

# CITY RESEARCH AND INNOVATION AGENDA

## ACCELERATING RESEARCH AND INNOVATION FOR CITIES AND LOCAL GOVERNMENTS

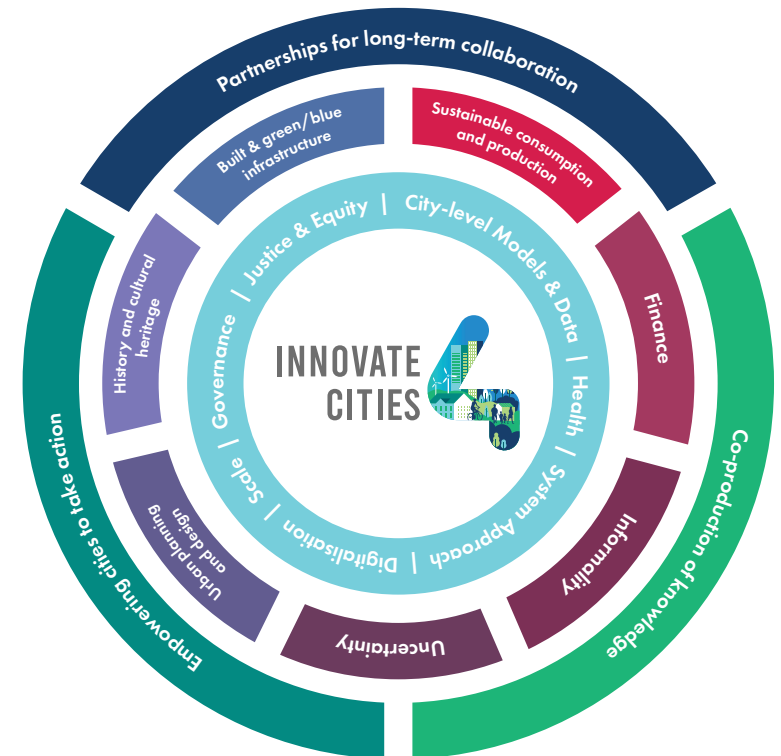
**The science is clear: climate change is the crisis of our time and must be addressed by all sectors of society at unprecedented speed and scale.**

Impactful consensus at the highest levels of international research on climate science have increased recognition of Paris Agreement aims, the Sustainable Development Goals, and the pathways required to achieve them.<sup>1,2,3</sup> Yet current national government commitments are not enough; at the COP26 World Leaders Summit, UN Secretary-General Antonio Guterres highlighted “a deficit of credibility and a surplus of confusion over emissions reductions.”<sup>4</sup> Amidst uncertainty cities and local governments are rising to meet the moment - with more than 11,700 already committed to ambitious mitigation and adaptation action through the Global Covenant of Mayors for Climate and Energy.

***With one voice, the world’s cities are underscoring their role as an effective driving force in implementing the Paris Agreement.***

To deliver accelerated and more ambitious city climate action, it is critical for all levels of government, academia, the private sector, civil society, and other organisations to form transformational, outcome-oriented partnerships.

Built on a cross-sector evidence base,<sup>5,6</sup> the City Research and Innovation Agenda clearly identifies the global and regional priorities that can enable local governments to rapidly and holistically transform ambition into implementation.



**Figure 1:** Themes from the Findings from Innovate4Cities 2021 and Update to the Global Research and Action Agenda (GRAA), 2022: Cross Cutting Themes (inner ring), Topical Themes (middle ring) and Delivery Approaches (outer ring).

# LET'S GET STARTED!

# THE CHALLENGE

Despite growing awareness of the need for transformative climate action – leading to significant emissions reduction, adaptive capacity, increased energy access, and mitigated energy poverty – critical gaps remain between city climate ambition and the large-scale implementation action required to meet the moment.

Massive demographic shifts, technological transformations, budgetary constraints, and the COVID-19 pandemic are remaking the urban fabric. The resulting uncertainty and pressure placed on city decision-making impacts the ability of local leaders to take effective, integrated, and cross-sectoral action at the scale required to safeguard the livelihoods of their residents and achieve – if not exceed – the goals of the Paris Agreement.

# THE OPPORTUNITY

No one sector or organisation alone can realise the actions needed to limit global warming to 1.5°C above pre-industrial levels and avoid its worst consequences. Cities and local governments, however, have established themselves as a driving force and incubator of incisive solutions to complex issues. In the face of unprecedented uncertainty, they wield the potential to catalyse transformative systems change across levels of government and sectors of society.

Delivering on this potential requires a new type of resource: knowledge and innovation. Located on the frontlines of the climate crisis, cities and local governments often act as barometers for life-saving research and action priorities, both in the short- and long-term. Simultaneously they serve as hotbeds for innovative, integrated solutions that cut through complexity and build partnerships across national and regional governments, academia, business, and civil society to address three core pillars: **science and research**, **innovation and technology**, and **city-level data access**.

The City Research and Innovation Agenda identifies and tackles the data, information, and technology gaps that cities have prioritised and, if addressed, would drive science-based, technology-driven, replicable sustainable action and implementation at the scale the world needs and cities demand.



SCIENCE &  
RESEARCH



INNOVATION &  
TECHNOLOGY



CITY-LEVEL  
DATA ACCESS

**Ignite significant momentum** to produce climate change research that is co-designed and co-produced with urban stakeholders on and for cities.

**Drive communicable, evidence-based action and innovation** to increase capacity for knowledge dissemination and enable efficient local government knowledge management frameworks.

**Explore possibilities for locally-scaled climate models** and nurture understanding of what city practitioner needs in scenario modelling.

Innovative technological, social, and institutional solutions must help cities **significantly reduce their emissions and boost their resilience**.

**Scale opportunities, horizontally and vertically**, to help cities catalyse, pilot, and procure new technologies - exploring potential for replication, expansion, and for institutional change.

Unique partnerships and implementation models need to **create solutions for cities of all sizes together with their vulnerable populations** - and enhance equitable global access to technology and innovation.

**Fill data gaps** to allow cities to effectively plan for and measure mitigation, adaptive capacity, resilience and energy access/poverty and evaluate potential solutions.

Call for key data to be **collected and disaggregated** from geospatial and national datasets, where available.

**Develop capacity to request, collect, process and evaluate data** to support a locally-relevant policy and action mix.

# PURPOSE OF THE AGENDA

## UNLOCKING URBAN POTENTIAL

The City Research and Innovation Agenda seeks to fill local-level knowledge, information, and technology gaps at every stage of the city climate action journey.

Sourced directly from local policymakers, city leaders, and practitioners, it highlights today's critical urban climate needs and charts pathways to increase ambition and drive action implementation.



The agenda is organised around city decision-making process, and built on **four priority questions** that cities and their partners ask as they develop and implement their climate action plans:

**1** .....  
**HOW DO WE BUILD THE EVIDENCE BASE FOR CLIMATE ACTION?**

**2** .....  
**HOW – AND FOR WHOM – SHOULD WE PRIORITISE?**

**3** .....  
**WHAT SHOULD WE DO?**

**4** .....  
**HOW DO WE FINANCE & SCALE CLIMATE ACTION?**

# CITY AGENDA: RESEARCH FOCUS

## 1 HOW DO WE BUILD THE EVIDENCE BASE FOR CLIMATE ACTION?

**Cities and local governments need data and information to understand the detrimental effects of climate change on their communities, ecosystems, and the interlinked impacts between local, regional, and global systems.** More than 11,700 cities and local governments are willing to take action, yet many lack the critical data, tools, and knowledge to produce action-oriented insights. Successfully identifying and justifying options (including nature-based solutions and social innovations) requires access to information, expertise, and local-level data on climate change science, impacts on local communities and ecosystem services, and the timelines within which action is necessary to address challenges.

## 2 HOW – AND FOR WHOM – SHOULD WE PRIORITISE?

**Cities and local governments face ever-increasing pressure to make climate-safe decisions that simultaneously secure prosperity for residents.** In both data-rich and data-poor contexts, local officers need efficient scenario planning tools and processes that incorporate impacts across key local government departments to arrive at evidence-based policy recommendations. Cities and local governments often lack the data and governance frameworks that enable comprehensive consideration of vulnerable populations, broader community engagement, and cross-cutting policy packages to help ensure inclusive and equitable climate action that maximises societal co-benefits. Innovative solutions that adapt to changing circumstances and scenario inputs can empower local leaders to react quickly while retaining scientific and political effectiveness in both the near- and long-term.

## 3 WHAT SHOULD WE DO?

**In many cases, cities and local governments lack information on policy options and examples of successful implementation of known solutions – much less innovative approaches which carry significant risk and reward potential.** Understanding the research and innovation needs of local governments – including mixed policy packages that incorporate known sectoral approaches with cutting-edge innovation – is paramount. Where cities can plan and play strong roles in reducing emissions, building resilience, and managing energy supply, collaboration with cross-sectoral partners and other levels of government is vital to ensuring a holistic systems approach, action impact, and policy sustainability. Gaps in technology and information must be filled to enable city planning for innovative action implementation – as well as employing innovation in the governance processes that can move local governments forward in their climate action journeys.

## 4 HOW DO WE FINANCE & SCALE CLIMATE ACTION?

**The Cities Climate Finance Leadership Alliance (CCFLA) estimates that cities only received seven percent (7%) of the USD 4.5-5.4 trillion (EUR 3.9-4.7 trillion) needed to realise the full pipeline of city climate action.**<sup>7</sup> Financing and investment can be difficult to access, especially for small and mid-sized cities; unlocking them requires close collaboration with other levels of government, development agencies, and financial institutions. A clear understanding of available financing mechanisms at local, national, and international levels – as well as increased local capacity for their use and the development of succinct project proposals – are key to ensuring that city climate finance is available, sustainable, and scalable.

# CITY AGENDA: R&I PRIORITIES

1

## HOW DO WE BUILD THE EVIDENCE BASE FOR CLIMATE ACTION?

Evidence is required to progress decision making in cities and provide a rationale to act.

- **Generate city scale data** for development of specific observation, models, and scenarios.
- **Communication of uncertainty and risk of climate hazards for cities.**
- **Reduce the gap in climate relevant data** on vulnerable communities.
- **Equitable development and dissemination** of knowledge and data inclusive of co-design and co-production through collaborative partnerships across public and private sectors, and civil sectors (including youth, Indigenous populations and other marginalised individuals).
- **Calculation and communicate** of economic and health effects of action vs. inaction.
- **Measures to value** a wide range of climate and societal co-benefits of climate solutions.

2

## HOW – AND FOR WHOM – SHOULD WE PRIORITISE?

Local context needs to be built into the knowledge generated to enable cities to prioritise and act to reduce impact and increase benefits for vulnerable communities.

- **Understand the mitigation and adaptation potential of city actions**, including implications for social equity and justice
- **Evaluate combinations** of high-tech and low-tech innovation.
- **Determine how to incorporate informal settlements and their residents** in urban planning strategies.
- **Use of social science** in engaging a broad group of stakeholders in new initiatives from planning through implementation.
- **Explore incentives for municipal employees** to innovate and take risks with transformative decisions.
- **Investigate emerging social innovations** in cities that could be exported globally to scale solutions.
- **Develop flexible and distributed/networked solutions** that can be expanded or changed as innovation progresses or financing allows.
- **Explore effective governance frameworks** to facilitate city-led research and innovation, including creating space for learning-by-doing and learning-from-failure.

3

## WHAT SHOULD WE DO?

Research priorities on topical areas that are most important entry points for city action.

### URBAN PLANNING & DESIGN

- **Assess planning policies and prioritise actions** to help mitigate urban heat island effect.
- **Quantify potential and chart implementation pathways** for blue/green infrastructure and nature-based solutions to reduce emissions, build adaptive capacity and resilience, provide co-benefits, and address issues of biodiversity.
- **Mainstream climate change action planning into city decision making**, integrating mitigation and adaptation into comprehensive planning and budgeting processes.
- **Explore adaptation and resilience in cities through culture and history** to better understand their impact on climate action today.

### BUILDINGS

- **Identify a strategic approach to retrofitting** city building stock based on building typology to reduce emissions.
- **Develop policy** to set new building standards and accelerate uptake of efficiency benchmarks.
- **Quantify emissions and energy savings potential** for deep energy retrofits of all buildings within the municipality and incorporation of digital tools to support emission reduction and boost systems' efficiency.

### ENERGY

- **Evaluate balance between connected vs. distributed renewable systems** based on access and reliability.
- **Assess energy efficiency increase** through use of micro grids.
- **Understand impact of scope 3 emissions** in urban mitigation planning and how this can be best incorporated into urban climate plans.

### WASTE

- **Evaluate benefits** of diversion and recycling considering supply and demand.
- **Better understand how sustainable consumption habits** can be fostered.
- **Explore potential for circular economy** approach throughout city systems, and how these may differ in developed and developing cities.
- **Communicate community benefits** of controlled landfilling to build understanding and buy-in of waste collection systems.

### WATER

- **Assess solutions** to address the urgency of water-scarcity, pollution, and allocation in cities and their related ecosystems.
- **Explore connections** between water, energy and materials to develop sustainable solutions in urban areas.

### TRANSPORTATION

- **Explore how digital infrastructure can be built into transit systems** to connect public and private transit technology.
- **Explore how urban plans** can be shaped to reduce vehicle miles travelled and support active/shared transit.

4

## HOW DO WE FINANCE & SCALE CLIMATE ACTION?

Policy and finance instruments to promote large scale uptake of solutions that account for time-scale differences in local decision-making processes.

### FINANCING

- **Collaboration and capacity building** to develop bankable projects and increase creditworthiness to de-risk investment.
- **Increase focus on understanding the finance adaptation gap for cities**, including short and long term financial needs for nature-based solutions.
- **Increase understanding of potential for digital financing** - including crowd-sourcing, digital green bonds, and others - to fund city-scale projects.

### GOVERNANCE

- **Governance landscapes** (considering formal and informal actors) to support greater generation of municipal revenue and which support groups marginalised due to gender, age, race, ethnicity, religion, indigenous status and disability.

### PUBLIC PROCUREMENT

- **Strategic methods for awarding projects** which prioritise sustainability, circular economy, and resilient low-emission roadmaps in urban solutions.

### FOOD

- **Support community-based and entrepreneurial innovation** in climate smart food systems.
- **Further understanding is needed on potential for urban agriculture** in terms of climate change mitigation and local food security.

# CRAFTING A REGIONALLY-RESPONSIVE AGENDA

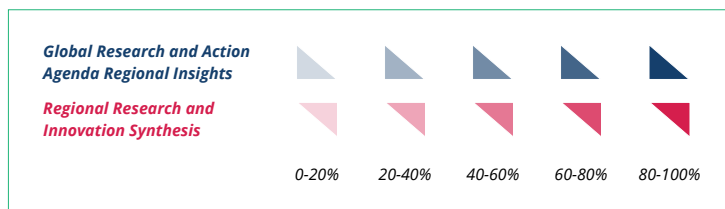
The Global Covenant of Mayors for Climate and Energy (GCoM) is comprised of Regional and National Covenants: specific alliances and partnerships across countries who coalesce under the banner of the Global Covenant with the intent of meeting region-specific needs and priorities.

2021 analysis<sup>8</sup> of research and innovation priorities across GCoM Regional and National Covenants points towards a critical need for city-scale data and climate financing in developing country contexts. Moreover, GCoM signatories highlight a need to focus on generating climate-relevant data around vulnerable communities – especially those in Latin America and the Caribbean, Oceania, Sub Saharan Africa, Eastern Europe and Central Asia, and Southeast Asia, where some of the largest impacts of climate change can be felt.

Leveraging a regionalised City Research and Innovation Agenda that localises the critical gaps and priorities that need to be met – as well as taking the necessary steps to strengthen it over time – will be key to ensuring that resources for R&I are directed to the cities and local governments who need it most.

The **Regional Research and Innovation Synthesis** is represented in **red**, where shading intensity indicates the share of respondent cities in-region who selected that specific priority insight. The **Global Research and Action Agenda Regional Insights** are marked in **blue**, highlighting the percentage of total 'tags' allocated by a region to a specific priority insight.

Regions <sup>9</sup>	AFR	EA	EECA	EUWE	LAC	MEWA	NA	OCE	SA	SEA
Generation of city-scale data										
Innovative strategies for financing climate action										
Urban planning strategies for vulnerable communities and informal settlements										
Climate relevant data on vulnerable communities										
Green infrastructure opportunities to improve air quality										
Role of digitization, cloud computing, and mobility in climate action										
Public procurement methods that prioritise sustainability										
Waste management and closed loop systems										
Water scarcity and management best practices										
Promotion and application of social entrepreneurship and innovation										



# FROM AGENDA TO ACTION

While opportunities for local action are becoming more cost-effective and best practices more accessible, cities and local governments continue to face significant challenges in responding to climate change. Institutional capacity, knowledge, finance, technology, and data gaps present real limitations, hindering the transition from climate ambition to successful implementation.

The GCoM alliance of cities, local governments, and their partners aim to advance the **City Research and Innovation Agenda**, maintaining it as an ever-evolving set of priorities and partnerships that will be refined through ever-broader engagement as research questions are answered and data gaps are filled while new opportunities emerge. The Global Covenant welcomes partners within and beyond the alliance to come together under the Innovate4Cities banner and craft innovative solutions that can accelerate city climate action, boost cross-sector and national prosperity, and secure a safe and sustainable world.

**Multi-sector collaboration is critical, and the world is beginning to mobilise:**



## NATIONAL GOVERNMENTS

GCoM, the European Commission Directorate-General for Research and Innovation, and Joint Programmes Initiative (JPI) Urban Europe are co-leading the Urban Transitions Mission under Mission Innovation, with the goal of delivering at least 50 large-scale, integrated demonstration projects in urban environments around the world by 2030. National governments are stepping up and momentum is critical to ensure national prosperity through urban sustainability. Dedicating up to one-third of national R&I budgets to city climate action priorities can help deliver stronger vertical alignment, leverage cities as testbeds for innovative solutions, and set the foundation for transformative systems change.



## PRIVATE SECTOR

Rising to the challenge, the private sector is sharing its intellectual property, expertise and investment into urban climate change solutions. Continued – and strengthened - partnership with cities and local governments can develop institutional and technological solutions that can be piloted, with pathways for scalability. Proven solutions can drive further funding for research and innovation to mature new processes and technologies, unlocking access to the critical data and tools local governments need today.



## ACADEMIA

Recognizing the need to fill critical knowledge gaps and to co-design research questions and solutions to climate change in urban areas, academia are critical partners in the Innovate4Cities roadmap. Building on the Innovate4Cities 2021 Conference – which brought together more than 7,000 participants and 500 speakers from 159 countries – students and academics of all backgrounds reinforced their role in reevaluating and strengthening research priorities to fill evolving gaps. Continued and accelerated recruitment of students to climate change-related studies – as well as mainstreaming climate education across programs at primary, secondary, and tertiary levels – are critical to nurturing the next generation of problem-solvers and experts.



## GLOBAL COVENANT OF MAYORS FOR CLIMATE AND ENERGY

Built by global and local city networks - and now including 11,700+ city signatories across 6 continents and more than 140 countries, representing 1 billion people or roughly 13% of the global population - GCoM will continue to drive the INNOVATE4CITIES initiative as one of its three primary initiatives. Research and Innovation Technical Working Group are committed to facilitating opportunities and building collaborative projects to fill the research gaps identified in the City Research and Innovation Agenda.

# REFERENCES

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- 7 2021 State of Cities Climate Finance Report. Cities Climate Finance Leadership Alliance, 2021.
- 8 Hadfield, P., Oke, C., & Verbeeck, J. (2021): Regional Research and Innovation for City Climate Action: Global Synthesis Report. University of Melbourne. Online resource. <https://doi.org/10.26188/14743125>
- 9 AFR = Africa  
EA = East Asia  
EECA = Eastern Europe and Central Asia  
EUWE = European Union and Western Europe  
LAC = Latin America and the Caribbean  
MEWA = Middle East and West Asia  
NA = North America  
OCE = Oceania  
SA = South Asia  
SEA = Southeast Asia

Figure 1 on first page: modified from original Graphic design by Amanali Cornejo V (WCRP GRAA report 2019 with appropriate permissions). Themes from the Findings from Innovate4Cities 2021 and Update to the Global Research and Action Agenda (GRAA), 2022: Cross Cutting Themes (inner ring), Topical Themes (middle ring) and Delivery Approaches (outer ring).

This is an updated version of the 2018 City Research Agenda located at [www.globalcovenantofmayors.org](http://www.globalcovenantofmayors.org)

## Suggested citation:

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## MISSION STATEMENT

*The Global Covenant of Mayors serves cities and local governments by mobilizing and supporting ambitious, measurable, planned climate and energy action in their communities by working with city/regional networks, national governments and other partners to achieve our vision.*

## ABOUT US

*The Global Covenant of Mayors for Climate and Energy (GCoM) is the largest global alliance for city climate leadership, uniting a global coalition of over 11,700 cities and local governments representing over 1 billion people and 100+ supporting partners. The cities and partners of GCoM share a long-term vision of supporting voluntary action to combat climate change and towards a resilient and low-emission society. GCoM serves cities and local governments by mobilizing and supporting ambitious, measurable, planned climate and energy action in their communities by working with city/regional networks, national governments, and other partners to achieve our vision.*

*The Global Covenant of Mayors is co-chaired by Frans Timmermans, Executive Vice President for the European Green Deal at the European Commission, and Michael Bloomberg, UN Secretary-General's Special Envoy for Climate Ambition and Solutions, and Founder of Bloomberg LP and Bloomberg Philanthropies. [www.globalcovenantofmayors.org](http://www.globalcovenantofmayors.org).*