Climate Resilience Framework should develop a mandatory and standardised mechanism for cooperation across different governance levels that goes beyond consultation and dialogue.

Recommendations and way forward

The upcoming EU Climate Resilience Framework provides a unique opportunity to set Europe on the path to climate resilience. This should mark a key turning point in coordinating the way local and national governments and the European Union address the threat of climate change. However, as the impacts of climate change evolve, so too should our response. Work is already underway on the second EU-wide climate risk assessment, which will be published in 2028.³ Climate risk assessments and hazard models at various levels of government must be updated on a regular basis and used to inform policies and investments. Crucially, building climate resilience ultimately depends less on new tools than on strengthening the governance and financial conditions that allow cities to translate climate risks into durable, equitable and long-term adaptive transformation.

“Our data show that while many cities are advancing adaptation planning, they continue to face significant gaps in technical capacity, regulatory clarity, and—most critically—predictable, long-term financing,” notes André Sobczak, Secretary General of Eurocities. “A strong EU framework can help close these gaps by providing clearer governance structures that support collaboration across governance levels, better access to localised risk data, and funding instruments that match the scale and urgency of urban climate risks.”

If designed in close partnership with cities, the EU Climate Resilience Framework can move us from fragmented efforts to a coherent resilience agenda that empowers local governments to protect communities, infrastructure and local economies in the face of escalating climate impacts. Building on the expert analysis presented in the previous chapters, we provide recommendations for improved European, national and local action on adaptation.

Recommendations for the European level

1. Recognise multilevel governance as a core enabler of climate resilience

Permanent mechanisms for collaboration are the foundation to realising resilience on the ground. While cities are working to address adaptation needs by piloting innovative ways of collaborating across internal departments and with external stakeholders, intermunicipal and multilevel coordination – namely regions and national governments – remains a major obstacle to harmonised planning and investment. The EU Climate Resilience Framework must mandate and set the standard for member states to move beyond mere consultation with cities towards multilevel governance structures as a legal requirement for the co-design and implementation of national plans. This would ensure that the framework vertically integrates city-led risk assessments into the EU’s strategic architecture, captures local investment needs and builds on what already exists in terms of local adaptation, nature, water and preparedness plans.

However, it is not enough for the European Commission to mandate that national governments collaborate with cities; there is extensive evidence

The upcoming EU Climate Resilience Framework should mark a key turning point in coordinating the way local and national governments and the European Union address the threat of climate change.

3. <https://climate-adapt.eea.europa.eu/en/news-archive/work-has-started-on-the-second-european-climate-risk-assessment>

Building climate resilience ultimately depends less on new tools than on strengthening the governance and financial conditions that allow cities to translate climate risks into durable, equitable and long-term adaptive transformation.

of ineffective and diverse national-local cooperation in the past (see, for example, the CIDOB Monograph “Urban Recovery Watch” developed in partnership with Eurocities).⁴ The commission must outline how this should be done to ensure cities are core partners in the co-development of regional and national plans. As such, the European Commission should develop mandatory requirements for member states to establish permanent multilevel governance structures with cities for the development and implementation of adaptation plans, recurring as necessary for reporting and revision requirements. These structures would also serve as essential instruments to mainstream resilience across national and local operations, and to ensure coherence with other national plans such as National Restoration Plans and Building Renovation Plans, among others.

2. Set an ambitious and inclusive framework to build climate resilience across Europe and in cities

Common climate reference scenarios along with legally binding targets are urgently needed to drive effective resilience and preparedness planning at national and local level. The upcoming EU Climate Resilience Framework must address this by setting legal targets for member states; an EU target alone is not enough to ensure that urgently needed action is taken. Given the different realities on the ground – and that climate risks are locally determined – national governments could develop medium and worst-case scenario trajectories, supported by an analysis of risks, as a basis for national level planning and investment, and with guidance to support similar action on a local level.

To further support concrete action, the European Commission should clarify responsibility for climate risks and risk ownership which would support the shift from short-term planning due to policy cycles and political priorities towards long-term, predictable planning and investment.

To support tracking and progress towards adaptation targets, cities need standardised, accessible and interoperable climate data that is granular enough to be used for local climate risk assessments. It is important to note that granularity is a recurring challenge when it comes to EU satellite data. The European Commission should address these needs in the EU Climate Resilience Framework by establishing clear mandated data types for tracking national adaptation plans, developed in collaboration with cities.

3. Establish predictable and long-term adaptation financing

The main challenge to building resilience in cities is a lack of dedicated funding for adaptation. The European Commission should move away from short-term, competitive project-based funding toward stable, earmarked and long-term adaptation finance streams that enable long-term planning. The next EU budget will be crucial to setting the framework on this. The proposed National and Regional Partnership Plans (NRPPs) as part of the ongoing budget negotiations should include a dedicated and mandatory chapter on urban financing to clearly assess needs and sources of financing and align national and local financing on adaptation for cross-boundary infrastructure. The European Commission should encourage member states to support cities in developing good budgeting practices – such as tagging adaptation budget to be able to track and monitor investments. Focus should be given to tailoring financial support to the needs that

4. <https://www.cidob.org/publicaciones/urban-recovery-watch-empowering-cities-eu-green-and-digital-transition>

cities identify, namely human resources, quantification and assessment of adaptation measures, technical support for the diversification of financing sources, and development of a pipeline of projects. To address the request for support in quantification and assessment of adaptation measures, the European Commission should develop standardised cost-benefit analysis tools for the prioritisation of adaptation investments at both the local and national level. This will go some way to ensuring – as should be the case with broader EU financing – investments are based on common risk assessments, climate trajectories and benefit analyses.

Furthermore, access to financing should be simplified by providing one point of entry for EU funded urban initiatives, reduced and simplified applications, and staged financing to reduce administrative burden. This should be a priority of the Cities Platform announced by the EU Policy Agenda for Cities and coordinated across European Commission Directorates-General (DGs). The European Commission should additionally foster structured collaboration with the insurance sector to co-develop forward-looking risk scenarios and innovative risk-sharing schemes with cities and communities.

4. Embed fully resourced capacity building at the heart of the EU Climate Resilience Framework

The European Commission should embed capacity building, education and training as central instruments for effective transformation. Improved intermunicipal collaboration and multilevel governance structures are essential. The European Commission must develop mandatory mechanisms for permanent collaboration across local and national levels. Building the capacity of cities to carry out climate risk assessments, translate these into effective policies, and implement such policies is equally important to realising greater resilience. The European Commission should support member states and cities by developing specialised training programmes focused on national and local vulnerabilities and hazards, access and use of climate data, and the widening of training programmes to cities for emergency preparedness as proposed within the EU Preparedness Union Strategy. This requires dedicated, long-term and predictable funding for capacity building.

In addition, funding for education, awareness raising and engagement programmes for the wider public will be essential for building community resilience and shared responsibility. Cities have a central role in tailoring and delivering such programmes to the local context, but the commission can support by clarifying definitions of risk ownership and responsibility supported with appropriate resources. Training and upskilling workers for the implementation of NbS and other climate resilience measures in collaboration with local communities is equally key. Here, several pieces of legislation should be coordinated to support investment in skills for the implementation of adaptation measures, including the EU Nature Restoration Regulation, the EU Soil Monitoring Directive, the EPBD, the EU Water Resilience Strategy and the proposed revision of the EU Water Framework Directive, as well as the EU Skills Agenda. Again, the EU Policy Agenda for Cities could support the coordination between different responsible DGs on guidance for member states and cities to ensure coherence and capitalise on co-benefits. The European Commission should additionally foster structured collaboration with the insurance sector as noted above.

If designed in close partnership with cities, the EU framework can move us from fragmented efforts to a coherent resilience agenda.

5. Align legislation, including targets and reporting, on nature, water and adaptation

The full potential of nature-based solutions for resilience is constrained by three interrelated gaps: lack of measurable targets, insufficient long-term funding (especially for maintenance) and a limited, non-standardised assessment of multifunctional benefits. To address this, the European Commission must ensure that the upcoming EU Climate Resilience Framework establishes a seamless link in terms of targets, indicators and reporting timelines with the EU Nature Restoration Regulation (notably Article 8 on urban ecosystem restoration targets), the Urban Wastewater Framework Directive, the Water Framework Directive, and the EU Birds and Habitats Directives. Further, beyond mere alignment, the commission should develop a voluntary standardised methodology to assess the need for green and blue space in cities based on climate risk assessments, while also creating a standardised methodology to assess co-benefits of mitigation and adaptation measures. Work completed under the Urban Agenda Partnership on Greening Cities could provide a basis for this.

To effectively embed nature, water and adaptation solutions into decarbonisation and resilience objectives, the commission should prioritise the integration of nature-based solutions and resilience planning into legislation for buildings and national plans. In order to achieve this, funding instruments should be revised to specifically incentivise integrated, “silo-breaking” projects that combine climate adaptation with biodiversity and social objectives, rather than funding individual sectors in isolation. Green public procurement practices should support long-term cost assessments so that financing decisions evaluate green investments by accounting for the longer-lasting value of living infrastructure over traditional grey alternatives.

6. Embed social vulnerability into climate risk assessments

Climate risks depend in part on adaptability – the ability to respond to and recover from impacts. The European Commission should standardise climate risk assessments ensuring that indicators for social vulnerability are embedded. These are crucial for cities in prioritising actions for long-term and emergency planning. As noted above, cities that regularly collect temperature data while also using socioeconomic or demographic information tend to report more advanced early warning systems. The European Commission should provide technical support for the combining of meteorological data with demographic and health data, and the prioritisation of measures according to social vulnerability.

7. Align resilience with EU strategies for quality and affordable housing

Social vulnerability is strongly linked to access to affordable housing.⁵ While cities are working to address the need for affordable housing, there is a need to ensure housing is of good quality and resilient to future climate scenarios. Investments in new developments and retrofitting must be based on climate risk assessments and focus on overall quality. Given the renewed emphasis on housing across Europe, including initiatives such as the EU Affordable Housing Plan, the European Commission must ensure that housing expansion does not exacerbate flood and heat vulnerability. To achieve this, they should communicate and promote investments for housing based on climate risk assessments.

5. <https://eurocities.eu/wp-content/uploads/2025/12/1080-Housing-web.pdf>

Recommendations for the national level

1. Ensure concrete, effective and sustained collaboration with cities in the design and implementation of national adaptation plans

Effective resilience requires a territorial approach; cities are best placed to understand local risks, assess vulnerabilities and prioritise actions. However, they are also limited by financial and human capacity, as well as competences. National authorities must develop permanent mechanisms for collaboration with cities to enable regular and effective co-development of adaptation plans and align on prioritisation and implementation of measures. This is crucial to integrating local risk assessments into national architecture and aligning local and national investment.

2. Embed adaptation and resilience-by-design across sectors

National policies should be informed by local climate risk assessments and future climate scenarios to embed resilience-by-design across all sectors. This is key to ensure risk is not transferred from one area to another and requires coordination across national ministries for planning and investment decisions. For example, when it comes to affordable housing, national governments must ensure alignment between housing policies and resilience objectives by rooting investment decisions in climate risk assessments. They should mandate adaptation measures for new and existing buildings informed by future climate scenarios. Focus should be given to support and further expand resilience requirements for heat stress, storms and compound risks. To ensure effective implementation of resilience-by-design principles at the local level, support should be provided to cities in the form of technical knowledge and human resources, particularly for cross-department collaboration and planning.

3. Improve the municipal fiscal and regulatory space for adaptation

Cities highlight national regulatory and fiscal barriers as an important constraint to increased action on adaptation. National governments must collaborate with cities to ease borrowing and financing restrictions related to adaptation investments – especially those related to NbS. They should facilitate the increased use of blended finance, public-private partnerships and innovative instruments by providing regular technical assistance, capacity building and financial support.

4. Provide technical support to cities on climate risk assessments, policy making and financing

Building the capacity of cities to identify climate risks and vulnerability, translate these into effective policies and develop investment plans for implementation is key. Cities are working to build their resilience but often lack the human resources and technical skills required to do so effectively. National governments should develop specialised training programmes for municipal officers across departments including on risk assessment, data analysis, quantification of adaptation benefits and nature-based solutions. Addressing social vulnerabilities requires specialised human resources at the local level with the cross-disciplinary skills to integrate climate adaptation with social work, public health and urban planning. National governments should provide capacity building and financial and technical support to

cities to carry out climate risk assessments which include support for the combining of meteorological data with demographic and health data to ensure social vulnerabilities are at the heart of risk assessments and used to inform decision-making. Further, technical support is needed to support cities in project development including through standard templates, advisory services and technical assistance. And cities need support for diversifying their funding sources including through public-private partnerships, blended finance and bonds.

Recommendations for the local level

1. Create long-term partnerships with academia, community groups, local businesses and institutions, and regions to embed resilience in long-term adaptation plans and emergency response plans

Evidence from the survey finds that by building on existing community groups and initiatives and strengthening participatory engagement strategies, cities can support communities to take meaningful action and shape local solutions. Prioritising longterm relationshipbuilding over oneoff project collaborations, particularly in community relations, delivers sustained engagement and trust, strengthens social cohesion and fosters shared ownership of resilience processes. To inform decision-making, bridge gaps in knowledge and test policy options, cities should build long-term partnerships with local universities and innovation centres. Partnerships with local businesses and private landowners are equally important. Such shared ownership is crucial to behavioural change and effective societal transformation.

2. Embed resilience across departments and policies through integrated planning

Collaboration across municipal departments is key to integrated planning. Cities must prioritise cross-sector collaboration to ensure coherence of planning policies and embed resilience across the city. This is crucial for planning adaptation measures within housing and the built environment, as well as building resilience across transport, energy and digital infrastructure. Many cities note that this requires leadership from the political level and department heads, but also that it should be embedded within the job description – or even better, the job title – of municipal staff.

3. Close the strategy-to-finance gap

The main challenge to building resilience in cities is a lack of dedicated funding for adaptation. Cities must embed adaptation investment into annual adaptation budgeting processes by ensuring adaptation plans are supported by a finance strategy. This should group measures into priority packages with indicative cost ranges. In addition, cities could introduce adaptation tagging of major investment lines so that allocations can be tracked over time and as a means to better attract external investors.

4. Strengthen project preparation, prioritisation and bundling, and establish a sustained pipeline of projects

To support the financing of climate resilience projects, cities should standardise how they scope, cost and prioritise interventions. But this

must be underpinned by dedicated funding for human resources and skills training, and institutional capacity building. Enabling conditions include stable, multi-annual budget lines for climate adaptation teams, access to technical expertise (for example through EU-level support facilities or knowledge networks) and the integration of climate criteria into municipal planning and procurement processes. Ranking criteria should be harmonised and include risk reduction potential, equity considerations, financial feasibility and co-benefits (for climate, health, social). In addition, cities should bundle measures together into multi-year programmes aligned with EU and national funding cycles to reduce transaction costs and increase credibility with investors. To make the most of last-minute financing sources – especially from local budgets – cities should maintain a pipeline of well-prepared projects ready to submit and implement.

5. Institutionalise data governance across city departments

Effective adaptation relies less on new technologies than on better and systematic integration and use of existing data across sectors. Cities should assign responsibilities across departments for data management and, if relevant, establish a central data platform that is accessible and usable by all relevant city services. This institutionalised approach strengthens evidence-based planning, improves coordination, and enables cities to monitor risks and track progress in a coherent and transparent way.

Europe is the fastest-warming continent. Since the 1980s, temperatures have increased at roughly twice the global rate. As home to over 75% of the EU's population, European cities face significant climate risks. It is therefore no surprise that in 2025 climate action remained the top priority for European mayors for the third year in a row.

Against this background, and building on their long-standing collaboration, CIDOB and Eurocities have partnered to gather evidence as to the status, needs and challenges of adaptation planning and financing in cities. The CIDOB Monograph "Urban Climate Resilience in Europe" aims to fill key data gaps by providing a comparative assessment on the state of urban climate adaptation. In the context of the upcoming EU Climate Resilience Framework, it provides policy analysis and recommendations, by examining the main barriers to improved urban resilience and identifying how cities can be supported through regulatory and fiscal programmes at the local, national and EU levels.

The CIDOB Monograph draws on an analysis of city data collected through a survey designed and carried out by Eurocities in collaboration with CIDOB in 2025. The survey received 54 responses from cities across 17 countries and featured 101 questions. The chapters are authored by six experts in urban climate adaptation in Europe, who also contributed to the design of the survey. Together they provide an overview of policies and actions taken by cities, identify gaps and barriers, highlight emerging patterns, and distil key messages across the following topics: institutional capacities and climate risks, financing, data and monitoring, partnerships and community engagement, building codes and capacity building.