

Urban Insight

Planning for Climate Adaptation

Key actions for resilient and
adaptive cities of the future



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Climate change is a challenge but it is also a catalyst, a catalyst to (re)design and (re)build green, healthy and sustainable communities and cities of the future

Enrico Moens, Senior Expert Climate Change Adaptation at Sweco in the Netherlands.

Introduction

CITIES ARE UNDER PRESSURE EVERY DAY

Extreme rainfall, river floods, storm surges, heatwaves and drought are becoming commonplace in Europe’s cities. The costs of extreme events are damaging and significant, many of which can cause cascading impacts on the economy, natural ecosystems, infrastructure, and our most vulnerable communities¹. And they are projected to occur with increasing frequency and magnitude in the coming decades². Urban pressures go beyond environmental hazards. Growing populations, public health challenges, and strain on the provision of essential services are challenges that cities cannot afford to ignore either.

Cloudburst events in Copenhagen in 2011 caused an estimated €800 million in damage, whilst Thames Water estimates that a severe drought event resulting in infrastructure failure, water supply restriction and public health incidents could potentially cost London up to €365 million per day in the future³.

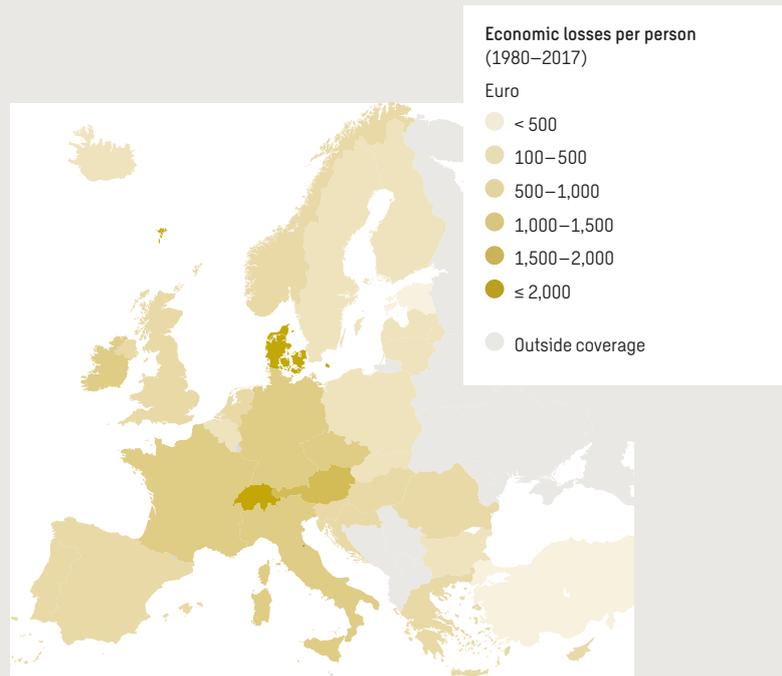
Hazards such as cloudbursts transcend the institutional and geographic boundaries that form the basis of planning in cities. Put simply, our systems for decision-making, cooperation and action are incompatible with the challenges posed by future climate change. That is why cities are looking at new ways to tackle climate hazards and urban pressures synergistically. By creating interventions that help them to prepare for and adapt to climate hazards, and maximise opportunities for improving urban life⁴.

LESS THAN HALF OF ALL EUROPEAN CITIES HAVE AN ADAPTATION PLAN

Despite expert and academic support, mainstreaming and acceleration has not always followed suit – implementation is not happening at the same rate as planning. Only 26 % of cities in Europe have an adaptation plan, and in 2018 just 17 % had a joint adaptation and mitigation plan⁵. Moreover, the problem is particularly acute in smaller cities, as larger cities (>500.000 inhabitants) represent the largest share of cities with either a mitigation or adaptation plan.

EVEN WHEN CITIES HAVE AN ADAPTATION PLAN, IMPLEMENTATION IS CRUCIALLY LAGGING BEHIND

Copenhagen, one of the leading cities in adaptation, approved their climate adaptation plan in 2011, and the first climate change adapted urban space opened in 2014⁶. Yet, the entire plan is not expected to be implemented before 2035 at the earliest⁷ – similar to e.g. Belfast in Northern Ireland. Looking wider afield, adaptation strategies from Vejle in Denmark, Rotterdam in the Netherlands, London in the UK, and Paris in France target climate resilience by 2050⁸.



The economic losses per person across all EEA countries resulting from climate-related events between 1980-2017.

HOW CAN WE ACCELERATE IMPLEMENTATION OF ADAPTATION?

At the current rate of implementation, we are leaving our cities and societies unprepared for the social and economic disruption that climate change will bring. Hence, we ask the questions:

1. What are the opportunities to accelerate the implementation of adaptation measures in our urban environments?
2. How can cities translate them to keep pace with the challenges of climate change?

This Urban Insight report, “Planning for Climate Adaptation”, aims to guide acceleration of climate adaptation in cities at the scale and urgency essential for future sustainability and resilience. For the report we have extensively interviewed and researched key cities at the forefront of climate adaptation implementation. Combined with our insights and expertise from multiple disciplines, we explore the challenges facing climate adaptation and provide cities, planners and citizens with 10 key opportunities for resilient and adaptive cities of the future.

The Sustainable Development Goals in focus in this report are:



Accelerating urban adaptation

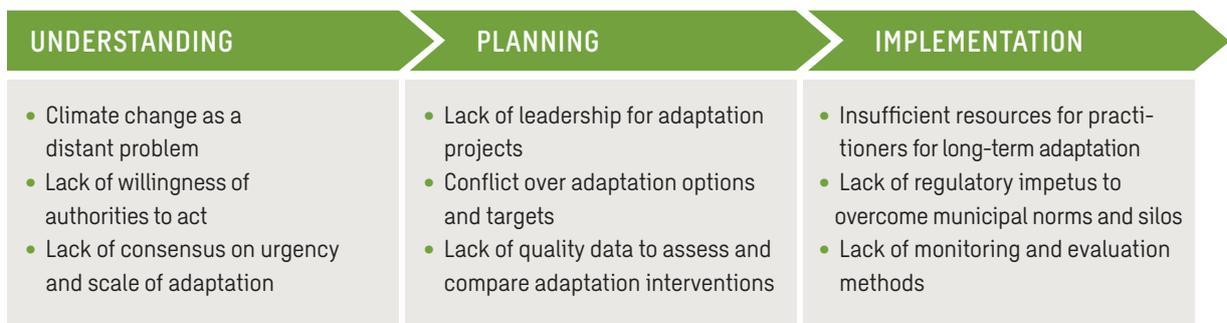
Cities are falling behind on implementation of urban adaptation. Traditional approaches to urban development are ill-equipped to cope with current and future challenges of climate change, and implementation is constrained by silo thinking, friction between institutions and a focus on short-term development agendas.

Adaptation requires an appreciation of the complexity and interrelatedness of urban systems, including the variety of sectors and disciplines at play in our cities. Whilst challenges and barriers can occur within the processes of Understanding and Planning for urban climate adaptation, the Implementation phase faces specific barriers to success, alongside the cascading challenges from earlier phases. Implementation commonly faces barriers such as a lack of financial or human resources, a lack of momentum to disrupt norms and habits, and failure to innovate, evaluate and learn quickly from adaptation solutions. Furthermore, cities often lack the capacities to exceed the guidelines and standards set by national governments for adaptation implementation. This makes it a critical phase for improvement and acceleration.

Handling complexity is crucial for implementing adaptation. Not only are practitioners and planners working to tackle the threats arising from climate change, but holistic adaptation measures should also positively influence urban mobility, social cohesion and economic prosperity. Coherent action is therefore essential to ensure long-term success as our city ecosystems undergo adaptation transformations. In the following section we will explain the barriers to adaptation, and explore four trends and challenges of urban adaptation that cities are dealing with.

The barriers to implementation (illustrated on page 6) may constrain the effectiveness or efficiency of an adaptation strategy if not managed appropriately, or result in maladaptation of the urban system

Mainstreaming and accelerating adaptation requires collective action. Crucially, the opportunities for tackling these challenges are diverse and flexible. All stakeholders, from policy-makers, developers, academic experts, urban planners, communities and families have a role to play. And therein lies its value. We have highlighted testimonials on barriers from cities in Europe working on adaptation.



Implementation of climate adaptation measures occurs after the Understanding and Planning phases. The barriers and challenges within these phases typically cascade down into the Implementation phase, providing further barriers to urgent and successful delivery of projects. Sweco, adopted based upon references 7, 8, 9 and 10



THE IMPLEMENTATION PHASE

Critical stage in which barriers can significantly constrain success. Transitioning from planning to implementation needs sufficient resourcing, momentum to overcome norms and silos, and a willingness to experiment, monitor and learn.

BARRIERS

- Regulatory Procedures
- Quality & Quantity of Resources
- Reluctance to Experiment, Learn and Share

Sweco, adopted based upon references 9, 10, 11, and 12



EXPERIENCING BARRIERS TO ACTION FROM ACROSS EUROPE

London:

It is just that adaptation is not high up on everyone's agenda. But acting on climate change is in the interest of politicians, business and, most importantly, citizens.

Copenhagen:

It is not always clear who is responsible. How can we work together to adapt in public and private spaces if we are all uncertain?

Basel:

Even the companies implementing green roofs have different agendas. They are often working in their own interest.

Berlin:

There has to be more technical expertise to monitor and evaluate these measures. Otherwise we can't learn and improve.



Four trends and challenges of urban climate adaptation

Based on our research, we have identified four trends in urban climate adaptation planning and implementation that connect the barriers and challenges for adaptation implementation to the opportunities and best practices for acceleration.



GOVERNANCE CHALLENGES



TOOLS FOR PEOPLE, PLANET, PROFIT



INNOVATION & EXPERIMENTATION



THE SMART RESILIENT CITY

TREND 1: GOVERNANCE CHALLENGES



It is critical to make it a common challenge. Connect adaptation to the challenges that benefit multiple stakeholders and bottom lines in the city for long-term success.

Lykke Leonardsen, Director of Urban Resilience, City of Copenhagen

Friction across institutions and departments within the city hinders adaptation. One of the crucial challenges to implementation of adaptation is the lack of cooperation between institutions, departments and stakeholders within the city. Often adaptation projects are designed within one department – but the implementation will be hindered by the regulative requirements of another department. In Copenhagen, for instance, the city is facing a bump in the road towards adapting the city's streets due to road design regulations. Although the planning phase was an interdisciplinary process, the implementation of road transformations into e.g. cloudburst boulevards is being blocked by national legislation and local requirements for road design and construction. Too often, city decision-makers are stepping on each others' feet in the crucial implementation phase.

Cities need long-term adaptation strategies to cope with current and future governance challenges. Implementation of adaptation requires greater cooperation and support from different institutions and actors, especially if they are targeting transformational change. Future governance challenges will likely focus on new and competing urban patterns and norms, challenged by public health, zero carbon and mobility concerns, and greater urban densification in publicly-owned spaces. There is a grand competition for urban space – and the different departments within city government are competing to win that race.



TREND 2: TOOLS FOR PEOPLE, PLANET, PROFIT



Framing climate change adaptation to be green, environmentally focused but also providing economic growth; this is what helps when creating new connections and networks, and lots of no-regret impacts.

Paul van Roosmalen, City of Rotterdam

Retrofitting and regeneration are essential in 21st Century cities. Pressures on space, resources, and utilities mean new development will increasingly make way for multi-scalar transitions in our existing buildings, neighbourhoods and public spaces. Cities have huge potential for accelerating technological and social responses to climate change. However, adaptation to extreme rainfall or tropical heatwaves will require creative innovations and technologies that are sensitive to our existing city infrastructures.

Adaptation is more than risk reduction. Copenhagen, Rotterdam, London and Basel all place climate adaptation front and center in creating value – social, cultural and economic – for their inhabitants. Regulations and planning instruments should be sensitive to this approach, so that deciding what should be adapted, where, how and for whom can result in neighbourhoods and communities that are resilient to the impacts of climate change.

Disrupt institutional and sectoral silos and accelerate socio-technical transitions. Planning and implementation approaches should look for synergies between adaptation interventions and existing tools and technologies. They need to disrupt institutional and sectoral silos and accelerate the transition from pure technical approaches to one that places social values at the forefront. In light of the current health crisis and our ongoing climate crisis, cities need to be green and blue, open and accessible, and find a balance between risk management and liveability.

TREND 3: INNOVATION & EXPERIMENTATION



We often miss opportunities for retrofitting. It is not seen as relevant for residential buildings so we are lacking a policy for implementation. We need to target these holistic, innovative approaches better.

Wojciech Szymalski, Institute for Sustainable Development Warsaw

System adaptation requires practice. Creating visions of the adaptive city of the future can be done by innovating and experimenting with approaches. Generating new public-private partnerships, launching pilot projects, or catalysing citizen science may help to scale adaptation measures quickly and flexibly.

Demonstrate value creation. But how does experimentation align with existing methodologies and guidelines for keeping people safe or managing resources? Finding ways to demonstrate the value of adaptation, mobilise support and build capacities will be challenging for policy- and decision-makers in the cities of tomorrow.





TREND 4: THE SMART, RESILIENT CITY



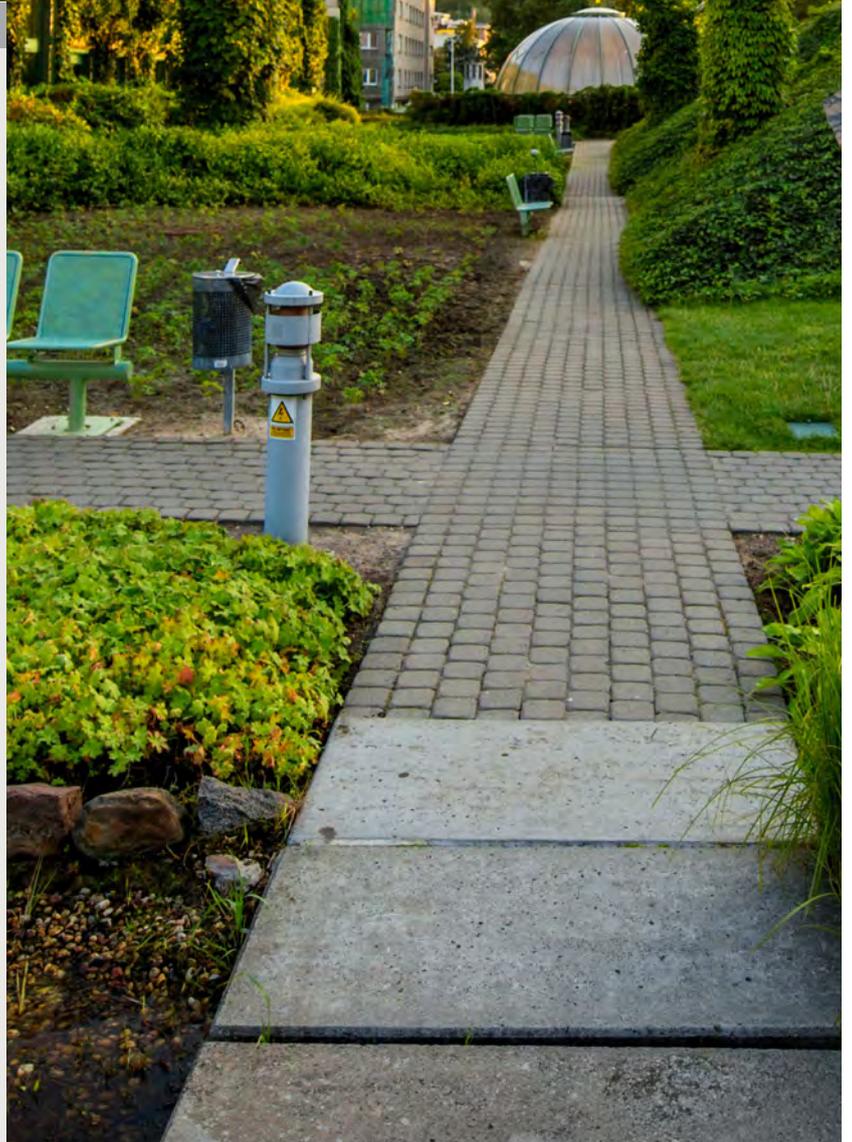
In development it's about smart water management, especially in urban areas. Reuse of wastewater, reuse of rainwater, in buildings, that is the future and also a huge business opportunity.

Tim van Hattum, Wageningen University & Research

Cities will be smart and connected. Sensors are already monitoring noise, air quality, flow of people and temperature. Our buildings, water squares and sewers will manage capacity for cloudburst events. And greener, permeable tramlines, cycle paths and roads will work to mitigate drought and extreme heat during our summers.

Smart and resilient cities. Adaptation can accompany this smart transition as data, AI, machine learning and innovative technologies interact in our urban ecosystems. Integrating this micro-transition into our existing, aging urban infrastructures will demand new legislative standards, modes of insurance and regulation, and the re-framing of responsibilities and liabilities between urban stakeholders:

- Who owns and operates data?
- How will data move from the public to the private sector?
- How will the flow and analysis of data create new value for city officials and local politicians when prioritising urban climate adaptation?



Building best practices for adaptation planning

Cities are preparing to place adaptation at the heart of urban development, but acceleration is required to catalyse changes to the norms, practices and habits of adaptation

practitioners. We signalled four trends. Building on these, we have identified key best practices for successful urban transformations from frontrunner cities around Europe.



Stronger together: Networks for adaptation governance

In order to optimize and increase the success rate of implemented green and blue solutions that contribute to urban resilience, the managerial approach to leading these efforts is highly important. Specific recommendations include thinking in polycentric approaches, which serves to include different stakeholders with unique perspectives, that are beneficial for the success rate of chosen solutions¹³. As many different stakeholders and actors have access to, and make use of, implemented green and blue solutions, it is only natural that they should be included in co-determining the planning and implementation of climate adaptation solutions.

Always get your researchers around the table. Get your boroughs around the table and get the community organisations. And as far as practicable, get the users involved.

Annette Figuerdo, Greater London Authority

LEARNING TOGETHER & FASTER WITH VIRTUAL REALITY

The City of London has been mapped in high detail to create a virtual reality environment to allow participation from stakeholders in planning and development processes, visualisation of different possible urban designs, and accelerate the transition from planning into implementation. Augmented and virtual reality can transform the way that climate adaptation projects are communicated and implemented, placing local communities at the heart of transformations.



BEST PRACTICE 1

Build capacities across stakeholders to build resilience

Co-creation, networking and knowledge partnerships take many forms. Global city networks, like the C40 Cities Group or the former 100 Resilient Cities (now the Global Resilient Cities Network), have accelerated the translation of best practices. However, adaptation planning requires networking at all scales. Strategic partnerships at the municipal level integrate public interests, private actors and government stakeholders, and provide opportunities for cooperative goal-setting and appropriate solution-creation. Look for instance towards the influential London Climate Change Partnership, which has successfully embedded non-governmental stakeholder perspectives in public policies and decision-making around climate change adaptation in this megacity¹⁴.

Moreover, creating a strong capacity across stakeholders helps foster trust. This is crucial in an experimental stage, where there is a high risk of failing. Often cities need to make mistakes, in order to adopt strategies – which worked in peer cities – into their own local context. Copenhagen and the C40 network have been frontrunners in sharing “mistakes and challenges” with city peers in “closed” networks of city peers. Failing to succeed is a crucial benefit of building capacities across stakeholders and networks.

BEST PRACTICE 2

Use digital tools to foster co-creation

Practitioners can look more transformatively to web-based tools for co-creating adaptation solutions and building capacities for adaptation. The city of Rotterdam has utilised the Climate Impact Atlas¹⁵ to drive awareness and engagement with adaptation planning, whilst online platforms for collaboration and knowledge generation are at the forefront of adaptation planning in Berlin and London^{16, 17}. Sweco’s “State of your Street” guides city planners and adaptation experts towards targeted implementation of measures in areas facing higher risk of extreme heat, drought-related subsidence or surface water flooding – all aided by community-led data collection and engagement. As public health considerations and citizen science become increasingly important and popular, taking adaptation planning into the virtual domain may create more flexible, agile networks for success.



Aerial view of the Stockholm Royal Seaport, a green and blue oasis where business, industry, society and nature all meet. And where policy instruments have placed climate adaptation as a top priority.

Illustration: Adept & Mandaworks

Policy instruments for new urban developments

Maximising policy instruments is crucial to accelerate climate adaptation. Policy instruments, such as green space indices, adopting adaptation into building codes and sustainability certification schemes have proven effective in different cities in Europe. Our research has shown them to contribute to increased expansion of blue-green solutions and standards. The best practices are particularly useful in areas of new urban development.

BEST PRACTICE 3

Use policy instruments to enforce nature and adaptation

In Stockholm, the creative use of a Green Space Index (GSI) has embedded blue and green infrastructures in the development of the Stockholm Royal Seaport (SRS). By focusing on blue and green infrastructures, the development in SRS aims at contributing to human health and well-being, while also creating resilient and healthy urban environments. To ensure that developers meet the goals and criteria set by the authorities, tools such as the GSI are specifically utilised to enforce and regulate high-quality adaptation implementation.

The specific goals for the ecosystem services in SRS are that 100% of citizens live within 200 metres from parks, around 16,700 m² of green roofs are implemented and residents have 8.2 m² of green oasis available to them¹⁹.

Categorizing surface cover to incentivise and enforce installation of blue-green infrastructure can work to guarantee valuable benefits for urban ecosystems. Improving capacities for coping with extreme rainfall and heat, providing environments for social and cultural activities, and contributing to higher house and asset values are tangible impacts of expanding blue-green space in our cities. Urban Greening Factors, utilised in Berlin, Copenhagen and London^{20, 21}, are effective for translating policy into practice, in combination with existing policies, plans and building codes, and can result in urban areas that are greener, multi-functional and climate-proof. Crucially, they offer flexibility for regulators to increase scoring for desirable features or innovative solutions to encourage and mainstream their usage.

Every piece of soil and land is claimed in the Netherlands as a function or a property. Roofs don't have this claim. Nobody claimed them for greening, recreation, energy, so there you can play quite freely... We can experiment with combinations while in any other place the guys with the oldest rights would refuse to give up their monopoly.

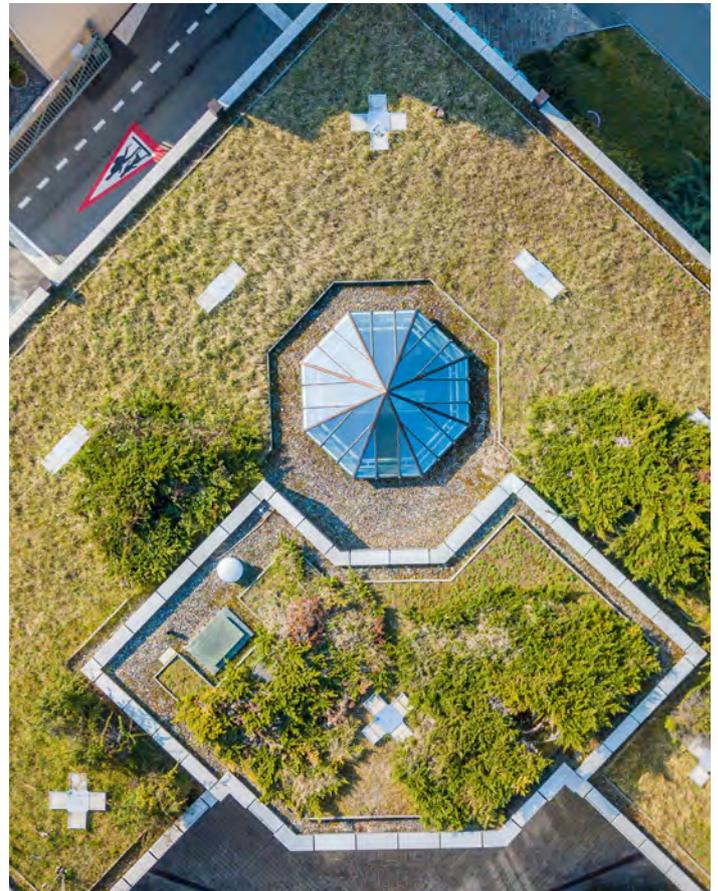
Paul van Roosmalen, City of Rotterdam

BEST PRACTICE 4

Incorporate adaptation in the building code

In the city of Basel, city authorities have taken further legislative action in order to expand the use of green and sustainable solutions. The authorities have had the political willpower to make legislative changes to the city's building code, making green solutions mandatory. This has positioned Basel as one of the frontrunners in terms of the number of green roofs, which amounts to somewhere from 1 to 1.4 million m² of green roofing. This is equivalent to 5.71 m² of green roof per inhabitant, substantially different when compared to Copenhagen's 0.07 m² and London's 0.17 m².

Inventive regulatory instruments can bring multiple benefits. They can allow cities to aspire beyond national- and EU-level adaptation policies. In Barcelona, the Trees Masterplan aims to exceed EU minimum standards for per capita access to green space²², whilst the boroughs of the Greater London Authority have embedded legislative regulations for more robust and resilient hydraulic performance of their SuDS interventions²³. As space becomes a scarce commodity, and the need for urban greenery to tackle flooding or cool our communities intensifies, instruments that motivate the expansion of blue-green infrastructure, enable experimental urban design, or connect adaptation measures across the public-private divide will be imperative.



To build resilient cities it's highly important we connect challenges. To do this cities and projects need both an inspiring story, to show the benefits, and a clear framework to reach measurable results.

Climate Action expert Martijn Steenstra sr. Consultant
Water Management and Spatial Planning at Sweco.



Design by Ulrica Larsson, Sweco Architects. Illustration: Sofia Kourbetis. Jakobsberg, Sweden. A green district for a sustainable future.

Adaptation across standards and guidelines

Adaptation is required in the public and private domains. Regulatory standards should incorporate climate adaptation considerations across these environments and reflect the complex interconnecting factors that influence planning and design. Standards for the built environment should not relate to new developments alone; it is widely acknowledged that urban regeneration is one of the driving forces of contemporary urban change, so standards for retrofitting and regeneration should be emerging at the same pace.

Neighbourhoods and planning zones require more holistic regulatory mechanisms to improve infrastructural adaptation. Cities are increasingly making the most of opportunities to improve adaptation planning, from embedding certification across sectors to experimenting with their functionality.

BEST PRACTICE 5 **Certification schemes accelerate adaptation in the private sector**

Building certification schemes, such as BREEAM, LEED and DGNB are implemented across a variety of European cities, by both the public and private sector. With specific regard to new urban development, institutional investors and private developers have taken to the certification schemes. Dependent on expert assessors, baseline surveying and calculations, these schemes encourage sustainable design and environmental performance within developments or stand-alone constructions. Private land will become an increasingly important terrain for accelerating climate adaptation implementation. Hence, tools and schemes that engage and motivate private-sector action can bring big wins for city governments and citizens alike.

Certification on the urban scale creates clear demands for private developers. Certification schemes are increasingly applicable to the urban district scale. Whilst the majority of the buildings and urban districts being certified are new, providing longer-term adaptation benefits, schemes are now integrated retrofitting into their certification standards. For example, the German Sustainable Building Council, or DGNB, has embedded retrofitting of urban districts into its certification assessments, increasing the functionality for existing housing and real estate in our densely populated cities.

More transformative approaches to certification and regulation are emerging. Catalysing synergy between public and private spaces is essential. In Rotterdam, connectivity between innovative blue-green roofing and the public water squares that lie at street level is a principle component of adaptive planning for extreme weather events. Performance standards and certification schemes should account for the connectivity of urban environments, simultaneously driving optimal standards for adaptation infrastructure and promoting the monitoring of performance for learning and improvement of technologies.

An important driving force for water-sensitive urban development is the legal obligation to take measures for decentralised rainwater management in new development projects. This is a key part of Berlin's transformative process towards a sponge city.

Peter Fehrmann, City of Berlin

Planning support tools

Climate change is a complex issue without easy solutions. Planners must plan for the future in the present, accounting for all of the complexities and trade-offs that will emerge over time. To tackle this, planning- and decision-support tools can be used to accelerate success. These tools ensure that policy-makers and stakeholders work cohesively to deliver adaptation planning, from knowledge creation and analysis, to intervention design and selection²⁴. At the EU scale, the EU Adaptation Support Tool²⁵, the C40 Climate Action Planning framework²⁶ or ICLEI's European Resilience Management tool²⁷ provide guiding frameworks for planning and implementing adaptation interventions.

BEST PRACTICE 6

Design for monitoring and evaluation using data facilitates decision-making

The tools share critical features for success and focus on robust and comprehensive data. As cities look towards a "smarter" future, adaptation planners should look to how interventions can act as a nexus for data collection and analysis. The Resilio project in Amsterdam is one example of a smart blue-green roofing system that is increasingly engaged with sensors for monitoring urban heat islands, wind dynamics and air quality standards²⁸. In Copenhagen, the Copenhagen Solutions Lab – a sub-department in the city –

We have to be efficient. There are all different kinds of programs that are wanting to add something into the streets when they open them up. We need to work together with the different projects of urban development to make this work.

Tara van Lersel, City of Rotterdam

Design by Sweco Architects. Illustration: Sofia Kourbetis. Proposal of stormwater management in central Gothenburg, Sweden. Opportunities on the way to Gothenburg's 400th anniversary in 2021.

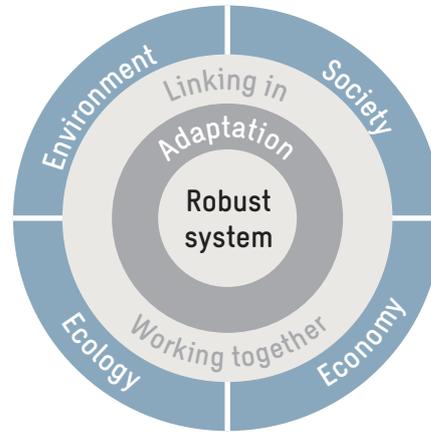


works on creating a smart and resilient city through sensors and big data²⁹. And London and Warsaw are rolling out a Sharing Cities Decision Support Tool³⁰. To support the smart city approach, cities should look to provide regulation and guidance to diversify public roofs, water squares or lamp-posts to enable flexible and innovative use for monitoring and evaluation of the urban system, and embedding in decision-making.

BEST PRACTICE 7

Strategize to deal with risks, attaining multiple benefits

Tools that enable the envisioning of a climate-proof city can be valuable for guiding and managing urban transitions. Planning can be underpinned by these practices for expanding dialogue and transparency, incorporating societal actors, and plotting and mobilising the essential resources that will facilitate acceleration of implementation. Use Rotterdam’s Adaptation Strategy³¹ or Copenhagen’s Cloudburst Management Plan as the springboard. These comprehensive and aspirational policies have generated legitimacy, funding, and embedded risk management in their adaptation planning, all founded upon robust municipal planning support strategies.



Rotterdam’s approach to building the basis of a robust risk management approach, looking to create value, legitimacy, and aspiration for the development of the city – using adaptation as a key vehicle for doing this

BEST PRACTICE 8

Embrace the dynamic uncertainty of climate change as a tool for robust and resilient adaptation

Adaptivity and robustness should be in focus. Adaptive planning provides a frame for incorporating equity and justice into adaptation strategies. London’s Thames Tideway 2100 has benefitted strongly from iterative planning, in which no-regret decisions were identified and taken to build longer-term adaptive capacity and ensure that decisions can be adjusted over time, in relation to the evolving nature of the urban environment³². Using this “adaptation pathways” approach ensures that resources can be made available for future changes to adaptation strategies – and that cities don’t get locked into their large infrastructural investments.

We’re never going to adapt unless we plan to deal with a range of urban vulnerabilities – poverty, health, mobility, environmental – in the places where they are most needed.

Kristen Guida, London Climate Change Partnership

Planners will need to continue to manage uncertainty and risk in preparing cities for the future, in which tools for supporting decision-making are embedded across sectors, not just in relation to adaptation, but for the generation of resilient and sustainable cities.



Foster funding and resource flexibility

Competing agendas, costly disasters, or “black swan” events like the current global pandemic are threats to climate adaptation planning. Cities have always needed to balance their resources and maximise their impacts. Planning for climate change adaptation requires similar forward-thinking. Municipal planners, landscape architects, civil engineers and non-governmental organisations co-create the planning and design adaptation measures. Why shouldn't they co-fund these measures too?

BEST PRACTICE 9

Rethink tariffs to enable new multi-stakeholder funding mechanisms for adaptation

Public-private partnerships can optimise resources for accelerating adaptation implementation³³. In Berlin the introduction of split tariffs for stormwater and sewage management have transformed funding availability for large- and small-scale adaptation interventions³⁴. Such approaches provide flexibility for municipal authorities to organise stormwater management, and place private stakeholders in the driving seat for small-scale investments in disconnection systems, rain gardens or pervious paving. Breaking the boundaries of responsibility, financing and implementation can create city-scale progress and catalyse the leap towards placing adaptation at the front of collective imaginations for a sustainable urban future.

The most important urban planner in a city is the chief financial officer. They look to capitalise on CCA investment to drive further investment and ‘profit’. Municipalities should capitalise on their investments, whilst now external stakeholders generally benefit the most.

Soren Heinecke, Copenhagen

BEST PRACTICE 10

Invest for the long term with institutional funds

Alternative innovative funding mechanisms could emerge from motivating investment and pension funds to support adaptation infrastructure and acceleration. Barriers to mobilising investment have arisen in relation to the scale of adaptation investments, a lack of investor knowledge and awareness, and limited commercialisation of adaptation technologies.

Looking towards the stimulatory pathway of the EU Green Deal, whilst predominantly focused on mitigation, climate action is mainstreamed within construction, retrofitting and renovation of urban real estate and infrastructure. Cities should align their adaptation budgets with the projected €1 trillion budget available from the European Commission up to 2030³⁵. And focus on making investment visible and just for urban communities, as well as incentivising private investment in development, innovation and experimentation.

Copenhagen, Milan²⁶, Rotterdam and Basel, with their myriad of water squares, green-blue roofs, and urban forests, have shown how urban greening and connectivity can reap socio-economic reward, as land values rise, investors buy in, and the city emerges as a global frontrunner for best practice. When we emerge from the current global health crisis, with an eye as ever on the climate crisis, municipal governments can look to capitalise on the motivations of investors to diversify portfolios and support lower-risk development, as well as delivering return of investment that is tangibly environmental, socio-cultural and health focused, rather than purely economic.



INVENTIVE PARTNERSHIPS FOR SMART AND INCLUSIVE GROWTH

Cities are getting creative with catalysing action and generating investment for climate adaptation measures such as urban greening or smart environmental management.

Milan launched its Urban Greening Challenge via the C40 City Solutions Platform. Open-access workshops and webinars brought local government, knowledge institutions and private sector actors together to co-create strategic solutions. This gave consultancies and businesses early access to municipal plans, streamlining the tender process, whilst providing the city with an opportunity to show off the value of extensive greening for investors and citizens alike.

Amsterdam Smart City is an innovative public-private partnership tackling ecological, social and economic issues head-on. The City of Amsterdam identified the potential to connect resilience building, climate adaptation and innovation across a broad array of stakeholders. Not only has Amsterdam Smart City diversified responsibility for implementing climate adaptation measures, but it has fostered private investment, improved scalability challenges, and catalysed value creation beyond simply managing climate risks and hazards.



Conclusion and reflections

Urban climate adaptation is essential for our cities to be healthy and sustainable in the future. But current progress lags behind ambition. In order to deliver effective and equitable climate solutions, cities will need to accelerate and mainstream adaptation measures across all sectors of society.

ONLY 26% OF EUROPEAN CITIES HAVE AN ADAPTATION PLAN – NONE HAVE MANAGED FULL SCALE ADAPTATION

Many cities are struggling to implement holistic climate adaptation. Implementation is challenged by a multitude of barriers, from inflexible organisations to incompatible regulations. Cities need to think about how they can match urban trends and challenges for successful planning with innovative, flexible and transferable practices. Cities face their own contextual challenges but often experience similar barriers within their organisations, cultures and communities as well as through national politics and legislation. A city that builds adaptation planning processes holistically can generate solutions and interventions that are appropriate and effective in their localities.

Aspiring for future-proof adaptation solutions requires long-term visions, in which uncertainty is accounted for, citizens and the environment are prioritised, and smart and synergistic infrastructures are used to connect competing agendas for sustainability, carbon neutrality, development and economic growth.

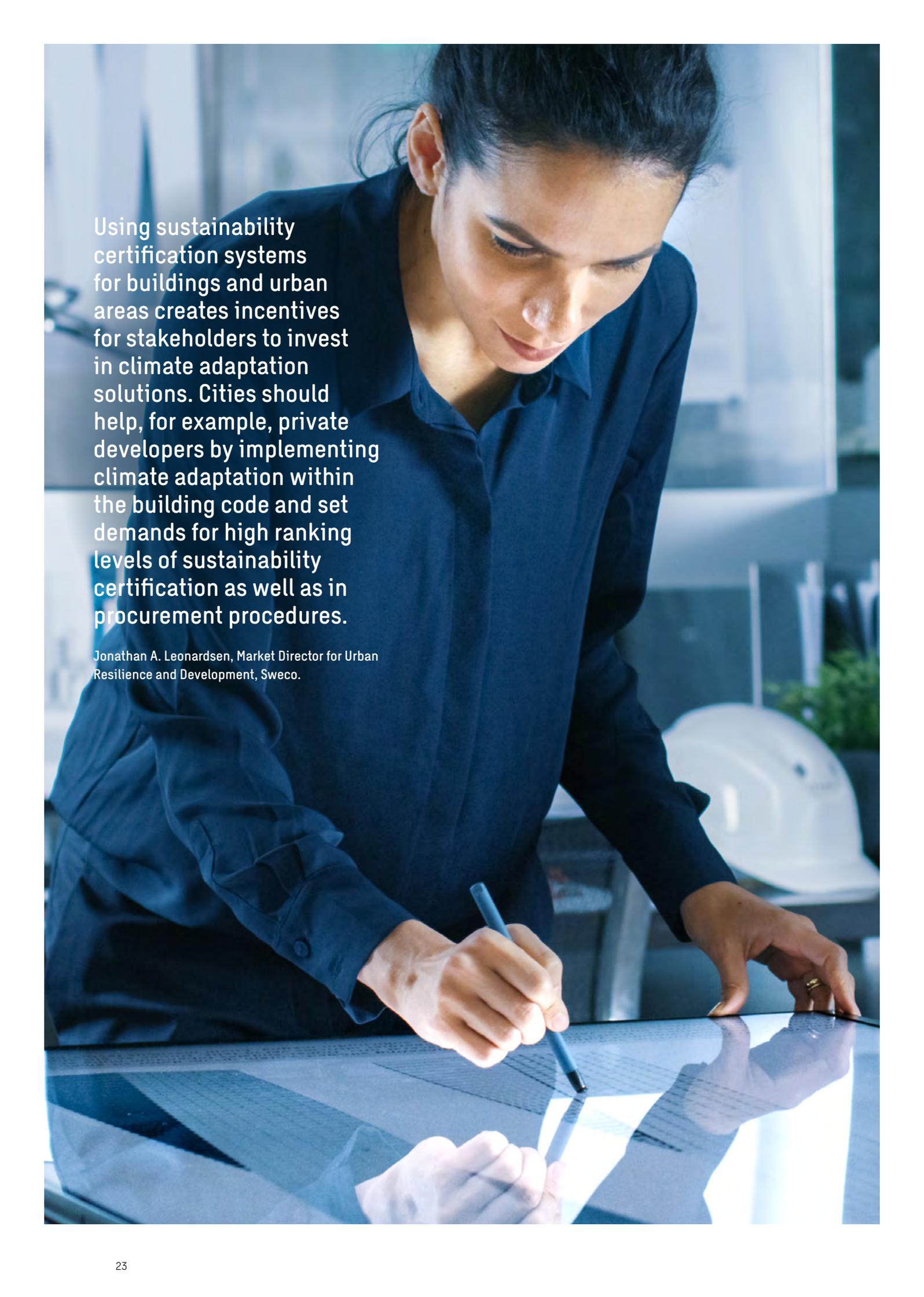
It is critical that we look to expand and translate inventive solutions to the barriers and challenges to the implementation of adaptation measures. By exploring success stories from across Europe's frontrunner cities, an array of these best practices for facilitating acceleration of climate adaptation have been discovered.

They range from creating policy instruments that facilitate experimentation and enforce future-proof standards, to fostering institutions that work collaboratively and plan for uncertainty. Cities should utilise resources that catalyse innovation, work to intelligently monitor adaptation interventions, and allow data-driven learning, improvement and acceleration of best practices within, and between, cities from across the continent. For city decision-makers, stakeholders and citizens themselves, the implementation of climate adaptation measures can be aided and accelerated using these key urban insights.

10 OPPORTUNITIES TO ACCELERATE CLIMATE ADAPTATION IMPLEMENTATION

Based upon our research, we have identified 10 opportunities for accelerating climate adaptation implementation in cities in Europe:

- 1 Build capacities across stakeholders at all levels
- 2 Use digital tools to foster co-creation
- 3 Use policy instruments to accelerate and enforce nature and adaptation
- 4 Embed adaptation in urban building codes and zoning regulations
- 5 Use certification systems to accelerate adaptation in the public and private sectors
- 6 Design smart methods to monitor, evaluate and improve adaptation measures
- 7 Strategize to deal with risks, attaining multiple benefits
- 8 Embrace the dynamic uncertainty of climate change
- 9 Rethink tariffs and funding mechanisms for adaptation
- 10 Invest for the long term using institutional funds



Using sustainability certification systems for buildings and urban areas creates incentives for stakeholders to invest in climate adaptation solutions. Cities should help, for example, private developers by implementing climate adaptation within the building code and set demands for high ranking levels of sustainability certification as well as in procurement procedures.

Jonathan A. Leonardsen, Market Director for Urban Resilience and Development, Sweco.

REFLECTIONS ON THE NEXT STEPS AHEAD FOR THE ADAPTATION AGENDA IN CITIES

Driven by motivated leaders, cities are now frequently working together, in networks like the C40 Cities Group, ICLEI and the Global Resilient Cities Network, to learn from and share with each other. Opportunities for acceleration are not only applicable to large cities. Small and medium-sized cities should look to translate solutions to their local contexts, whether by co-creating solutions with experts from frontrunner cities or targeting niches for funding and knowledge. They should be unafraid to leapfrog towards the implementation of transformative adaptation measures as living labs for innovation and experimentation.

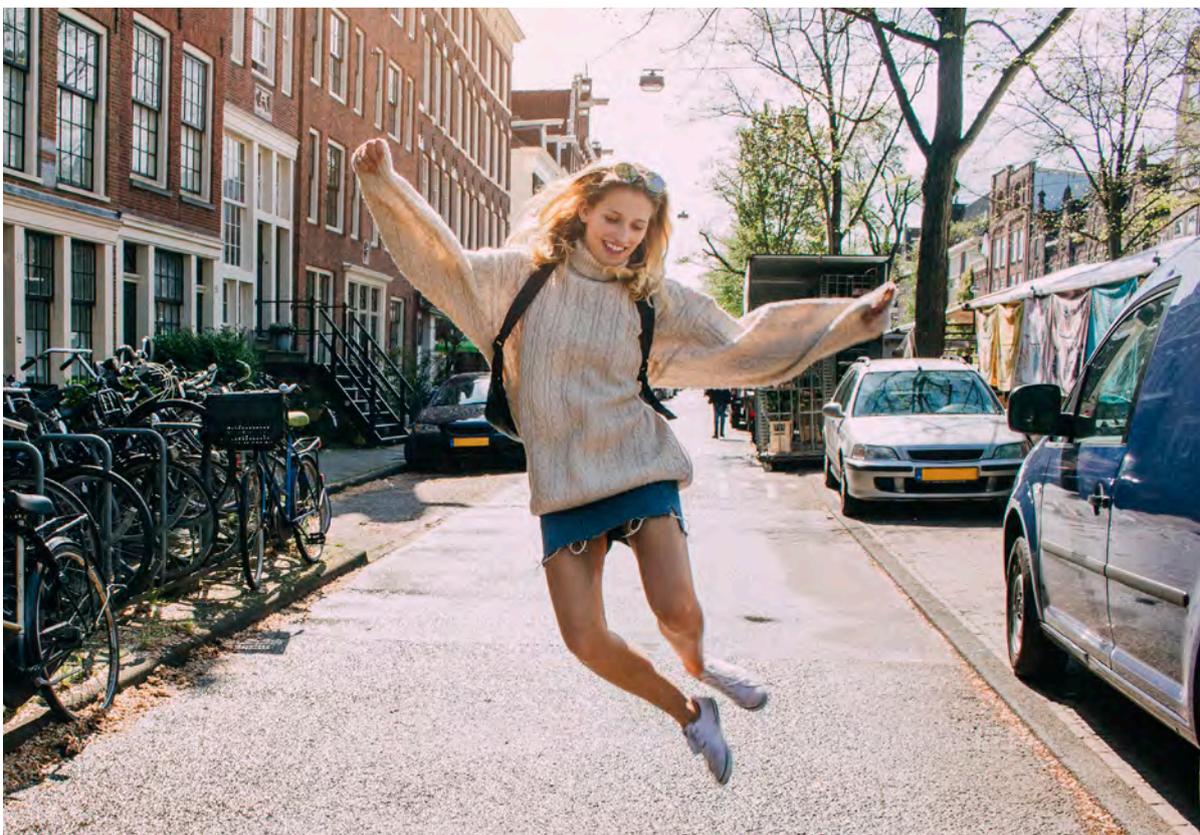
Innovation and experimentation with urban adaptation is taking place at all scales, from grassroots urban farming to new modes of climate policy governance. Increasingly, attention has shifted towards adaptation interventions that tackle multiple challenges, and capacities, within the city. Therefore, it is clear that adaptation should not be tackled by one department within a city, rather cities should work collaboratively and creatively to accelerate change. All examples show that frontrunners have been effective in scaling up solutions, engaging and empowering citizens to break down barriers to capacity building, governance and resources, and being willing to experiment, fail and learn.

Finding synergies between adaptation and other urban challenges to anchor policies and measures as serious priorities are critical steps for accelerating implementation. Indeed, cities should not be satisfied with business as usual in their pursuit of resilience, sustainability and prosperity through the 21st century.

However, it is always difficult to know when you have done enough. As it is difficult to predict the future. How much warmer or wetter will it be? How fast will the climate change? What time perspective should we have in planning?

Christina Salmhofer, Stockholm Royal Seaport

When and whether we will know if we have done enough – only time will tell. But by learning from the best practices of frontrunners, and by working integrated and holistic with adaptation, we maximise the chance of investing in and implementing solutions that will create multiple benefits – for cities, citizens, businesses and nature.



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Urban Insight

Urban Insight is a long-term initiative that provides insights about sustainable urban development, seen from a citizen's perspective. The initiative is built on a series of reports, based on facts and research, written by Sweco's experts. The initiative provides society and decision-makers with facts needed to understand and meet current and future challenges.

This report is part of a series of reports on the topic Climate Action in which our experts highlight specific data, facts and science that are needed to plan and build safe and resilient future urban environments.

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