Progress and Challenges in the
Urban Governance of Climate Change

Results of a Global Survey

Credits

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Executive Summary

Urban responses to climate change are entering their third decade. The potential for cities to lead in the field is now widely recognized. Efforts that began with a narrow focus on energy efficiency and mitigation are becoming increasingly ambitious, and have also expanded to include adaptation. Simultaneously, cities are moving climate change out of a narrowly environmental silo and attempting to mainstream it across the municipal bureaucracy. Some are also involving civil-society and private actors in climate planning and implementation. But important barriers remain. Current understandings of these issues are based on a variety of case study and best-practice literatures that provide detailed insights into specific localities, but are unable to identify regional and global trends. To gain access to this broader perspective, a survey was conducted among over 700 communities that are members of ICLEI – Local Governments for Sustainability. This survey explored the state of adaptation and mitigation planning globally, the challenges cities are facing, and the way that networks connecting multiple different players (municipal, community-based, and business) influence how climate policies are designed and implemented. A total of 350 cities (48%) responded to the 69 question survey. The majority of respondents were from the United States where ICLEI has its largest membership.

Local Responses to Climate Change

In total 75% of cities worldwide report that they are engaging with both adaptation and mitigation. Just under 24% are focused exclusively on mitigation. The United States is the one notable exception, with 58% of cities reporting that they engage with both adaptation and mitigation, and the highest percentage of cities conducting only mitigation planning (41%). Rather than producing isolated climate change plans, cities report that they are increasingly building climate change into other local government plans (i.e. sectoral, long range, or sustainable development plans). Canadian cities have made the most progress in this direction, while African and American cities report the lowest rates of integrating climate change into other municipal plans.

Eighty-five percent of cities worldwide have conducted an inventory of local greenhouse gas emissions. An ambitious minority (15%) are including in their inventories some portion of the upstream emissions related to the goods and services consumed within the city. Seventy percent of cities report that their mitigation efforts have produced measurable emissions reductions. The most common areas where local governments reduce emissions are those under their direct control (i.e. local government buildings and vehicle fleets). The least common are reductions made in emissions coming from the private sector, with only 23% of cities reporting reductions among local businesses.

Motivations and Competing Priorities

The top three motivations that cities report for initiating climate change mitigation planning are: to demonstrate leadership globally, nationally, or regionally (66%); to promote sustainable

urban development more generally (57%); and to improve community quality of life (53%). Forty percent report being motivated by an understanding of local climate related risks.

Local responses to climate change must function within the broader context of multiple other development priorities. There is a growing literature on the potential synergies between climate change policies and other urban development goals, but examples of this in practice appear to be rare. Respondents report that mitigation policies contribute little or nothing to their ability to meet goals in other areas. The two exceptions to this are priorities related to increasing local sustainability, and increasing access to basic services which are both seen to work in synergy with mitigation programs. Africa was the only region where a large percentage of cities (100%) report mitigation programs make important contribution to meeting local economic goals.

Urban Climate Change Planning

Globally, 63% of cities report that they have between 1 and 5 staff members whose core responsibility is climate change planning. North American cities are the most likely to report having only one staff member. Sixty-one percent of cities report that their mitigation plans are created with regular input by other municipal agencies throughout the planning process. The two exceptions to this are Africa and Asia, where a majority of cities report carrying out mitigation planning in an isolated fashion (64% and 51% respectively). The agencies that contribute most heavily are those responsible for environmental planning, land-use planning, solid waste management, water, and transportation. Those that contribute the least are the locally operated electrical utility (where these exist), and the agencies responsible for health, and economic development.

Challenges in Planning and Implementation

Cities report that their climate change planning and implementation work faces multiple significant challenges. Foremost among these are financial challenges. A lack of funding for implementing projects and programs is a significant challenge for 78% of cities. A lack of funding to hire sufficient staff to work on climate change affects 67% of cities.

Competing priorities (in areas such as health, nutrition, housing, sanitation, and economic growth) are the second most significant challenge experienced by cities (76%). As cities work to integrate climate change planning across municipal agencies, many also report important difficulties incorporating climate change into existing departmental functions and procedures. Encouragingly though, few cities cite a lack of leadership from mayors, senior officials, and other levels of government as important barriers to their climate change work. The main exception to this are Canadian cities, which report the highest rates of being affected by a lack of strong leadership from senior management (53%) and from regional or national government (73%).

External Partners

Civil society and private sector groups can play an important role in helping design and implement local responses to climate change. Cities report that civil society groups are already acting as valuable partners in urban responses to climate change. Fifty-seven percent report that these groups have lobbied government for strong climate change action, and 55% report that they are actively engaged in provided input into local government climate

change policy making. On these and other metrics of engagement the private sector trails far behind. Only 26% of cities, for example, report that the private sector has actively engaged with local climate change planning. Rather than strong opposition, results here point to a more neutral disengagement with the issue of climate change on the part of local business and industry.

Enablers of Planning and Implementation

The top three factors that enable local governments to design and implement their mitigation strategies are: (1) leadership from the mayor or senior elected officials; (2) leadership from senior management, and; (3) support from various types of local government networks (such as ICLEI). The next three most important enablers all relate to obtaining adequate funding for climate change programs, and staff. Access to information on local emissions and the local impacts of climate change are also signaled as important enablers by 40% and 32% of cities, respectively.

Conclusions

The survey results show both the evolution of urban responses to climate change and the significant challenges that cities still have before them. Cities are pursuing climate change planning in an integrated fashion and mainstreaming it across local government agencies. They are conducting their planning in a collaborative manner, enabled by strong leadership and support from local government networks.

Simultaneously, the strongest cross-cutting finding in the survey is the lack of engagement of economic actors (both public and private) in urban responses to climate change. What cities can accomplish will necessarily be limited if they do not effectively connect economic and environmental priorities, and actively incorporate economic actors into local networks of urban climate governance. The lack of synergies in this area is the most severe example of a general inability to effectively link mitigation policies to other local development priorities. Finally, many cities have yet to build strong partnerships with the civil-society and private sectors. Addressing these issues may help cities reduce the impact of the limited financial and human resources available to address climate change.

Introduction: Objectives and Methodology

Urban responses to climate change are entering their third decade. The potential for cities to lead in the field is now widely recognized. Initially narrow efforts focused on energy efficiency and mitigation are becoming increasingly ambitious, and have expanded to include adaptation. Simultaneously, cities are moving climate change out of a narrowly environmental silo and attempting to mainstream it across the municipal bureaucracy. Some are also involving civil-society and private actors in climate planning and implementation.

But important barriers remain. Current understandings of these issues are based on a variety of case study and best-practice literature that provides detailed insights into specific localities, but is unable to identify regional and global trends. To gain access to this broader perspective, a survey was conducted among over 700 communities that are members of ICLEI – Local Governments for Sustainability. This is the first systematic study of this scale to look at how cities are approaching climate change planning and implementation. It provides an overview of who is involved in addressing climate change, what measures they are taking, what barriers they are facing, and how they are resolving them. It also explores how climate change work overlaps with other local government priorities and responsibilities. The study covers both adaptation and mitigation efforts. Mitigation receives proportionally more attention in order to compliment an earlier adaptation-focused report, also released in collaboration with ICLEI (see Carmin, Nadkarni, and Rhie 2012).

This report summarizes key findings that arose from the survey. It describes how ICLEI members are approaching climate change planning and implementation, the types of governance structures they have put in place, their accomplishments and challenges to date, and key enablers of their work. It also highlights areas where increased attention and support could allow them to be more efficient and effective in their responses to climate change.

Governance and Local Responses to Climate Change

Urban areas occupy a unique space in terms of the causes and the impacts of climate change. Cities are responsible for between 30% to 70% of global greenhouse gas emissions (Satterthwaite 2008) and consume roughly 60% of the world's energy (van der Hoeven 2012). At the same time, the projected impacts of climate change show that urban populations and infrastructure around the world are at significant risk (Carmin, Nadkarni, and Rhie 2012, Hunt and Watkiss 2011, IPCC 2014). As a result, local governments have emerged as important players in global efforts to mitigate greenhouse gas emissions and to enact adaptive policies to protect both people and assets.

Often beginning with low-hanging fruit like increasing the energy efficiency of local government assets, many cities are now aiming to reduce a broad array of emissions linked to transportation, urban form, residential and private buildings, and waste management. In addition to work on mitigation, cities are now also putting in place adaptation plans aiming to protect residents and urban

infrastructure from the impacts of climate change. Rather than producing single isolated plans, they are also mainstreaming their climate change work into plans across the various agencies that govern, build, and maintain our urban spaces.

This is a significant shift. Rather than the regulation of climate change by a single local government agency, we are seeing governmental and non-governmental actors working together within broad networks of urban climate change governance (Aylett 2011, Brownill & Carpenter 2009, Bulkeley 2010). This is a response to the fact that both emissions and vulnerabilities are distributed across the urban landscape in a way that makes it impossible for effective responses to be based on the isolated work of any one group or agency.

Understanding how these networks of governance function – and how they could function more effectively – means paying attention to processes of institutional design, alliance building, collective innovation, and collaborative implementation. The internal dynamics within and between municipal agencies can have a determining impact on local transitions to more resilient low-carbon cities (Roberts 2008). Key as well are the contributions made by other scales of government, civil-society groups, and the private sector (Aylett 2013, Bulkeley et al. 2011, While et al. 2004).

Governance and Resilience

This governance-focused approach to understanding local responses to climate change is also central to discussions of urban resilience. In the context of climate change, urban resilience refers to the ability of urban systems to withstand, adapt to, and recover from climate related hazards. This applies to social and institutional systems, as much as to the brick and steel of urban infrastructure. Increasing the disaster-resistance of transportation or energy systems, for example, is crucial. But so too is increasing the ability of urban institutions and networks of governance to practice adaptive management, integrate new ideas, support innovation, and coordinate active collaborations between different stakeholders (Evans 2011, Folke 2006, Leichenko 2011, World Bank 2009). These socio-institutional factors increase urban resilience by broadening the base of information and resources available to plan for and respond to disturbances, enhancing governance systems by expanding and strengthening collaborative relationships between different actors, and increasing the flexibility of established systems to create and test new ideas and policies.

Survey Methodology

In the spring of 2013 a survey was sent to communities around the world that were currently members of ICLEI – Local Governments for Sustainability. The survey questionnaire was composed of 69 questions divided into 6 sections: (1) basic characteristics of local government climate change initiatives; (2) institutional structures for addressing climate change; (3) the mainstreaming of climate change; (4) challenges to planning and implementation; (5) engagement of non-governmental and non-local groups with planning and action, and; (6) location characteristics.

The survey questionnaire was reviewed for content and clarity by ICLEI staff members in Europe, Africa, and Asia, and urban climate change researchers in North America and Europe. The final questionnaire was translated into French, Spanish, and Korean.

ICLEI members around the world were then invited to participate in the survey. All direct communication with respondents was conducted by e-mail, with supporting publicity for the survey included in ICLEI's iNews newsletter. First contact was initiated with an introductory e-mail explaining the aims of the research and containing a link to the on-line survey. This e-mail also offered respondents the opportunity to receive the survey as a document, and to opt-out of future e-mails. Non-respondents, or respondents who had only completed a portion of the survey, were sent reminder e-mails at two-week intervals, as well as 72 and 24 hours before the on-line survey closed. As an additional incentive to complete the survey, respondents were entered into a draw for one of three tablet computers. These communications were carried out in English, French, Spanish, or Korean, according to the language that was most commonly spoken in the destination country.

After correcting for inaccurate contact information and removing ICLEI members who were not representative of local governments (regional associations for example), 736 communities received an invitation to participate in the survey. In total 350 (48%) of these responded to the survey, and 264 (36%) completed the entire survey. American cities account for the largest number of survey responses (in line with the large number of ICLEI members in the USA); they were followed by cities in Europe, Australia and New Zealand, Asia, Latin America, Canada, and Africa (see Table 1). Response rates were highest in Canada, followed by Latin America, Australia & New Zealand, the United States, Europe, Asia, and Africa.

Notes on the text: In the results presented below all percentages have been rounded to the nearest percentage point. This research covers both adaptation and mitigation. These are referred to individually when specific results apply only to one or the other. To avoid repetition, I have used to phrases "climate change planning" to denote both adaptation and mitigation together.

TABLE 1 | NUMBER OF SURVEY RESPONSES AND RESPONSE RATES BY REGION

	Contacts	Responses	Response Rate
Canada	26	17	65%
Latin America	41	22	54%
Australia & New Zealand	87	45	52%
USA	292	141	48%
Europe	152	69	45%
Asia	97	42	43%
Africa	41	14	34%
Global	**736**	**350**	**48%**

II Local Government Responses to Climate Change: A Global Overview of Planning and Action

After more than two decades of work on urban climate mitigation, there is still no accepted common metric to gauge the scope and scale of urban mitigation plans and actions. To provide a clear picture of the current state of urban mitigation efforts, the survey asked respondents a series of questions covering the defining aspects of their plans and actions. This included information on the scope and frequency of emissions inventories; the type, number, and institutional location of climate relevant plans; the areas where local governments have made measurable emissions reductions; and the history and evolution of climate change planning in the municipality. It also engaged with the way in which cities view the relationship between adaptation and mitigation. Taken together these responses create a detailed portrait of the current state of local responses to climate change.

The Focus of Local Responses to Climate Change: Mitigation & Adaptation

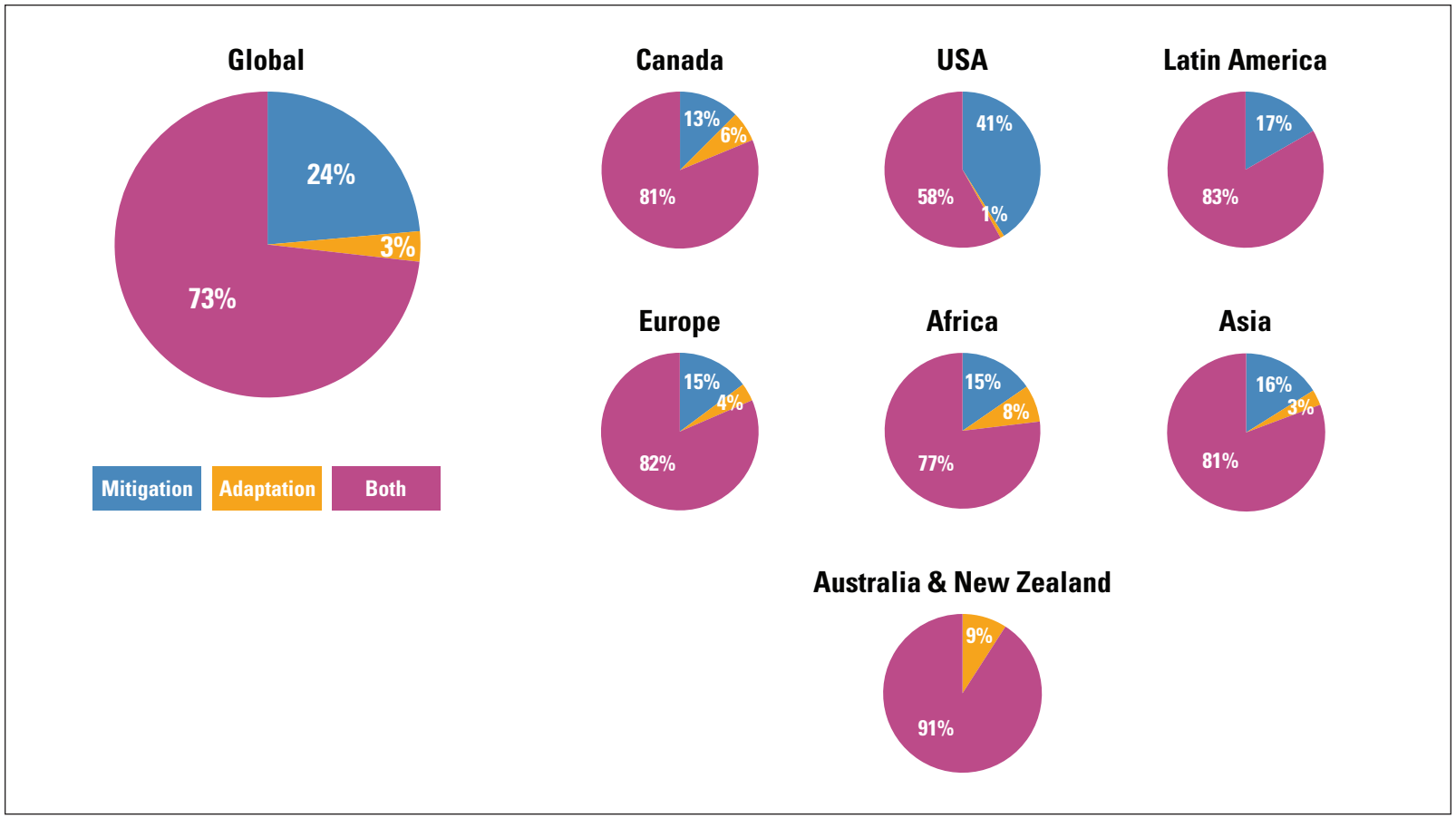
The survey asked respondents to identify the focus of their local government's engagement with climate change. In total 73% of respondents stated that their engagement was focused on both adaptation and mitigation. Just under 24% reported a focus solely on mitigation, and only 3% reported that engagement was focused on adaptation. Looked at regionally we see a generally stable level of performance in terms of the number of cities conducting both adaptation and mitigation planning, as can be seen in Figure 1. Australia and New Zealand lead (91%), followed by Europe (82%), Canada (81%), Asia (81%), and Africa (77%). The one area where there is a stark difference is in the United States, where only 58% of cities report engaging with both adaptation and mitigation. The United States is also the country with the highest percentage of cities conducting only mitigation planning (41%).

When asked about the relationship between adaptation and mitigation planning, 92% of respondents report treating the issues in an integrated way that takes into consideration the synergies and conflicts between planning in the two areas. The overall picture that emerges from these responses is of a strong majority of cities engaging with both adaptation and mitigation, and conducting their planning in these areas in an integrated fashion. This calls attention to how rapidly adaptation planning has come to establish itself in a policy space previously dominated by mitigation plans.

Integration of Climate Change Plans Across Local Government Planning

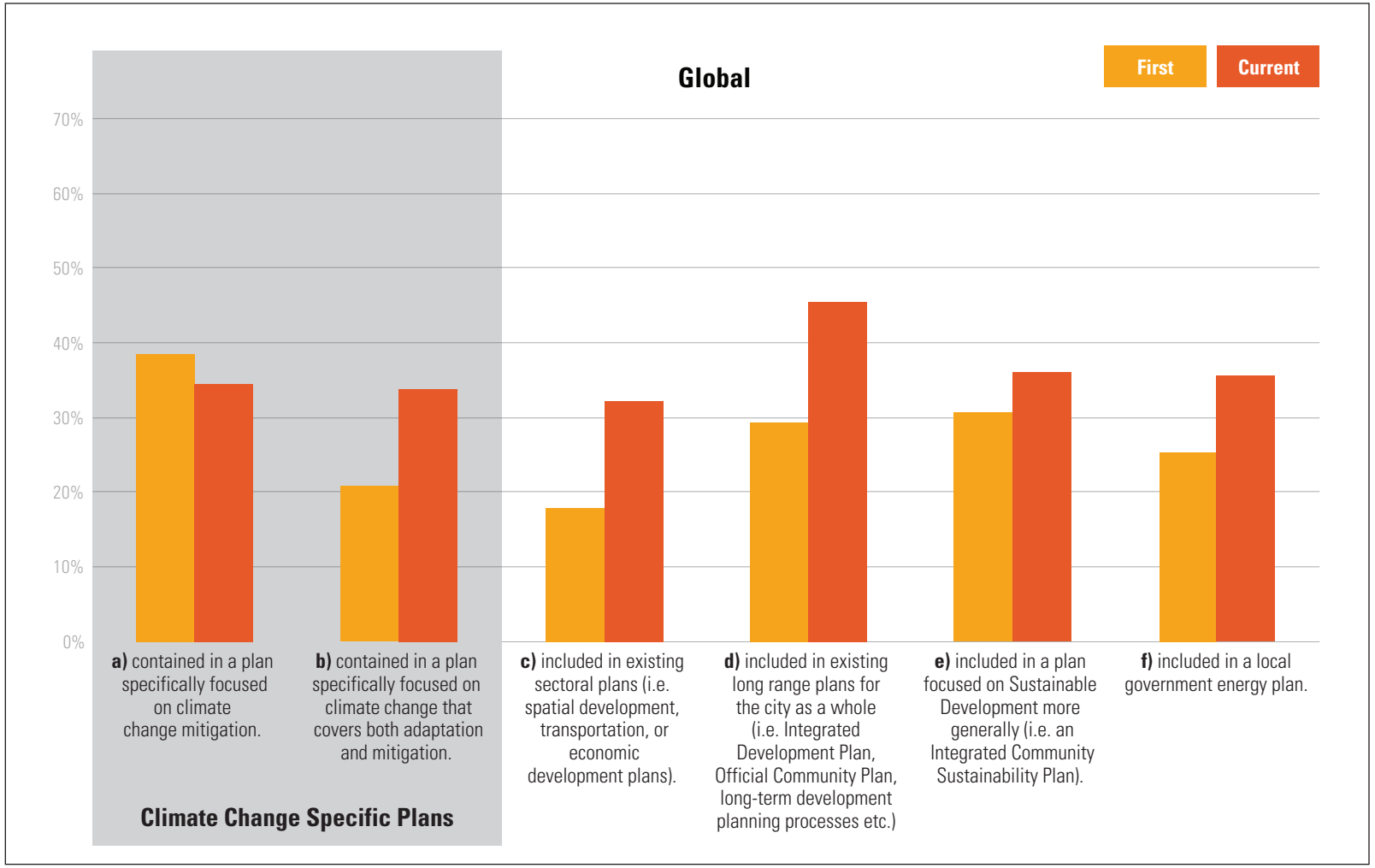
To better understand how local governments are carrying out climate change planning (for both adaptation and mitigation), respondents were asked to select from a variety of options describing the position of climate related plans in relation to other local governments plans (i.e. sectoral, long range, or sustainable development plans). Respondents were asked this question for their current climate change plans, as well as for the first climate change plans produced by their local government. Recognizing that

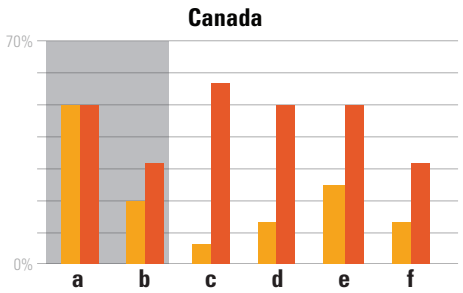
FIGURE 1 | FOCUS OF CLIMATE CHANGE PLANNING AND ACTION



local governments may conduct climate change planning in more than one area within local government structures, respondents were able to signal all areas where they had mitigation or adaptation plans. A city may have, for example, a plan focused specifically on climate mitigation and also have included climate change as a planning variable within their spatial development plan.

FIGURE 2 | CLIMAGE CHANGE PLANS: FIRST AND CURRENT MITIGATION PLANS COMPARED

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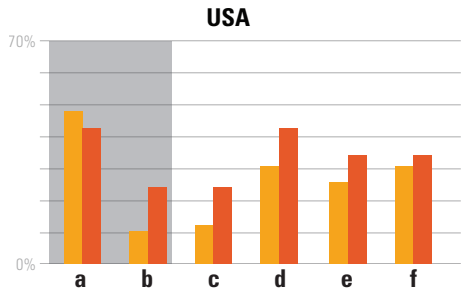
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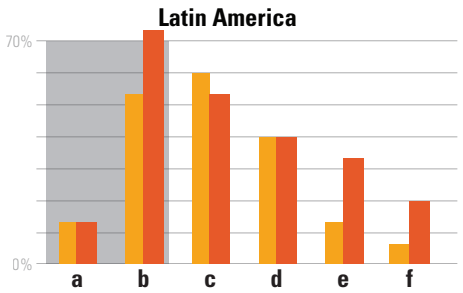
Latin America
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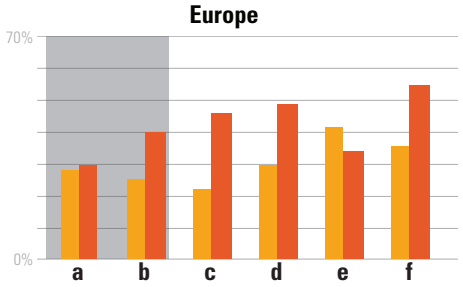
Europe
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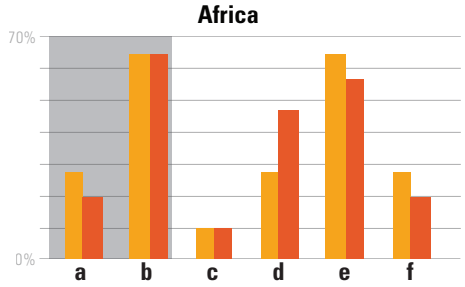
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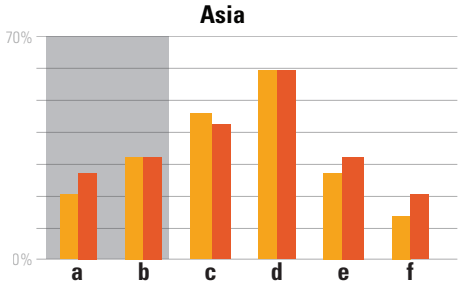
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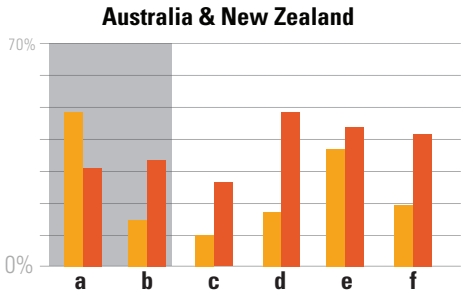
Australia & New Zealand
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For their current plans, respondents report a dominance of plans that are integrated into other types of plans across the municipality. The most common (46%) are plans that are included in existing long range plans for the city as a whole (i.e. Integrated Development Plan, Official Community Plan, long-term development planning processes, etc.). This is followed by climate plans that are included in broader sustainable development plans (36%), and those (32%) that are included in existing sectoral plans (i.e. spatial development, transportation, or economic development plans). Only 34% of mitigation plans and 39% of adaptation plans are described as being "contained in a plan specifically focused on climate change adaptation and mitigation."

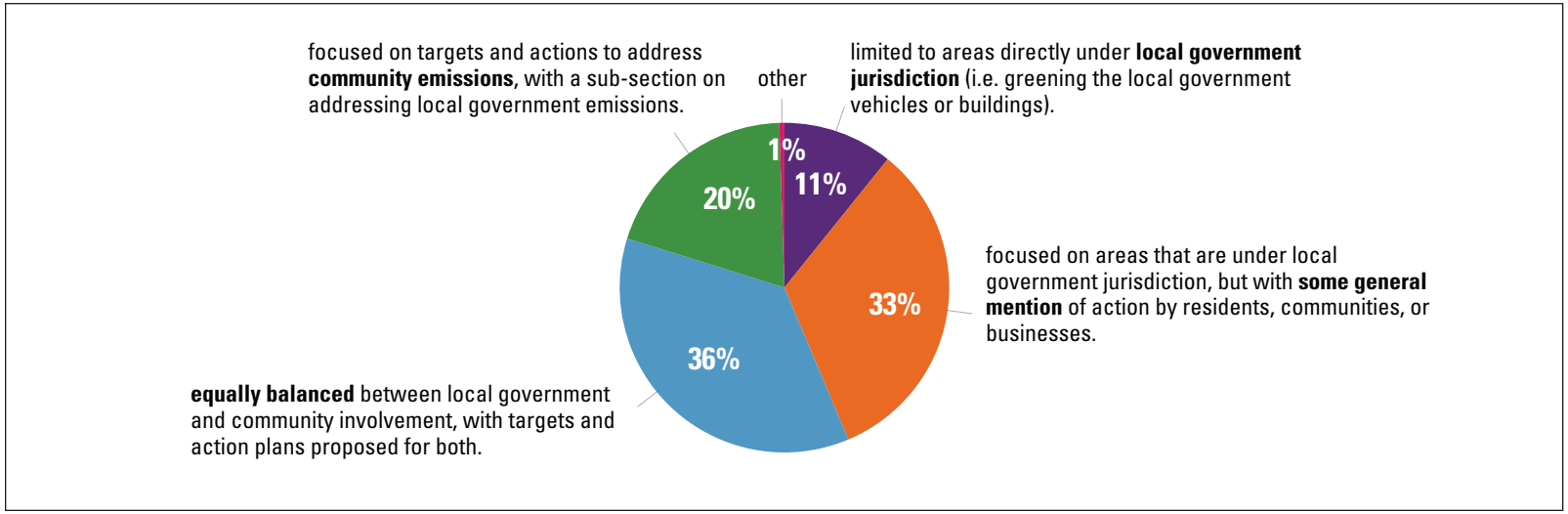
Overall, these results show a preference for the integration of climate change planning within other plans. But, as can be seen in Figure 2, there are significant regional variations here. Notably, a higher percentage of North American cities (47%) report having plans focused specifically on mitigation. Latin American (73%) and African cities (64%) lead in terms of creating plans that are focused on both adaptation and mitigation. Local governments in the United States (25%) and Africa (9%) lag in terms of integrating climate change into sectoral plans. Canadian (50%) and African (55%) cities are most likely to have integrated climate change plans into existing sustainable development plans. European cities (54%) are most likely to have included them within local government energy plans.

This integration of climate change planning within other plans is highlighted when descriptions of current climate plans are compared to those provided for the first climate change plans produced by the municipality (see Figure 2). Respondents report a slight decrease in the number of plans focusing solely on climate change, and a significant increase in plans included in long range plans (an increase of 16 percentage points), and sectoral plans (+14%p). This comparison also shows an increase in the number of local governments conducting adaptation and energy planning. Finally, it can be inferred from their answers that local governments have also increased the number of climate relevant plans going from an average of 1.6 plans in their initial emissions mitigation planning efforts, to a current average of 2.2 climate mitigation related plans in each city.

Canadian cities are those that report the largest shift between their first and current climate change plans. While climate specific plans stay relatively stable, Canadian cities report marked increases in the inclusion of climate change plans within existing sectoral (+50%p), long range (+38%p), and sustainable development plans(+25%p). Asian cities show the smallest amount of change, with both initial and current plans showing among the highest rates of integration. American cities also report little change, but in contrast they consistently report among the lowest rates of integration across both their initial and current climate change plans.

To establish which of these various plans was the dominant climate plan for the local government, respondents were asked to identify their central or most important climate planning document. Here the most common single responses were that the central plan was one that focused solely on mitigation (21%), or on mitigation and adaptation together (23%). But overall, a strong majority of respondents (56%) describe the central

FIGURE 3 | SCOPE OF MITIGATION TARGETS & PLANNED ACTIONS: GLOBAL RESULTS



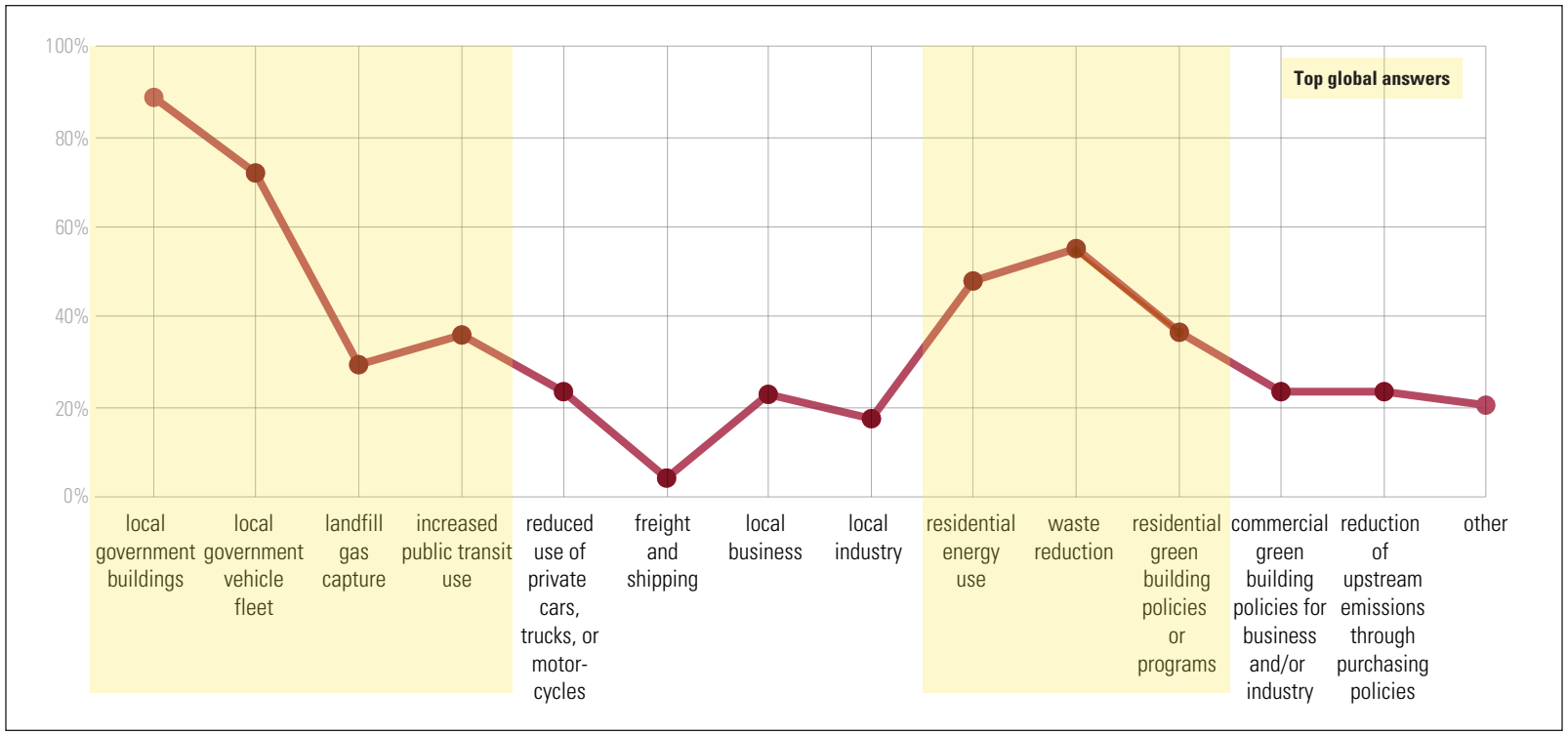
climate-planning document as being one that is integrated into some other local government plan. The type of policy integration reported here also bolsters the more general push to increase urban resilience by maximizing synergies across different policies and programs.

Targets and Proposed Actions

Respondents were asked to report on the existence of greenhouse gas (GHG) emissions reductions targets and specific actions to meet those targets. The majority of respondents report having concrete reduction targets (78%) and of these 93% report having specific actions proposed in their climate change plan (or plans) to meet those targets. For the minority of respondents whose local governments have not committed to specific reduction targets (n=64), 86% report that their climate change plan (or plans) nonetheless proposes specific actions to reduce emissions.

This is an encouraging result that shows that local governments are tying their reduction commitments to specific actions, and taking action even when they have yet to commit to specific reduction targets. But to understand the likely impact of these efforts it is necessary to take into account the scope of the proposed actions. Early initiatives often focus only on corporate emissions that are directly under local government control (retrofitting municipal buildings, for example). It is only by addressing larger community emissions that local governments will have a significant impact on global anthropogenic emissions.

FIGURE 4 | WHERE CITIES HAVE MADE MEASURABLE EMISSIONS REDUCTIONS: GLOBAL RESULTS

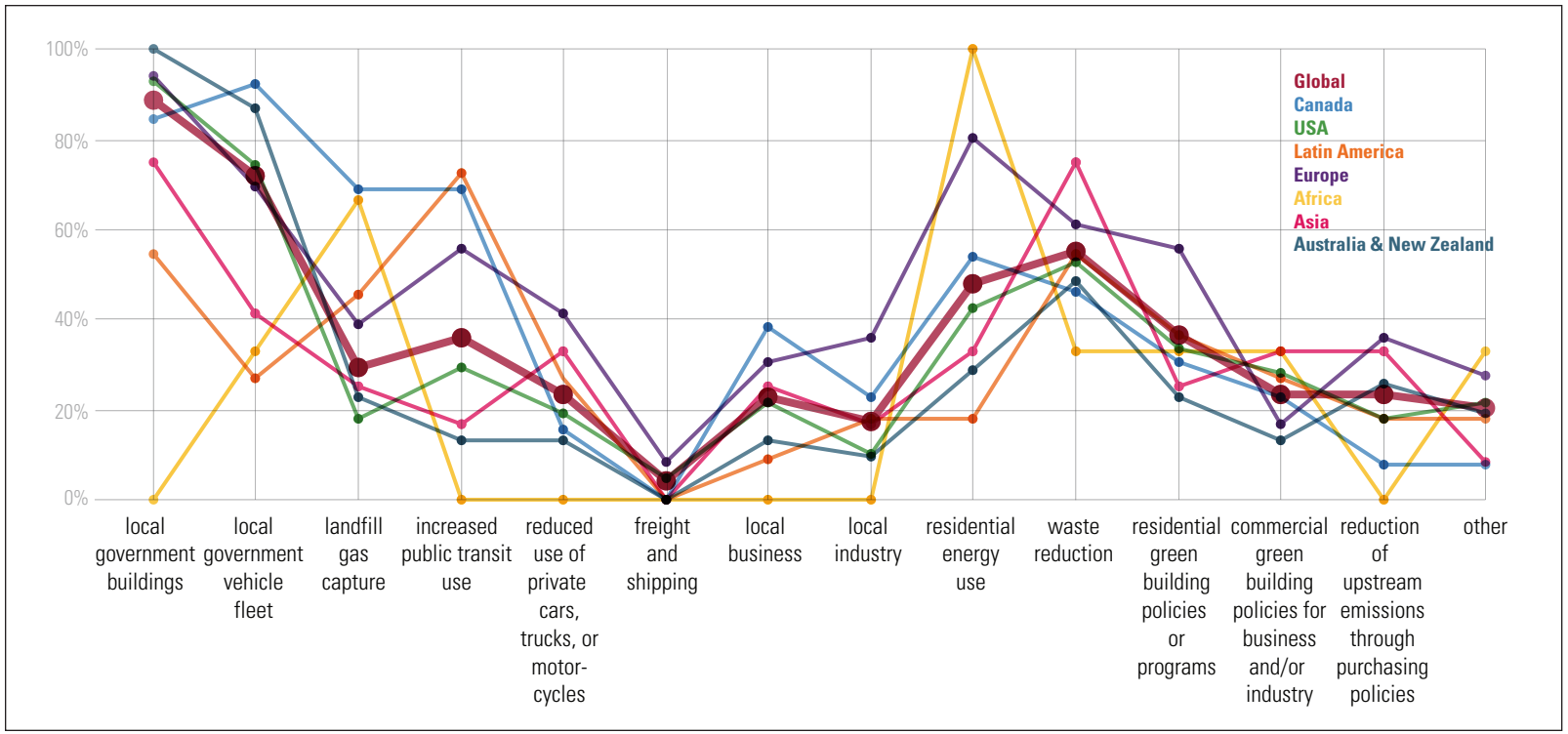


When asked to select between statements that described the scope of their targets and planned actions, the majority (56%) of respondents reported that they were seriously tackling both corporate and community emissions. But this leaves 44% of cities with plans that are either limited exclusively to corporate emissions (11%), or that focus on corporate emissions and make only a general mention on broader emissions and actions to reduce them (33%).

Inventories: Frequency and Scope

Conducting an emissions inventory is a basic first step in climate change planning processes. When asked if they had conducted an emissions inventory (or hired a third party to do so), 85% of cities report having done so. Globally, 59% report having conducted multiple inventories since the start of their efforts to reduce GHG emissions. American and Canadian cities are most likely to have conducted an inventory (at 98% and 94% respectively). African

FIGURE 5 | WHERE CITIES HAVE MADE MEASURABLE EMISSIONS REDUCTIONS: REGIONAL RESULTS



and Asian cities are most likely not to have conducted one (at 82% and 46%).

The majority of local governments (62%) are conducting inventories that include corporate and community emissions as well as the emissions associated with the generation of the electricity consumed within the city (known as Scope 2 emissions). A smaller more ambitious group (15%) is also inventorying at least some portion of the upstream emissions related to the goods and services consumed within the city (moving towards what are known as Scope 3 emissions). Roughly one quarter (22%) of respondents report that they are only inventorying the local government's corporate emissions.

The most significant deviation from these averages occurs in cities in Australia and New Zealand, where 74% report having

inventories that focus solely on corporate emissions. Latin American and European cities are leading efforts to expand the scope of urban emissions inventories. Twenty-five percent (25%) of Latin American cities and 20% of European cities report that they are including upstream emissions in their inventories.

Where are Cities Reducing Emissions?

Cities can pursue a wide range of activities to reduce their GHG emissions. In total, 70% of cities report that their mitigation efforts have produced measurable emissions reductions. Of these, the three most common areas where local governments reduce emissions are: local government buildings (89%), local government vehicle fleets (72%), and waste reduction (55%). The next most common areas where reductions are made are: residential energy use (48%), residential green buildings policies and programs (36%), and increased public transit use (36%). (see Figure 4).

Reductions made in emissions coming from the private sector are far less common: 24% of cities report reductions from commercial green building programs, 17% report reductions from local industry, and 4% report reductions made in the freight and shipping sector. Roughly one quarter of cities surveyed (23%) report reductions made by addressing the upstream emissions associated with municipal purchases.

Looked at by region, in all but two areas the percentage of cities reporting that they are making measurable emissions reductions tends to vary between 72% (for the EU) to 82% (for Australia). The two outliers are African and Asian cities, where the percentages fall to 27% and 43%, respectively. As can be seen in Figure 5 regional responses on where emissions reductions are being made tend to follow the global averages, with a few notable exceptions. Latin American cities were the least likely to report reductions made in the areas of local government vehicle fleet or residential energy use. They were however leaders (along with Canadian cities) in reductions related to increased use of public transportation. Although lagging in the area of public transportation, Asian cities reported were the most likely to report that they had cut their GHG emissions through waste reduction measures. African cities displayed the most uneven responses. They lead in the areas of landfill gas capture (along with Canadian cities) and residential energy use, but reported no reductions in half of the different areas of emissions reductions presented in the survey.

Discussion

Taken as a group, the questions in this section bring to light significant achievements as well as some priority areas for the future evolution of urban responses to climate change. At the level of climate change planning, a large majority of cities in most regions (with the notable exception of the US) are addressing both adaptation and mitigation. They are doing so in a way that brings together adaptation and mitigation, and are also including climate change planning itself within other long-range and sectoral plans within the city. This widespread mainstreaming of climate planning within cities suggests that cities are addressing climate change in an integrated fashion that should support both effective emissions reductions and an increase in urban resilience. However, comparing the scope of emissions inventories to the

areas where concrete emissions reductions have been made shows that the scale of measurement far exceeds the scope of action.

Through the inventories they are conducting, most cities possess the information necessary to support a much broader engagement with community-wide emissions. This is particularly true for the private and industrial sectors. As will be discussed below, the majority of cities have only recently begun their climate planning efforts. As these initiatives evolve it is important that there be a focus on bringing actions in-line with inventories, and that inventories themselves evolve to follow the lead of pioneer cities already engaging with Scope 3 emissions. This type of progression will help ensure that cities effectively contribute to an overall reduction in anthropogenic emissions (Satterthwaite 2008, Hoornweg et al 2011). As a strategic part of urban resilience strategies, this will contribute to keeping the anticipated impacts of climate change within a more manageable level.

Box 1: Key Findings

- 74% of cities report that they are engaging with ***both*** **adaptation and mitigation.**
- 78% of respondents report their climate change plan(s) contain **specific targets**, and of those 93% report proposing specific actions to reach those targets.
- A significant percentage (44%) report their **plans and actions are mostly or entirely limited** to areas directly under local government control.
- A majority of local governments (56%) report that they are **taking broader actions** that target community as well as local government emissions.
- Only 15% of local governments report that their inventories make any mention of upstream emissions generated in the production of the goods and services consumed within their boundaries (Scope 3 emissions).
- Respondents report a significant increase in the **integration of climate mitigation** into sectoral plans, long range plans, general sustainable development plans, and local government energy plans.
- The top areas where local governments report making concrete emissions reductions are: local government **buildings**, local government **fleets**, **waste** reduction, **residential energy** use, **residential green buildings**, and increased **public transit** use.

III Motivations, Synergies, and Competing Priorities

Climate change policies and programs do not exist in isolation. Both the policies themselves and the reasons for undertaking them exist in relationship to other local priorities and development goals. There is a large and growing literature in this area discussing the potential for synergies and co-benefits between mitigation and adaptation policies and other non-environmental urban development goals in areas such as economic development, health, and resilience (Gibbs et al. 2002, Robinson et al. 2006, Van Asselt et al. 2005). The advantages of these synergies are two-fold; they both increase efficiencies by accomplishing multiple policy objectives with fewer resources, and they increase the social and political attractiveness of climate change policies by clearly tying them to successes in other areas that already have supportive constituencies among the local population. To understand this broader context for local climate change efforts, respondents were asked a series of questions covering their motivations for undertaking climate mitigation planning, and whether in practice they have been able to realize synergies between their climate goals and other local development priorities.

Motivations for Mitigation Planning and Action

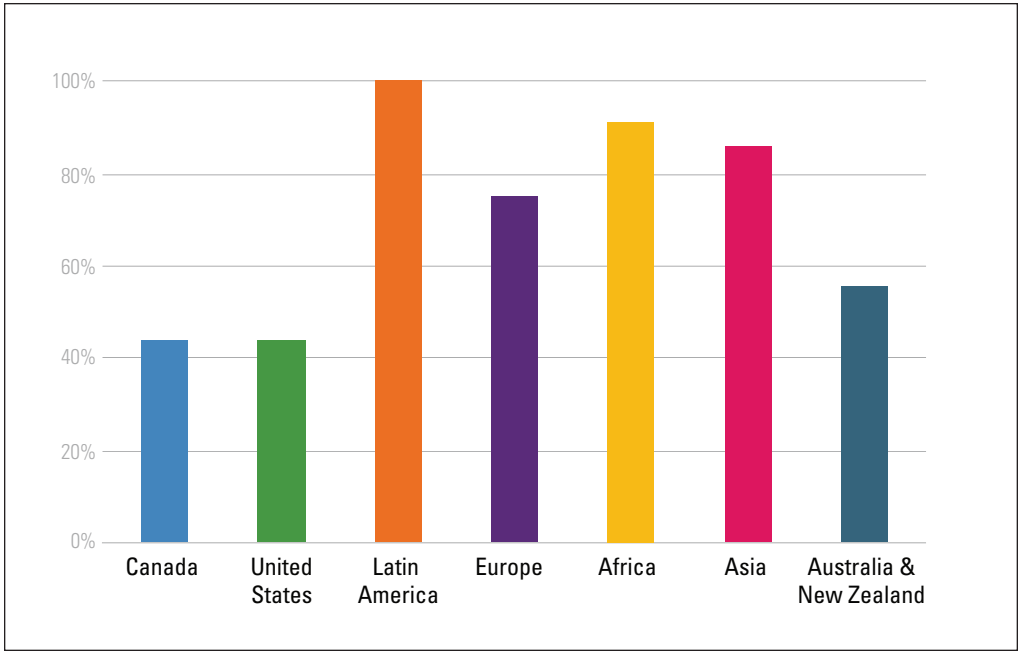
The top three motivations for initiating climate change mitigation planning where: to demonstrate leadership globally, nationally, or regionally (66%); to promote sustainable urban development more generally (57%); and to improve community quality of life (53%). A large number of respondents (40%) also reported that their local government had been motivated by an understanding of the climate related risks and vulnerabilities that their city would face in the future (i.e. coastal erosion & storms, drought, flooding, crop failures, heat waves.) Rounding out the top 5 motivations were the desire to create a positive image for the community in the media, and to create green jobs and green economic development (both tied at 34%). These results were roughly stable across the different regions covered by the survey.

Complying with legal requirements to carry out climate change planning is another important motivation for some cities. Although only identified as a primary motivation by 20% of respondents, the influence of requirements enacted by higher levels of government is still quite widespread. In total 59% of respondents signal that national, state/province, or regional governments have laws or policies requiring them to undertake mitigation or adaptation planning. There is considerable regional variation here (see Figure 6), from 100% for Latin American respondents to 43% for US cities. For local governments with a legal requirement for their climate change work, 59% receive that mandate from their national government. Many local governments also report having multiple legal requirements from national, state, regional, and other sources.

Equally interesting are the least common motivations reported by cities. Synergies between mitigation planning and the broader (non-climate related) goals of the department leading mitigation planning efforts, or of other local government

departments were rarely mentioned (6% and 4% respectively). Cities very rarely reported that mitigation planning was undertaken to meet the requirements of funding agencies (23%), or to attract funding to pursue climate mitigation (12%) or adaptation (9%). While green economic development featured among the top five motivations, far fewer cities (11%) reported that mitigation was pursued as a way to attract talent and investment. Only 5% of respondents reported that meeting the needs of the poor was a main motivation for undertaking climate mitigation planning.

FIGURE 6 | LAWS OR POLICIES REQUIRING CLIMATE PLANNING



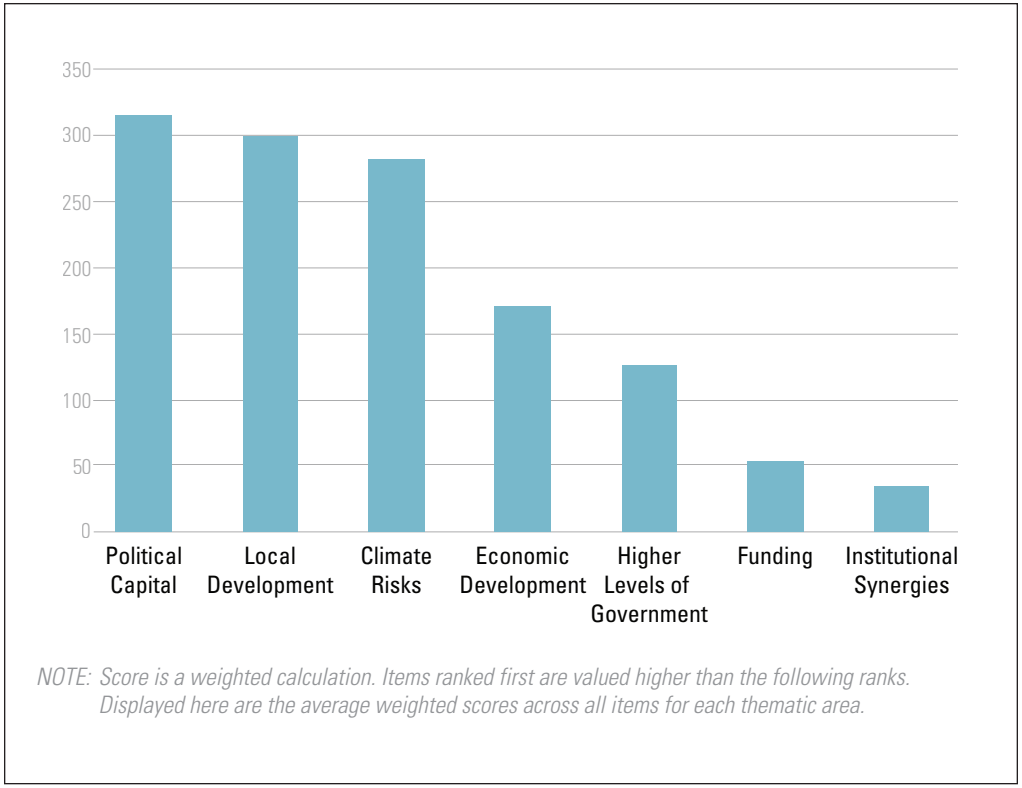
The importance of addressing the needs of the poor was comparatively higher in Latin America, the EU, Africa, and Asia. But even in these areas it did not rank among the top catalysts for mitigation planning. A more significant regional variation was the higher importance of attracting talent and investment as a motivation for mitigation planning among Latin American cities (ranked 6th, compared to a global average rank of 14th). Cities in Australia and New Zealand also reported another key divergence from the global averages, ranking the desire to minimize the impacts of future carbon regulations and penalties on the local economy as their 4th most important motivator for undertaking climate planning (as compared to a rank of 10th globally).

The multiple motivations that respondents could select from fall under 7 distinct thematic areas: generating political capital, meeting local development goals, responding to risk, promoting economic development, responding to higher levels of government, attracting funding, and supporting existing institutional goals and mandates. Comparing the average ranking between these 7 themes reveals that cities so far have been predominantly motivated by the first three:

- generating political capital,
- meeting local development goals, and
- responding to climate associated risks.

The scoring in the four other areas is significantly lower, with the lowest ranked theme (supporting existing institutional goals and mandates) trailing the lead motivator by almost a factor of 10 (see Figure 7).

FIGURE 7 | MOTIVATIONS FOR INITIATING MITIGATION PLANNING



NOTE: Score is a weighted calculation. Items ranked first are valued higher than the following ranks. Displayed here are the average weighted scores across all items for each thematic area.

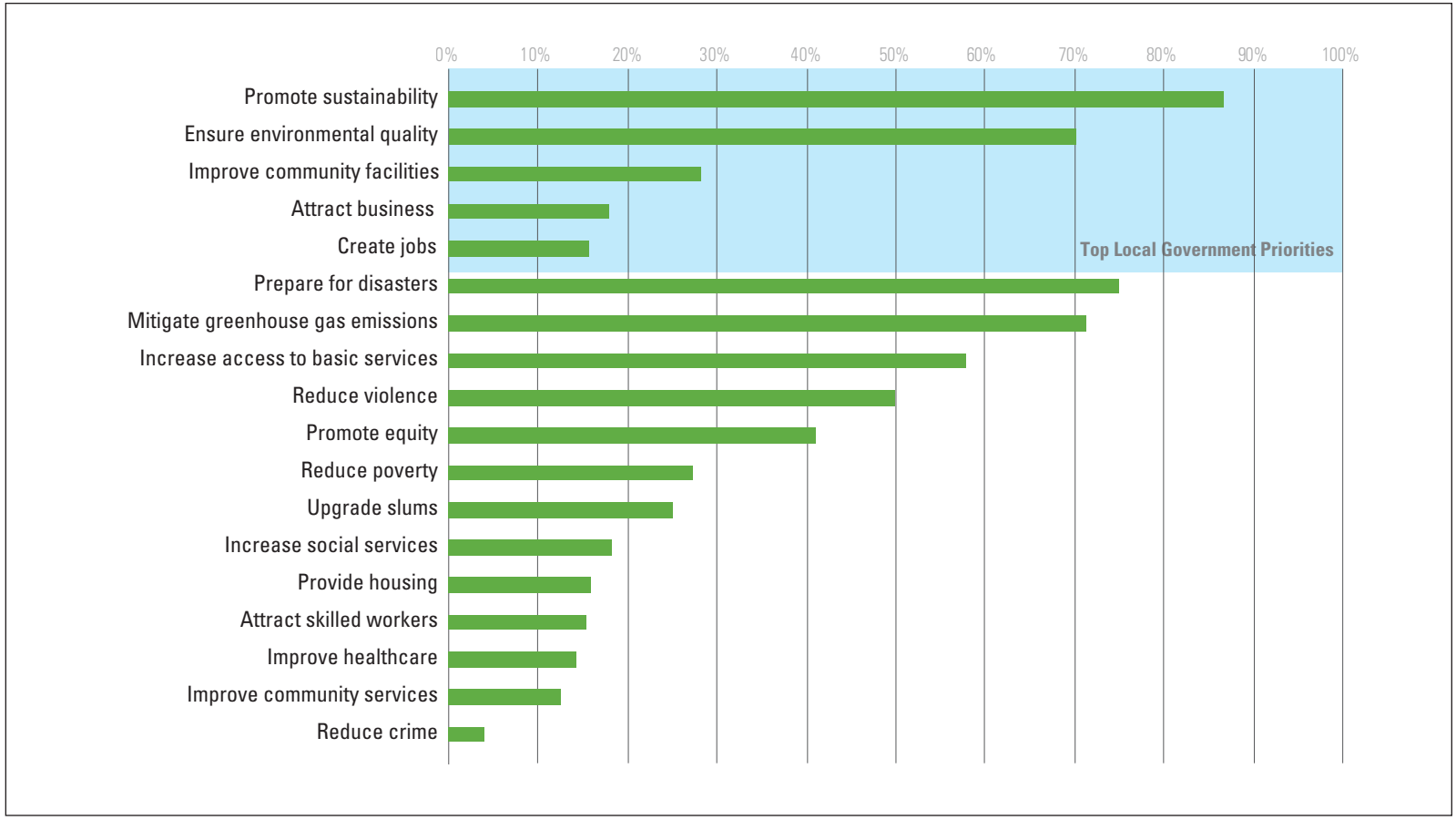
Synergies & Co-Benefits with Local Development Priorities

When asked, a majority of respondents (55%) reported that climate change related policies and programs were perceived to contribute to other local government objectives and goals. To explore these contributions in more detail, respondents were first asked to identify their top three overall (non climate change related) priorities from a list of common goals. Of these, a group a five emerged as strong favorites that were identified by a third or more of respondents as being among their local government's top three overall priorities:

- attracting business (54%);
- creating jobs (40%);
- improving community facilities, i.e. libraries, parks, recreation centers, schools (39%);
- ensuring environmental quality, i.e. air, water, green space, biodiversity (37%); and
- promoting sustainability (35%).

Respondents were then asked to rank the contribution that climate mitigation programs had made to the top priorities that they had identified on a spectrum ranging from 0 to 4, where 0 corresponded to "no contribution" and 4 to "significant contribution". Figure 8 shows the percentage of cities that ranked this contribution as either a 3 or a 4.

FIGURE 8 | CONTRIBUTIONS OF MITIGATION PLANNING AND ACTION TO OTHER LOCAL DEVELOPMENT PRIORITIES



Here the results show a sharp split. For priorities relating to economic development, climate mitigation programs were reported to have contributed little or not at all (rankings from 0-2) by 82% or more of respondents. For priorities that related directly to environmental quality and sustainability 70% or more report that mitigation programs had made some or significant

contributions (ranking them a 3 or a 4). For the final priority area looking at community facilities the responses are less polarized, with a roughly balanced cluster of responses around the neutral point of the ranking scale.

Across a majority of the priorities identified by respondents (not simply those that ranked within the top 5) climate mitigation policies are seen to make little or no contribution. One interesting exception is in the area of providing increased access to basic services, which is seen to work in synergy with climate mitigation programs. Also two other priorities – reducing poverty, and increasing equity – received rankings more evenly distributed across the spectrum. It is important to signal that even in cases where the majority of cities report little or no contribution, on average 19% of cities report some or significant synergies (ranking them a 3 or a 4).

Looked at geographically there are some notable variations. The largest percentage of cities, reporting that their mitigation programs have made an important contribution to attracting business, come from Africa where 100% of respondents ranked this contribution as a 3 or a 4. Among participating African cities the contribution of mitigation policies to crime reduction efforts receives an identical ranking. Asian cities are the only respondents to signal that mitigation programs have made a significant contribution to improving healthcare (at 100%). Canadian cities are the only respondents to report that mitigation programs have made a significant contribution to increasing social services. Finally, Canadian, Latin American, and Asian cities are the only ones to report that mitigation programs have made a significant contribution to promoting equity (each at 100%).

Discussion

Overall the responses in this section show an important difference between the positive relationship reported between mitigation initiatives and other local priorities in general, and the more neutral to negative relationship reported between mitigation policies and concrete development goals. This is true of economic development goals, but also of broader developmental goals having to do with housing, health, community and social services, for example. This shows that the opportunities for synergies between climate mitigation and other local development priorities that have been discussed and documented in the literature on local responses to climate change have yet to be realized in most cities. However, the presence of positive examples in almost all cases shows that realizing synergies is possible and that there are potentially useful examples and best practices that can be opened up in future research.

Box 2: Key Findings

- The top five motivations for initiating local government mitigation planning are: demonstrating **leadership**, promoting **sustainable urban development**, improving **quality of life**, understanding the expected local climate related **risks and vulnerabilities**, creating **green jobs** and green economic development.
- The top five *overall* priorities for local governments are: attracting **business**, creating **jobs**, improving community **facilities**, ensuring **environmental quality**, and promoting **sustainability**.
- When asked how much their climate mitigation programs had contributed to their top priorities, local governments reported that they made **little or no contribution** to the top three, but contributed significantly to the final two (environmental quality and promoting sustainability).
- Across a majority of the priorities identified by respondents (not simply those that ranked within the top 5) climate mitigation policies are seen to make **little or no contribution**. One interesting exception is in the area of providing **increased access to basic services** (water, sewage, electricity, solid waste collection), which is seen to work in synergy with climate mitigation programs.
- Across the areas where the majority of cities report little or no contribution, an average of **19% of cities report some or significant synergies.**

IV Institutional Structures and Integration

Underlying discussions of synergies and co-benefits is the larger argument that for climate policy to be most effective it should be mainstreamed across municipal organizations and integrated into the multiple planning and operational procedures that govern urbanization. The ability of a municipality to design and implement integrated climate change plans is also a key contributor to its overall resilience, given that effective collaboration and coordinated action across sectors is an important aspect of overall institutional capacity. Who is responsible for climate change planning and how planning is conducted can therefore have a determining influence on the success of attempts to mainstream and integrate climate change at the city-level.

There are a variety of ways in which local governments assign and house responsibility for climate change planning within bureaucratic structures. Some have dedicated climate change or sustainability departments or teams; others have a single sustainability coordinator or rely extensively on consultants. Beyond these differences, there are also important variations in the extent to which other local government units participate in climate relevant planning or implementation.

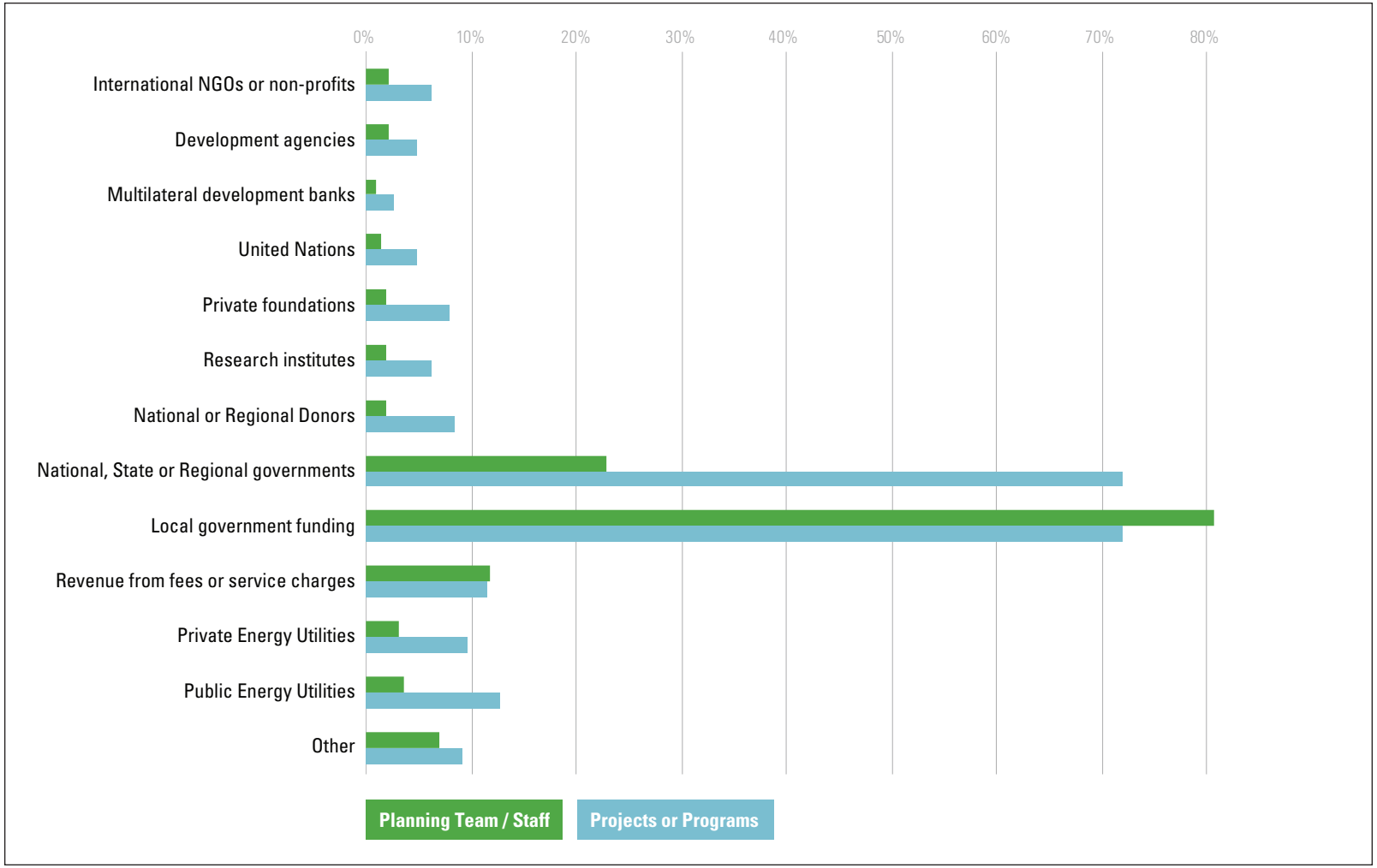
To understand these issues, respondents were asked a series of questions covering the institutional structures that surround climate change planning, how various local government units are involved in climate change planning, and what tactics have been used to encourage the mainstreaming of climate change across local government units.

Institutional Structures

Asked to describe the type of agency that is principally responsible for their climate change planning (covering both adaptation and mitigation), 40% of respondents reported that they had a small team of 1 to 5 employees. The second most common arrangement (23%) was having a single staff member, for example a Sustainability Coordinator, for the entire local government. A smaller proportion (15%) of respondents report that responsibility for the climate-planning portfolio had yet to be clearly assigned. Eight percent report having a large team (of 6 or more full time employees), and 4% have two distinct teams for adaptation and mitigation.

Looked at regionally, cities in Canada and the United States report an almost equal percentage of having either a small team or a single employee (roughly one third of respondents in each case). This makes North American cities the most likely to report that they only have a single staff member working on climate change. In all other regions, with the exception of Africa, the most common arrangement is for cities to have a small team. Having a large climate change planning team is most common in Latin America (21%), Asia (19%), and Canada (13%). At 21%, Latin American cities are also the most likely to report that responsibility for climate change planning is not clearly assigned. For African cities, the four most common responses were having

FIGURE 9 | SOURCES OF FUNDING: GLOBAL RESULTS



a small team, having two teams, not having clearly assigned responsibility for climate planning, or employing a consultant to lead their climate change planning efforts (each at 18%). This makes Africa the only region where a significant percentage of cities report that the climate planning is being led by a consultant (the next closest, the United States, reports 4% of cities in this situation).

Where they exist, the majority of dedicated climate change mitigation teams are located in either the bureau/department responsible for Environmental issues (42%), Sustainability (17%), or Planning (12%). In the rare cases where they exist, dedicated adaptation teams are located in the bureau /department responsible for Planning (33%), Environmental Issues (25%), or the Mayor's Office (17%). These figures change in cities where there is only a single staff member focusing on the climate change planning, where 28% are based in the bureau/department responsible for Environmental issues, 24% in Planning, and 21% in the Mayor's Office.

A small numbers of cities (n=11) report establishing their mitigation teams or coordinators prior to the year 2000. The bulk of these are located in the United States, Canada, and Europe. But globally, the majority of cities created their mitigation positions far more recently. Just over three quarters of mitigation teams have been established since 2005, and just over 80% of sustainability coordinator-type positions were established during the same period. These results are generally stable across all the regions.

Funding

Respondents were asked to identify funding sources for their climate change work. They selected their answers from a list of various public, private, and non-profit sources. Figure 9 presents the percentage of cities that identified each of these as a principal source of funding for their climate change planning staff, or for specific local mitigation programs and projects. The most significant sources of funding for climate change staff were short-term and long-term funds provided by the local government itself (identified by 81% of respondents), funding from national or state/regional governments was the second most commonly identified source of funding (identified by 23%), followed by revenue from fees or service charges derived from areas under the climate agency's jurisdiction, or under the jurisdiction of its parent department (i.e. fees charged for waste collection and recycling (12%).

For staff funding, no other source is reported as being significant. As can be seen in Figure 9 however, funding for projects and programs differs from this significantly. As with funding for staff, the two most common sources of funding for mitigation programs and projects are short-term and long-term funds provided by the local government itself, and funding from national and state/regional governments. But rather than being separated by a large margin, both funding sources are here identified as a principal source of funding by 72% of respondents. This increased importance of funding from higher levels of government is one area where the financing of projects and programs differs significantly from the sources that fund climate change planning staff. There is also a greater diversity of funding sources for programs and projects. In addition to the top two sources of

funding, there are between 5% and 13% of cities identifying an additional 11 principal sources of funding for their mitigation projects and programs. These include national and international non-governmental organizations (NGOs), UN programs, national development agencies, public and private energy utilities, and private donors and foundations. These global results show that while a diversity of funding sources exists for funding for specific projects and programs, funding sources for staff are much more restricted.

Regional responses tended to follow these general results quite closely. Notable exceptions are African cities which, in addition to the staff funding sources covered above, are more likely to report receiving funding from international NGOs (14%), national or regional donors (14%), and development agencies such as DANIDA, DFID, USAID, or CIDA (29%). Higher numbers of African cities also report receiving funding from private energy utilities (14%), and having access to revenue streams that are under their control, or the control of their parent organization (29%). For project and program funding, African cities are the most likely to report receiving funding from international NGOs (43%), development agencies (71%), multilateral development banks such as the World Bank (29%), and United Nations organizations such as UN-Habitat (43%).

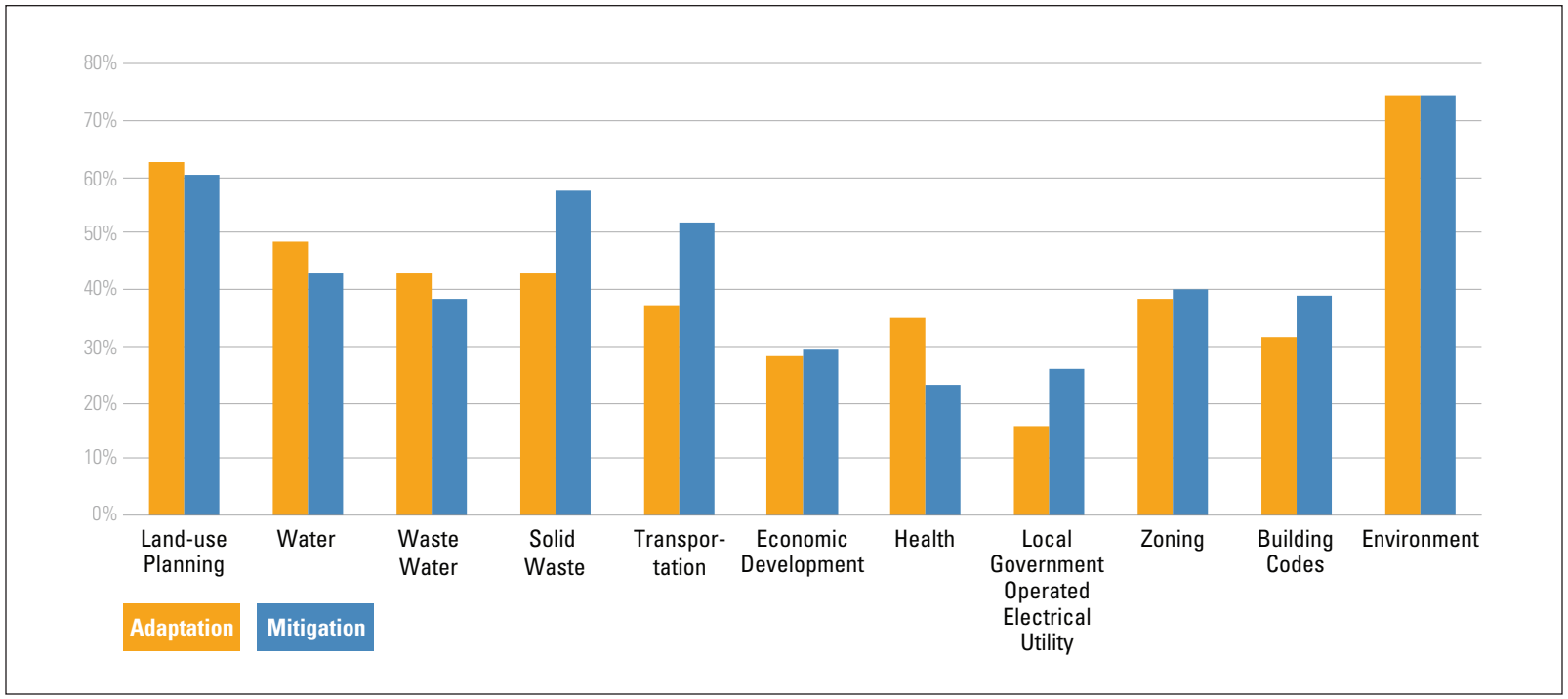
Cities in North America, Australia and New Zealand also display an interesting divergence from the global results. For both staff and program funding they are the most narrowly dependent on funds from higher levels of government. They are also the least likely to report that the principal source of funding for their climate change work comes from non-governmental sources.

Interdepartmental Collaboration and Mainstreaming of Mitigation

The ability to design and implement climate change plans is not limited to the agency directly tasked with climate planning. In fact, given the crosscutting nature of the climate challenge, effective responses require action at a government-wide level that goes beyond any one agency or jurisdiction. Key areas for action include transportation, land-use, waste, and energy policies and infrastructure. A key component in an understanding of urban climate governance is, therefore, an understanding of how different departments and agencies interact with the core climate planning team, and participate in the planning and implementation of a city's climate mitigation strategy.

Attention to the interdepartmental dynamics is evident in the way in which cities report carrying out their mitigation plans. A majority of cities (61%) report that their plans are created with regular input by other municipal agencies throughout the planning process. More specifically, over a third of respondents (37%) report that the person/unit specifically tasked with climate planning oversees a collaborative planning process that extensively involves other multiple local government agencies/departments. This leaves 24% of cities reporting that mitigation planning is conducted in a more isolated fashion either by core climate planning staff or among individual agencies/departments within their own silos. For the remainder, 8% report relying on a consultant to carry out their climate change planning, and 7% report carrying out their planning in other ways. These results show the general dominance of integrative and collaborative mitigation planning processes over more isolated and siloized approaches.

FIGURE 10 | CONTRIBUTIONS OF MUNICIPAL AGENCIES TO CLIMATE CHANGE PLANNING & IMPLEMENTATION: GLOBAL RESULTS



This pattern is seen across most regions, with the exceptions of Asia and Africa. African cities (at 64%) are most likely to report that their most important mitigation plans are created in a more isolated fashion, (with 46% reporting that they are created entirely by the person or unit specifically tasked with climate change planning). In Asia, 51% of cities report carrying out mitigation planning in an isolated fashion. In both cases, there are still a significant percentage of cities reporting a more integrated and collaborative approach to mitigation planning (27% for Africa, and 43% for Asia). But overall results in each region invert the relationship between the different approaches to planning seen globally.

To understand the engagement of different local government agencies in greater detail, respondents were also asked to rank the degree to which specific agencies contributed to designing and/or implementing climate change adaptation and mitigation plans. Respondents were asked to rank each agency from 0

"no contribution" to 4 "contributes heavily." Figure 10 shows the percentage of cities ranking each agency as a 3 or a 4, with results displayed separately for their contributions to adaptation and to mitigation.

The agencies that contributed most heavily were those responsible for environmental planning, land-use planning, solid waste management, water, and transportation. Those that contributed the least were the locally operated electrical utility (where these existed), and the agencies responsible for health, and economic development. These rankings were generally stable across both adaptation and mitigation. Exceptions to this were solid waste, transportation, and locally operated utilities (which contributed more to mitigation); and water and health (which contributed more to adaptation).

Looked at geographically, we see that a higher percentage of cities in Asia (83%), Latin America (90%), and Africa (74%), report significant contributions from the solid waste sector. This is also true in the health sector where significant contributions are reported by 66% of Asian cities and 48% of African cities. Asia also distinguishes itself by being the only region where a high percentage of cities (54%) report that the agencies responsible for economic development contribute significantly to climate change planning.

Globally, the agencies which contributed the least to climate change planning and implementation (local electrical utility, health, and economic development) were also those where, elsewhere in the survey, respondents reported the least alignment between climate change mitigation plans and the existing objectives of the government agencies responsible for those issues.

Tactics for Mainstreaming Climate Change and Encouraging Innovation

The subdivision of responsibility within municipal bureaucracies creates barriers to effective collaboration, information sharing, and coordinated action. These barriers need to be overcome if cities are going to present coherent and effective responses to climate change. To address this, cities often employ specific tactics and strategies to encourage the mainstreaming of climate change and the participation of multiple departments in the planning and implementation of policies, projects, and programs.

Respondents were presented with a list of fourteen commonly employed strategies that covered educational outreach, network building, and formal institutional reforms and interventions. They were then asked to identify the strategies that their local governments had employed, and to rank their effectiveness on a scale from 0 "not effective" to 4 "highly effective". Figure 11 shows these strategies ranked according to the percentage of cities who ranked them either a 3 or a 4.

Tactics for building internal networks between departments dominated the strategies that were identified as most effective. Among these were more formal interventions such as creating climate change or sustainability focused working groups that brought together staff from various agencies (ranked 4th), or "facilitating collaborative internal dialogues" to create a shared understanding and vision of what a sustainable future meant for their city (6th). But even more effective were informal interventions based on person-to-person exchanges and trust. Specifically, the

FIGURE 11 | TACTICS FOR ENCOURAGING ENGAGEMENT WITH CLIMATE CHANGE WITHIN LOCAL GOVERNMENTS: GLOBAL RESULTS

top two strategies were:

- "Creating informal channels of communication between the person/team responsible for climate planning and staff within other local government agencies" (ranked 3 or 4 by 64% of participants) and
- "Cultivating personal contacts and trust between the person/team responsible for climate planning and staff within other local government agencies" (ranked 3 or 4 by 62% of participants).

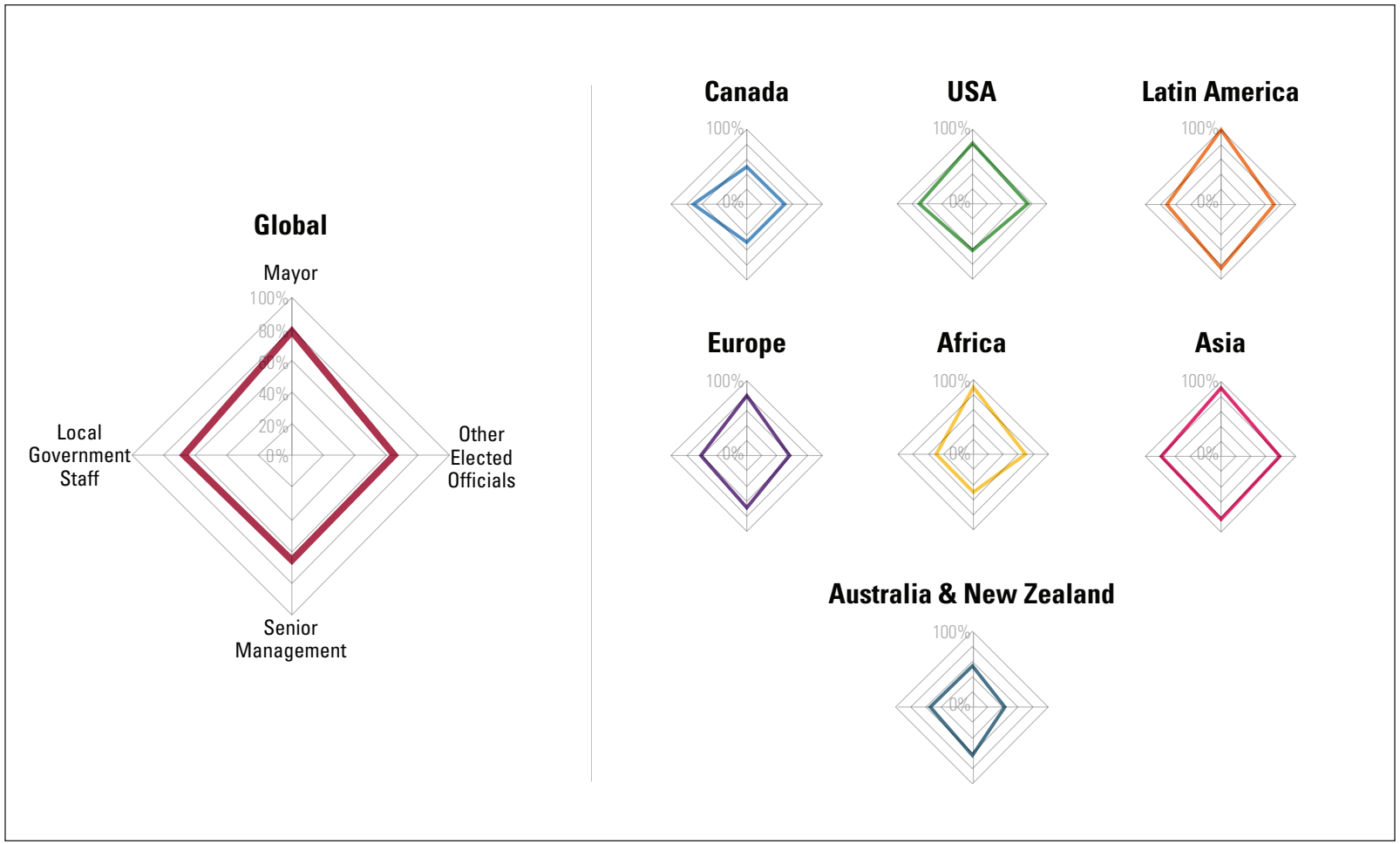
These results are consistent across the different regions, and confirm the role of personal networks and relationships of trust in creating the conditions necessary for shifts in policy direction within complex urban systems that has been noted in other research (see Campbell 2012). But this should not downplay the importance of more formal interventions that aim to directly build bridges between the climate planning team (and the climate plan) and other local government agencies. The third ranked strategy was to create climate policies and programs that also help meet the existing (non-climate related) priorities, goals, and core mandates of local government agencies. The fifth ranked strategy was to build bridges more directly by hiring or designating staff within local government agencies to coordinate that department or agency's engagement with climate responses.

Formal climate education and training programs were ranked as relatively ineffective. The two exceptions to this being Africa and Asia, where an average of 66% of cities reported that formal climate education and training programs are effective at encouraging different departments or bureaus to engage with climate change. By far the least effective strategies where those that sought to formally integrate climate related metrics into either budgeting procedures, or into performance management contracts at various levels within local government agencies. Overall only an average of 22% of respondents ranked these types of interventions as effective. These results were consistent across different geographical regions. The one exception being Asia, where significantly higher percentages of cities reported the effectiveness of integrating climate related metrics into: the performance management contracts of senior local government officials (33%), the budgeting procedures of local government agencies (42%), and the procedures that local government agencies use for budgeting infrastructure spending (38%). Globally, ratings here were not strongly negative, but were rather clustered at the midpoint of the ratings scale or just below it. It is also interesting to note that an average of 47% of respondents reported that they had not attempted these types of interventions, making them by far the least common within the list.

Internal Support for Climate Change Policies and Programs

Support among local government leaders and staff for climate change policies and programs can be a critical factor in determining their success or failure. When asked to rate levels of internal support for climate change policies and programs, cities report generally high levels of support. Mayors are reported as being the most supportive of climate policies, followed by senior management, other elected officials, and local government staff (see Figure 12). Only small percentages of respondents (between 3% and 7%) report that any of these groups oppose or actively oppose climate policies.

FIGURE 12 | LEVELS OF INTERNAL SUPPORT FOR CLIMATE CHANGE POLICIES AND PROGRAMS



Cities in Canada, Australia and New Zealand are significantly less likely to report high levels of support than their counterparts. Their responses in this area are as much as 28 percentage points lower than the global average. This is true for both elected officials and local government staff.

Nonetheless, the generally high levels of support being reported are encouraging. It is important to note that the population being surveyed here is composed entirely of ICLEI member cities. It may therefore not be surprising to see high levels of support, given that this group has already committed to engaging actively with climate change.

Support for Innovation

The above shows a high level of support for climate change policies and programs. However, one barrier to engaging with climate change is the necessity to introduce new ideas and technologies into established decision-making and infrastructure systems. Given the specificity of each individual city, local innovations are often necessary to design policies and technologies that are appropriate to the local circumstances. On this issue survey results again report a high-level of overall support. Three quarters of participants report that their local governments "actively support innovation and allow employees to take risks to test out new ideas." Looked at geographically, responses range from 85% of Australian cities reporting active support for innovation, to 68% for European cities. Therefore, even at the low-end of the spectrum of responses, a strong majority of respondents report a supportive context for innovation. But responses seem to tell a different story when cities were asked more specifically about the nature of this support.

Despite showing awareness about the importance of innovation, most cities are not adopting tried and true measures to create the conditions that make innovation possible. Respondents were presented with a list of five key mechanisms commonly used to support innovation within complex organization. They were asked to signal two things: first, whether a given mechanism was used within their local government generally; and second, whether mechanisms that were in use engaged in any way with climate related programs, technologies, or policies. Respondents were also given the option to signal that they had other mechanisms in place to support innovation.

As can be seen in Table 2, in all but one case the initiatives mentioned do not exist in the majority of cities. Seventy-five percent or more of respondents indicated that their city does not have any of the following in place:

- policies allowing employees to pursue personal work-related projects during a fixed percentage of their paid time,
- discretionary funds earmarked to support staff initiatives and new ideas, or
- rewards for innovation and risk taking included in performance management and assessment structures.

Furthermore, a large majority of cities (87%) indicated that they had no other specific programs or mechanisms in place to encourage innovation. Where innovation related mechanisms did exist, they were rarely applied to encourage innovation around the issue of climate change. The one exception to this was the creation of inter-departmental working groups on specific

challenges. This was identified as being in place in 48% of cities, with 32% of cities reporting that they had working groups in place specifically to address the challenges posed by climate change. This was particularly the case for Latin American cities, where 50% of cities have interdepartmental working groups in place to address climate change.

These results indicate that there may be an opportunity for local governments to pursue innovation through adaptive management practices and concepts developed in discussions of learning organizations (Senge 1990). An emerging body of research is looking at how cities can support innovation, experimentation and institutional learning as part of strategies to catalyze sustainability transitions within urban systems (Anguelovski and Carmin 2011, Bassett and Shandas 2010, Castan Broto and Bulkeley 2013).

TABLE 2 | MEASURES FOR SUPPORTING INNOVATION: GLOBAL RESULTS

Initiative	Does Not Exist	Exists	Exists & Engages with Climate Change
Thematic working groups on specific issues/challenges composed of staff from a variety of local government divisions	27%	48%	32%
"10% Time" or "20% Time" policies that allow employees to pursue personal projects during a fixed percentage of their at work paid time	93%	7%	0%
Speaker series to bring outside ideas into local government agencies	53%	35%	16%
Discretionary project funds earmarked to support staff initiatives and new ideas	75%	20%	9%
Rewards for innovation and risk taking included as elements within performance management and assessment structures	76%	21%	4%
Other	87%	7%	7%

Box 3: Key Findings

- 40% of respondents report that the agency or employee principally responsible for their climate change planning is **a small team** (1-5 employees), 23% have only a **single staff member**, and 15% have yet to clearly assign responsibility for the mandate.
- The most significant sources of **funding** for climate change **staff** is short-term and long-term funds provided by the local government itself.
- The most significant source of **funding** for mitigation **programs and projects** are local governments, as well as funds from higher levesl of government.
- **Fewer sources of funding** are available to cover **staff and operational costs**, as compared to funding sources for projects and programs.
- 37% of cities report that their mitigation plans are created through a **collaborative planning process** that extensively involves multiple local government agencies / departments. 32% report that their plans are created in more limited or siloized fashion.
- Respondents report that the agencies that contribute the most to designing and/or implementing climate mitigation policies and programs were those responsible for: **Environment**, **Land-Use Planning**, **Solid Waste**, **Water**, and **Transportation**.
- Those that contribute the least are those responsible for: **Health**, **Economic Development**, and the local **Electrical Utility** (where existent).
- Creating **informal channels of communication and personal contacts and trust** between the person/team responsible for climate planning and staff within other local government agencies were ranked as the most effective tactics for mainstreaming engagement with climate.
- Despite reporting a general support for **innovation**, most cities are not adopting tried and true measures used to create the conditions that make innovation possible.

V Challenges in Planning and Implementation

Planning to address climate change – whether focused on adaptation, mitigation, or both – is a new and rapidly evolving area of policy and action for local governments. It demands new skills, new resources, and new ways of guiding the processes of building, managing, and maintaining our cities. To gain a clearer picture of the challenges that cities are facing, respondents were asked to rate the significance of the challenges that they are facing in four key areas:

- resource related challenges,
- institutional challenges,
- leadership challenges, and challenges related to
- information and awareness.

Respondents were presented with 27 different challenges across these four areas. They were then asked to rate each challenge in terms of climate change planning and implementation on a scale from 0 "not a challenge" to 4 "a major challenge." Figure 13 shows the top ten barriers, according to how many cities rated each option as either a 3 or a 4.

Each of the four challenge areas are discussed in more detail below. Looked at collectively resource related challenges are ranked as most problematic. Across the 27 different challenges presented to respondents, 10 present a significant challenge to over 45% of respondents. All the issues covered in these questions are ranked as a significant challenge by at least 20% of cities. These responses paint a picture of multiple, varied, and significant challenges that are dominated by a core group of hurdles affecting cities worldwide.

Resource Related Challenges

Access to human, financial, and technological resources can have an important impact on local government responses to climate change (see Figure 14). Of the three, financial challenges dominated all other resource related challenges. Financial challenges were also ranked higher than all other challenges reported in other areas. Lack of funding for implementation of projects and programs was reported as a significant challenge by 78% of cities. Cities in Africa (100%), the United States (88%), and Latin America (86%) were particularly likely to identify this as a key problem. A lack of funding to hire sufficient staff for the climate change unit is reported as a significant challenge by 67% of cities, with Latin America (77%) and the United States (74%), most frequently reporting this as a significant challenge. Ranked only slightly lower, at 66%, was the related challenge of having insufficient staff or staff time to address the issue. Here Australia and New Zealand stand out, with 77% of cities reporting a lack of staff or staff time as a major issue. Taken together, these findings (although not surprising) add detail to the earlier discussion of funding in section IV of this report, and confirm the findings of earlier global studies of urban climate adaptation efforts (see Carmin, Nadkarni, and Rhie 2012).

FIGURE 13 | TOP 10 CHALLENGES: GLOBAL RESULTS

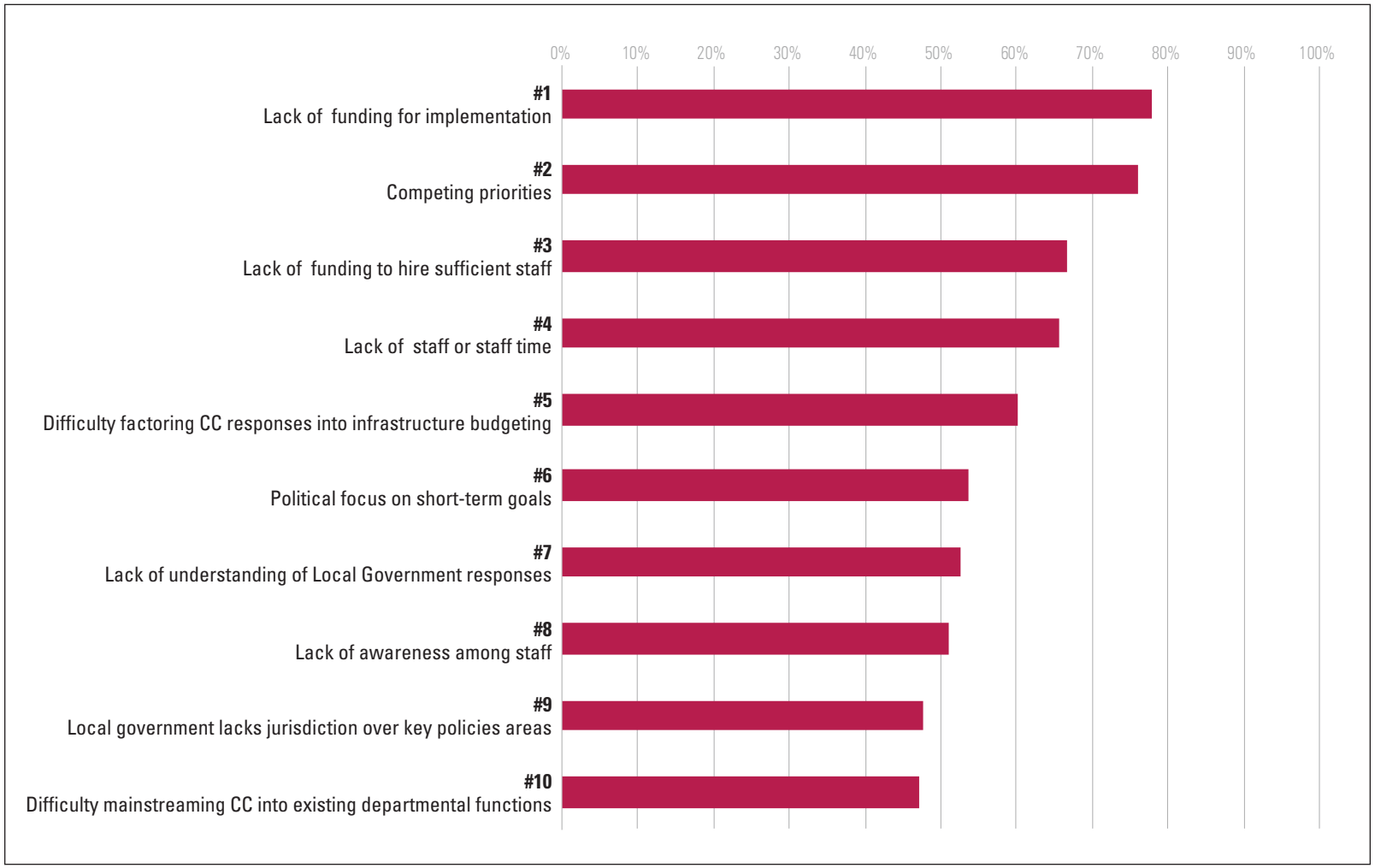
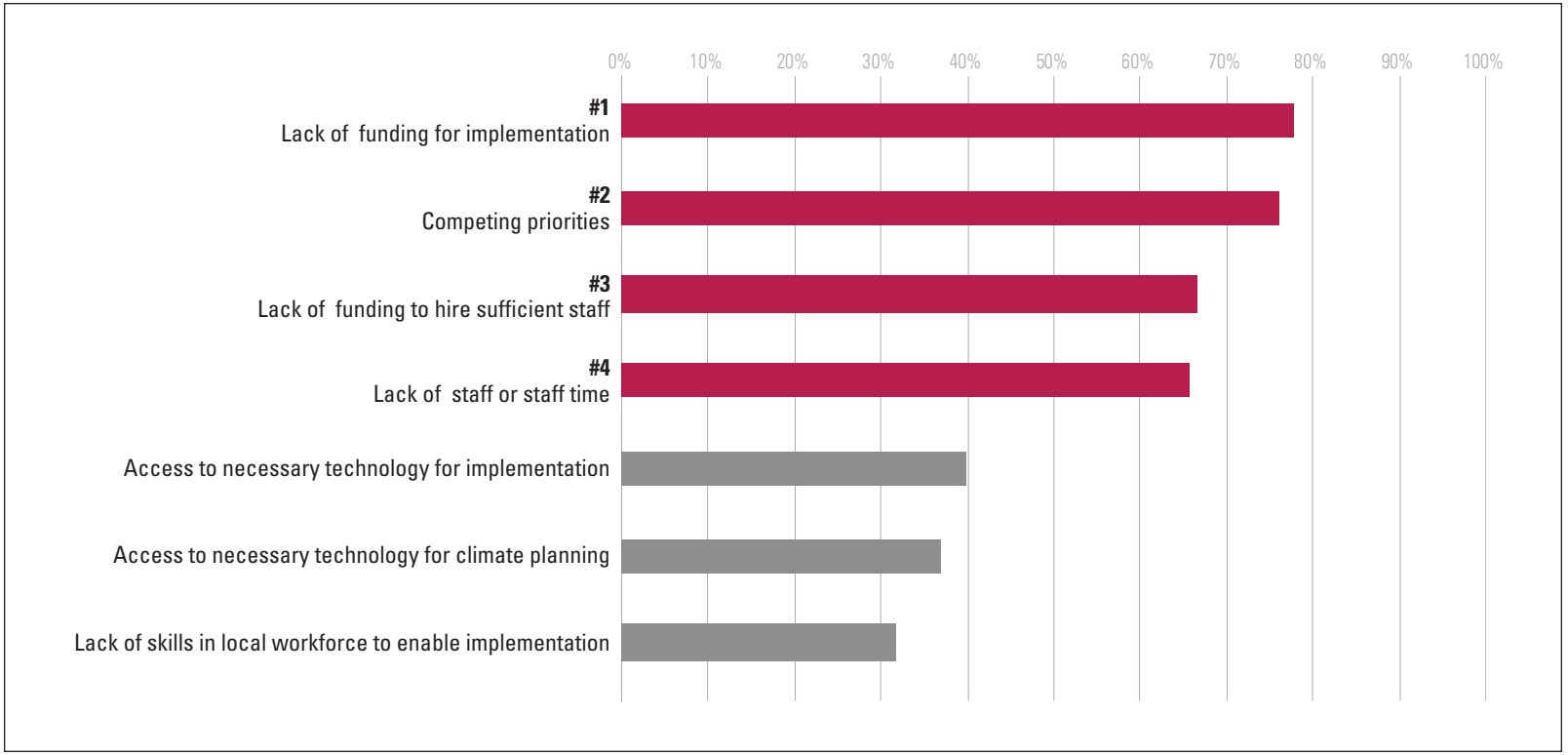
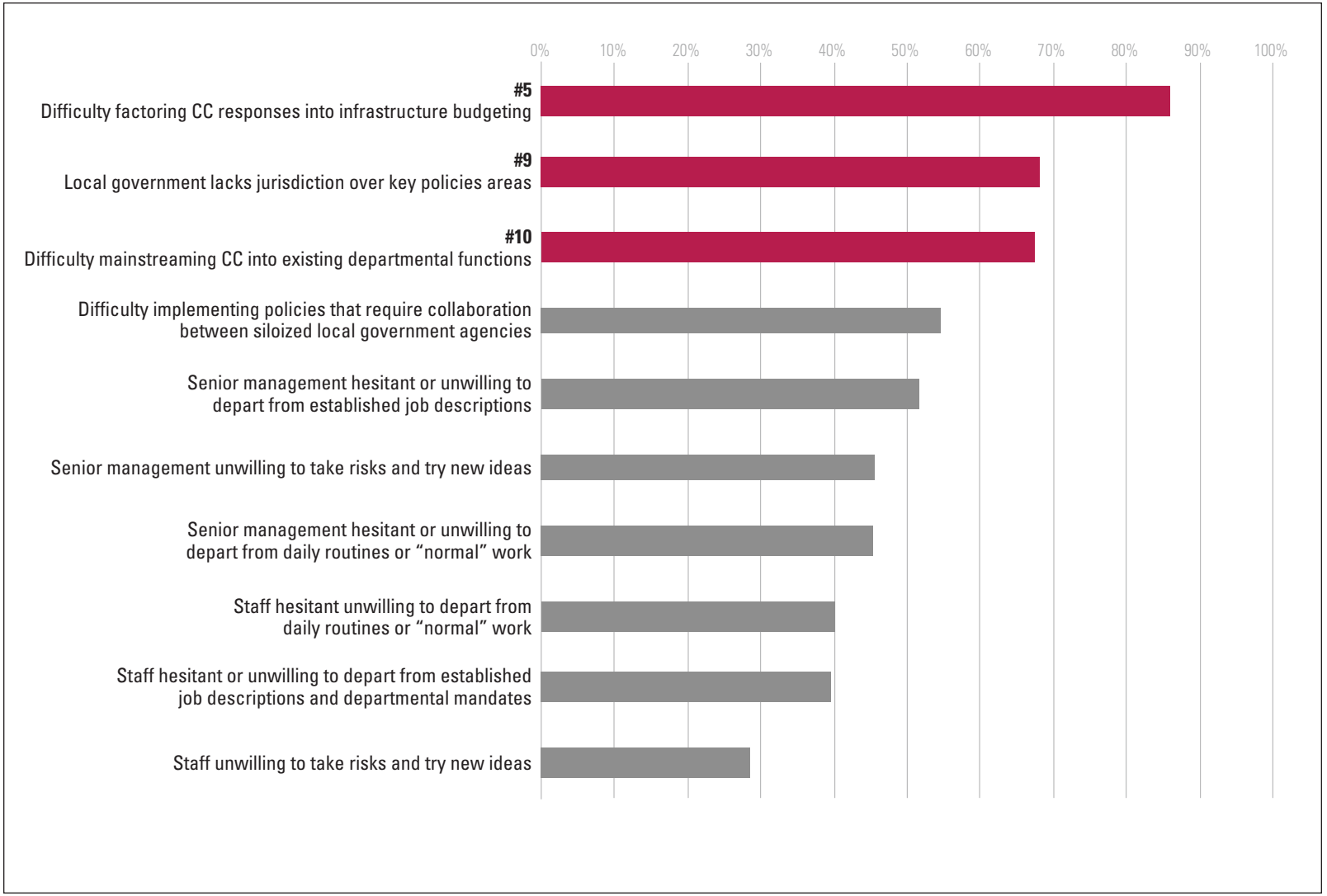


FIGURE 14 | RESOURCE RELATED CHALLENGES: GLOBAL RESULTS



Linked directly to these challenges is the competition between the climate portfolio and the multiple other priorities that compete for scarce human and financial resources. Competing priorities (in areas such as health, nutrition, housing, sanitation, and economic growth) were the second most significant challenge experienced by cities (76%). This is particularly true for Canadian and African cities, where 100% and 88% (respectively) report having significant challenges in these areas. Access to technology necessary for planning and for implementation, though reported less often, is also a significant challenge for many cities (at 37% and 39% respectively). African cities report being particularly affected, with 90% of cities signaling that access to the necessary technologies for planning and for implementation is a major challenge.

FIGURE 15 | INSTITUTIONAL CHALLENGES: GLOBAL RESULTS



Another challenge related to implementation is the degree to which the local workforce has the skills necessary to implement local government climate change plans. Objectives in areas of transportation, energy, green building, or increasing the robustness of existing infrastructure, all require a workforce able to carry out the necessary transformations to the city's built environment. Globally, 32% of cities rank this as a significant challenge. But it is noteworthy that African (90%), Asian (70%), and Latin American (46%) cities are much more likely to signal a significant problem in this area.

Institutional Challenges

Cities report that the top four institutional challenges that they face are those related to integrating climate change within individual local government agencies and coordinating across multiple local government agencies (see Figure 15). In order of the percentage of cities reporting them as significant challenges, they are:

- difficulty mainstreaming climate change responses into infrastructure budgeting procedures (60%),
- a lack of local government jurisdiction over areas such as building codes, transportation, or land use (48%),
- challenges mainstreaming climate change policies and programs into existing departmental functions (47%), and
- problems associated with implementing policies that require collaboration between siloized local government agencies (38%).

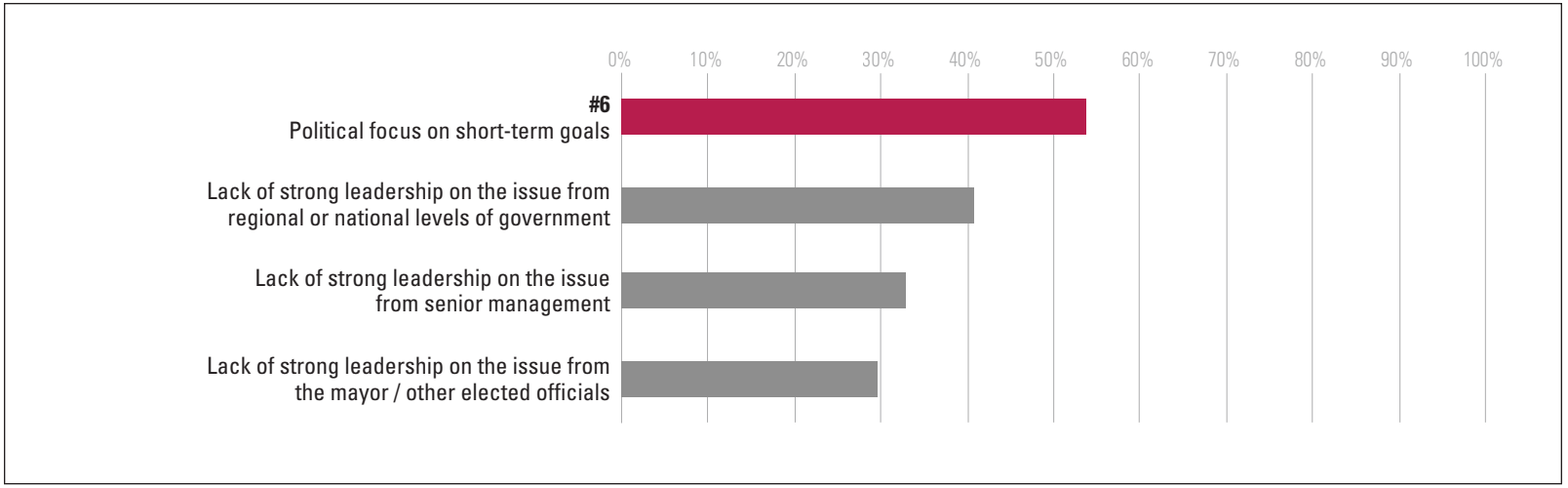
Personnel hesitant to depart from established job descriptions or departmental mandates, unwilling to take risks and try new ideas, or hesitant to depart from the routines of 'normal' work, are also signaled as a key challenge. This is particularly true for senior management (reported as a significant challenge by an average of 33% of cities), but also for line-function staff (reported as a significant challenge by an average of 25% of cities).

Overall, cities in Asia, Europe, Latin America, and the United States, are less likely to report that their climate change plans face significant institutional challenges. Only 41% of Asian cities and 46% of European cities, for example, report significant challenges mainstreaming climate responses into infrastructure budgeting procedures. In contrast, Canadian cities are the most likely to report significant institutional challenges. The percentage of Canadian cities reporting significant institutional difficulties surpassed those of all other regions for eight out of the ten challenges covered in this section of the survey. Senior management hesitant or unwilling to depart from established job descriptions and departmental mandates, for example, is signaled as a significant challenge by 67% of Canadian cities (compared to a global average of 36%). This reticence among senior management in Canada is something that resurfaces again, although less strongly, when cities are asked about the leadership challenges that they face.

Leadership Challenges

The importance of having strong leadership, or a "climate champion", is something much discussed by both practitioners and researchers. As visible in Figure 16, leadership related challenges, over all, are among the lowest ranked. Respondents were asked to rank the degree to which a lack of leadership

FIGURE 16 | LEADERSHIP CHALLENGES: GLOBAL RESULTS



from the mayor or other elected officials, senior management, or other levels of government posed serious challenges. They were also asked to rank the importance of the potentially related issue of a political focus on short-term goals linked to electoral cycles.

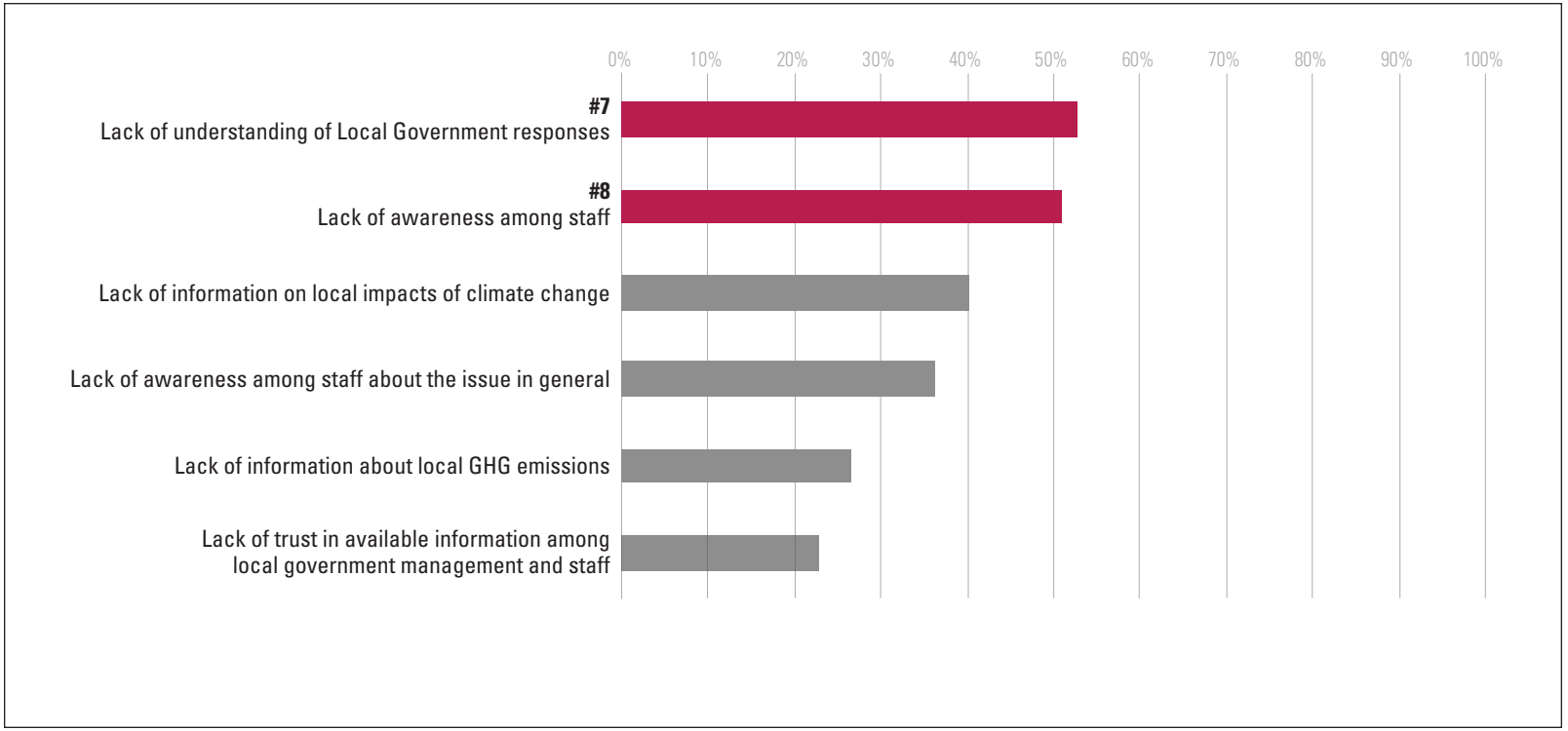
Of these, a politically motivated focus on short-term goals is ranked as the most serious (54%). A lack of leadership on the issue at regional or national levels is identified as a serious problem by 41% of respondents. Although a lack of leadership from senior management, or from a mayor and other elected officials ranks lower, as shown in Figure 16, they are still identified as significant challenges by close to one third of respondents (at 33% and 30% respectively).

Canadian cities report being most impacted by a lack of strong leadership from senior management (53%), from regional or national government (73%), and a political focus on short-term goals (93%). African and Australian cities also report more significant challenges in these areas, although at a lesser level than Canadian cities.

Challenges of Information and Awareness

Having accurate scientific information about local GHG emissions and the likely impacts of climate change on a city is essential to adaptive and mitigative responses. Helping to collect and disseminate this information has been a significant focus of climate change planning programs as far back as the early1990's. It is clear that for mitigation planning, a longer history and

FIGURE 17 | CHALLENGES OF INFORMATION AND ACCESS: GLOBAL RESULTS



more established methodologies have made access to relevant information less problematic than those for adaptation. Fully 40% of respondents report that a lack of information on the local impacts of climate change poses a significant challenge (see Figure 17). In comparison 27% report that a lack of information on GHG emissions is a significant challenge. This signals that access to basic information necessary for adaptive planning and increasing urban resilience remains an important challenge for a large number of cities.

More generally, a pattern of escalating severity emerges as one moves from challenges of general information and awareness to those dealing with more concrete local knowledge and an understanding of possible actions. Access to information on GHG emissions is ranked as comparatively less challenging, general awareness among staff occupies a middle ground, while a more

specific understanding of the impacts and relevance of the issue (51%) and how it can be addressed by local governments (53%) are ranked as the most significant challenges by over half of respondents. This points to the need to focus not only on providing more and better scientific data, but also on providing support for the processes through which this data is transformed into knowledge and action.

African cities in particular report that information and awareness are significant challenges. Across all seven of the areas covered in this section African cities report the highest level of difficulty. On average 61% of African cities report significant problems of information and awareness. The areas where African cities experience notably more difficulties than their peers are:

- a lack of awareness among staff about the issue in general (70%),
- a lack of information about local greenhouse gas emissions (60%), and
- a lack of information about the likely local impacts of climate change (70%).

In each of these areas the number of African cities reporting significant difficulties is at least 12 percentage points higher than their next closest regional counterpart.

Box 4: Key Findings

- **Access to funding** for **implementation** and hiring sufficient **staff** for climate related planning and implementation are ranked as the first and third most important challenges to effective local government climate change plans.
- **Competing priorities** (such as health, housing, sanitation, economic growth) are the second most important challenges to effective local government climate change plans.
- **Difficulty mainstreaming** climate change into existing departmental functions and **coordinating collaborative action** across local government silos are the most significant institutional challenges.
- The majority of respondents **do not rank a lack of leadership** as a key challenge faced by their climate change initiatives.
- Having **accurate information** on the local impacts of climate change is ranked as a significant problem by 40% of respondents.
- There is a need to provide support for the processes through which **data** is turned **into actionable knowledge.**

VI External Partners:
Civil Society & Private Sector Engagement

Local governments cannot carry out urban responses to climate change single-handedly. Only a small percentage of urban emissions are under the direct control of local officials. Similarly, effectively adapting to the impacts of climate change and increasing overall urban resilience demands action on the part of communities, individuals, and businesses – not simply local government agencies. Local governments can however act as leaders and facilitators to catalyze these types of broad-based shifts. Civil society and private sector groups can be powerful partners in the creation and implementation of municipal climate responses. But they may also play a more neutral or oppositional role. These dynamics are the focus of this section.

FIGURE 18 | ADVOCATES FOR STRONGER LOCAL ACTION ON CLIMATE CHANGE: GLOBAL RESULTS

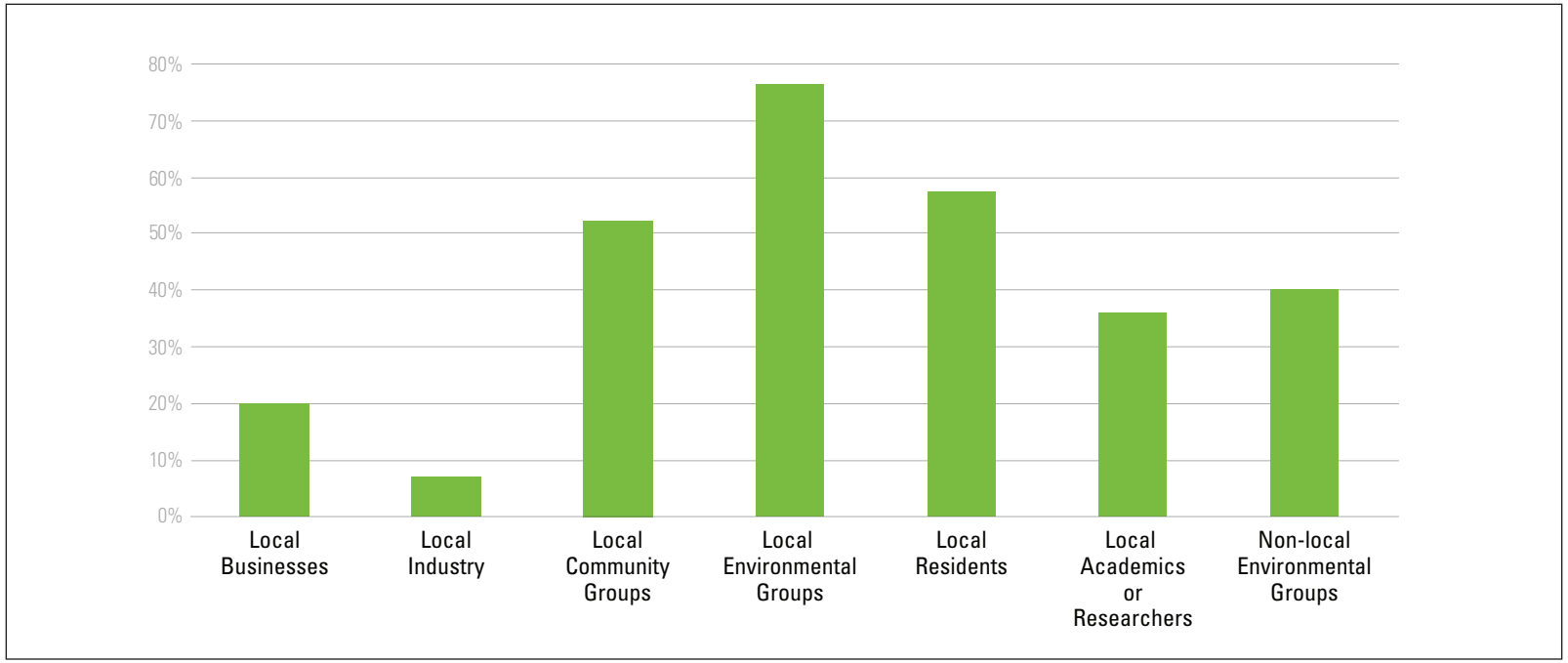


FIGURE 19 | LEVELS OF COMMUNITY SUPPORT FOR CLIMATE CHANGE POLICIES AND PROGRAMS

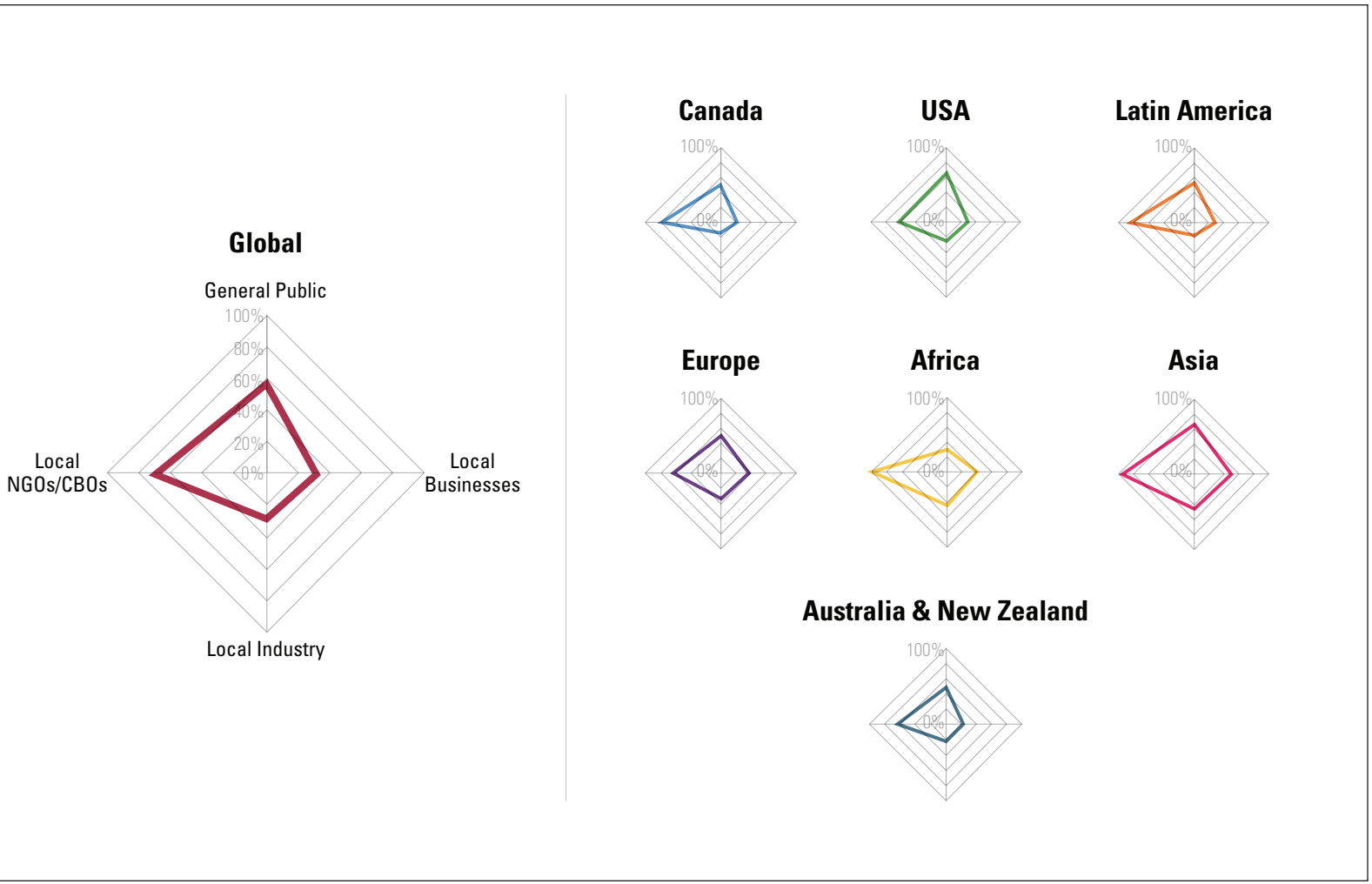
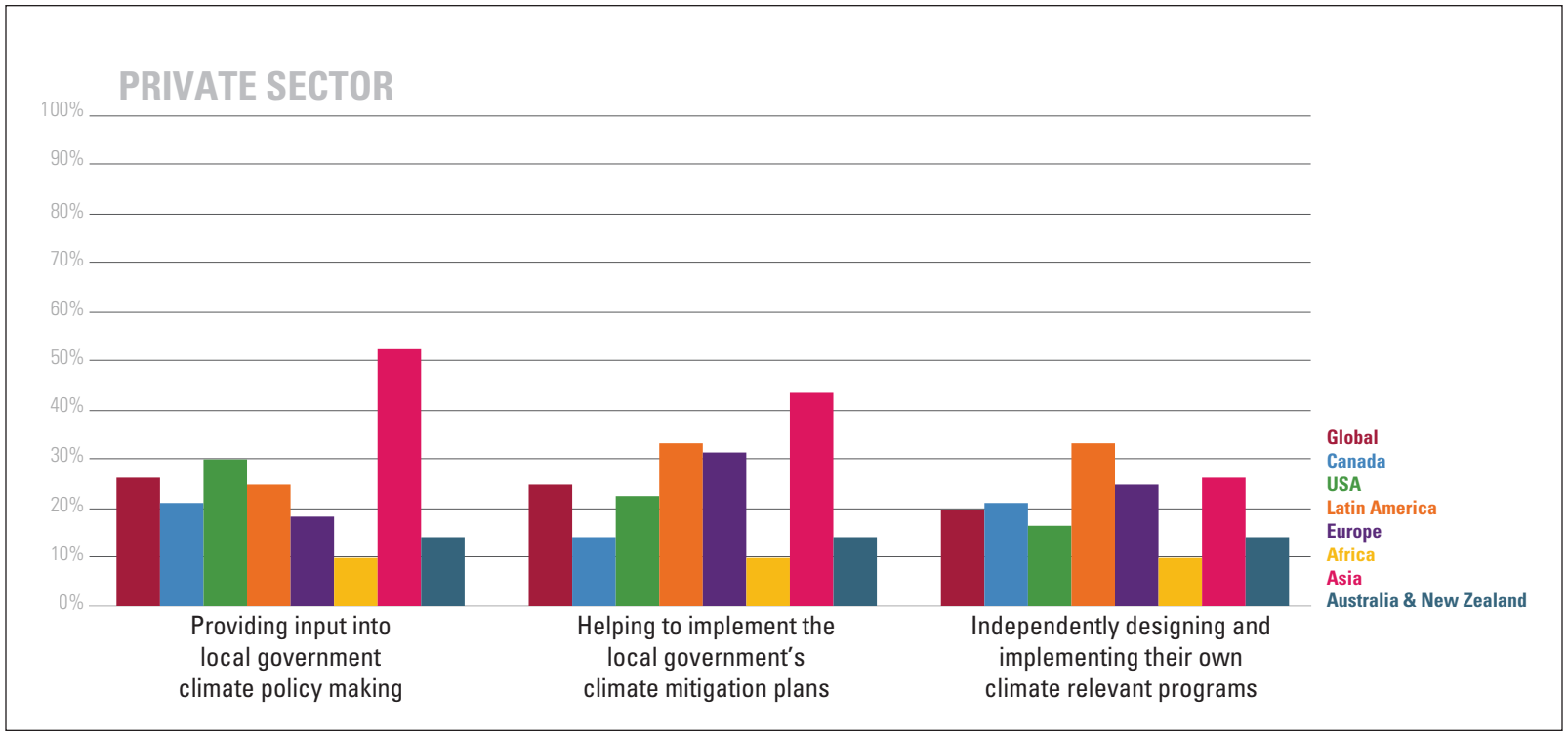


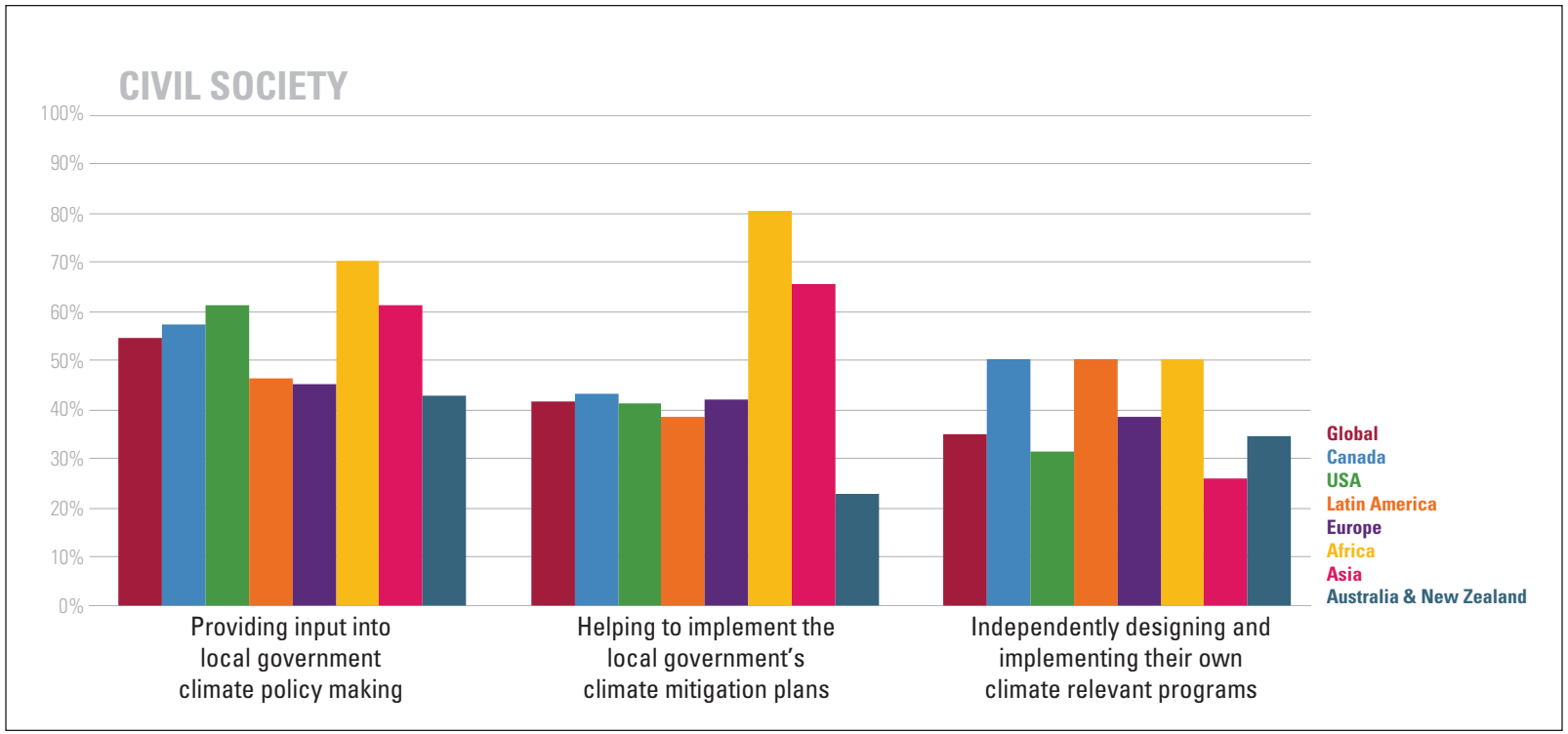
FIGURE 20 | PRIVATE SECTOR ENGAGEMENT WITH CLIMATE PLANNING & ACTION: GLOBAL RESULTS BY REGION



Support for Climate Change Policies and Programs

To first obtain a general portrait of the issue, participants were asked to rate how supportive different local groups were of climate change policies and programs. Local non-governmental and community-based organizations (NGOs/CBOs) are identified as the most supportive when ranked on a scale from 0 "actively opposes climate change policies and programs" to 4 "actively supports climate change policies and programs." As seen in Figure 19, which displays the percentage of respondents who ranked a given group either 3 or 4, NGOs/CBOs handily surpass other groups with a rating of 70%. They are followed by the general public (at 57%). Local business (32%) and industry (29%) come in substantially lower. Rather than being seen as active opponents, business and industry are ranked as neutral to slightly positive by the majority of respondents.

FIGURE 21 | CIVIL SOCIETY ENGAGEMENT WITH CLIMATE PLANNING & ACTION: GLOBAL RESULTS BY REGION



This general pattern of higher levels of support from non-profits and the general public, and lower levels of support from the private sector is generally stable across all regions. As can be seen in the regional figures, Australian and Canadian cities are the least likely to report high rates of support from non-governmental actors in general. Asian cities are the most likely to report high rates of support. Asian cities (46%) and African cities (44%) report the most active support from local industry. African cities also report the highest level of active support from local NGOs and community-based organizations (100%).

To get at something more concrete than general expressions of support, respondents were asked to indicate which, if any, local groups had made requests or placed pressure on elected officials or local government departments to take stronger action on climate change. As can be seen in Figure 18, the difference

between groups is stark. In total, 77% of cities indicate that local environmental groups have made requests or placed pressure on the local government to take stronger action on climate change. They are followed by residents (57%), and community groups (53%). All three lead other groups by a substantial margin. Coming in at the other end of the spectrum, a minority of cities report that local businesses (20%) or local industry (7%) advocated for stronger climate action by a substantially lower number of cities.

This pattern is consistent globally, with three key variations. Regionally, Asian cities report a lower overall level of external pressure for strong climate action. European cities are more likely to report active demands from non-local environmental groups (52%). Latin American cities are the most likely to report the engagement of local academics or researchers in lobbying for stronger action on climate change (71%). Apart from these variations, all three regions display little variation from the general global pattern visible in Figure 18.

Engagement in Planning and Implementation

Besides lobbying local governments, outside actors can also participate more directly in both the planning and implementation of local responses to climate change. Respondents were asked to rank how both the private sector, and civil society groups engaged in three distinct but linked spheres:

- providing input into local government climate policy making,
- helping to implement the local government's climate mitigation plans, and
- Independently designing and implementing their own climate relevant programs.

Respondents were asked to evaluate participation in each of these areas on a scale from 0 "very little engagement" to 4 "highly engaged".

Responses for both groups follow a similar trend to those observed in the area of general support for climate policies covered above. Here again the difference in rates of engagement between groups is notable. Ratings of active engagement (ranked either 3 or 4) by NGOs and community groups are more than double that of the private sector for some indicators (see Figures 20 and 21). Groups are most engaged with providing input into policy-making processes, and progressively less engaged from that point on. The most striking regional variations are the much higher rate of private sector involvement reported by Asian cities, and the comparatively higher importance of the civil society sector and lower importance of the private sector in African cities.

Discussion

Collectively these responses show that in some cases external local groups – particularly community groups and NGOs – are making significant contributions to planning and implementation. However, there are clearly significant resources yet to be brought on board. Most striking here is the general lack of engagement of the private sector and industry (which mirrors the lower level of concrete emissions reductions being realized in these areas noted earlier in section II). Rather than strong opposition, results here point to a more neutral disengagement with the issue of

climate change on the part of business and industry.

The private sector and industry are significant players in both the local economy and local emissions profiles. Different areas of the local economy will also be affected by the impacts of climate change in unique ways, which makes them key partners in adapting to climate change and building urban resilience. It is hard to imagine effective responses to climate change without a more active collaboration between local governments and the private sector. But even when it comes to the comparatively high levels of participation from community groups and NGOs, results show that much more may be possible. Only a minority of cities report that NGOs/CBOs go beyond providing input and become actively engaged in implementation or independent climate change action.

Responses highlight that processes of consultation have been effective at incorporating input from citizens and NGOs into climate change planning processes. But they also show that this collaborative relationship has not been as effectively maintained when it comes time to implement local plans. This leaves much of the burden on the shoulders of the local government, and also overlooks valuable resources that reside within urban communities.

Box 5: Key Findings

- **Local NGOs and CBOs** are ranked as being the **most supportive** of climate change policies and programs. The general public is also ranked as highly supportive.
- Levels of general support from **local businesses of industry** are ranked as **neutral**.
- **Local CBOs and NGOs** also rank highly for their level of participation in designing or implementing climate mitigation policies and programs: 55% are reported to be "engaged" or "highly engaged" in providing input into local government policy making.
- **Private sector actors** rank much **lower** in the same areas: 26% are reported to be "engaged" or "highly engaged" in providing input into local government policy making.

VII Enablers of Planning and Implementation

The work that cities do to plan and implement climate change adaptation and mitigation strategies can be enabled by a broad range of factors. Case studies point to the importance of everything from strong leadership by elected officials, to the policy windows created by the international attention that accompanies hosting major sporting or diplomatic events. Other research has also pointed to the importance of membership in intra-municipal networks (such as ICLEI), particularly when it comes to issues such as political legitimacy, and access to information, expertise, and technology (Betsill and Bulkeley 2006). To capture an overview of these diverse enablers, respondents were asked a series of questions about the factors that had helped support and guide their climate change initiatives.

An Overview of Key Enablers

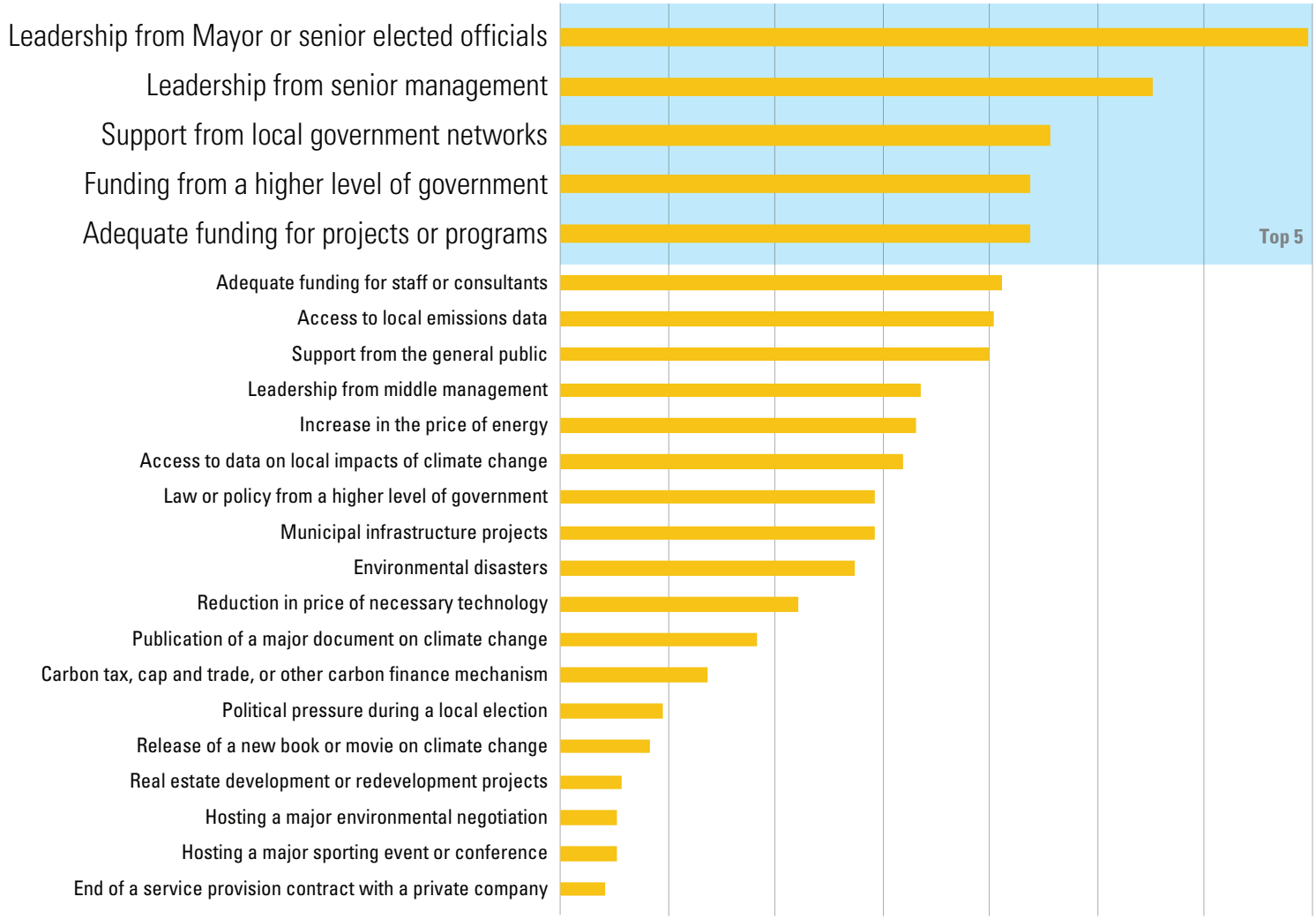
To begin, cities were asked to identify factors that had been the most helpful in allowing their local government to design and implement its climate mitigation strategies. These responses were selected from an extensive list of possible enablers in eight key thematic areas: leadership, funding, political support, information, infrastructure and development, economic factors, environmental factors (e.g. extreme weather), and legal requirements.

As can be seen in Figure 22, the most significant enablers to date have been leadership from mayors and other senior elected officials, and leadership from senior management. Support from local government networks at various scales ranks third, and access to funding and information on local emissions conclude the list of the most commonly identified enablers of mitigation planning and action.

Looking at the top 5 enablers for each region (see Table 3) highlights the importance of leadership from mayors, senior elected officials, or senior management. These factors ranked within the top five for nearly all regions. (The one exception being Australia, where leadership from mayors or senior elected officials ranked 6th.)

The importance of support from local government networks is something particularly important to cities in Canada, Latin America, and Asia. Adequate funding for climate change staff, projects, and programs was most often ranked within the top five enablers by cities in Canada, the United States, Europe, and Australia. Australian and Latin American cities placed particular emphasis on the role of funding from higher levels of government in enabling successful local mitigation strategies. And European cities were most likely to identify access to data on local emissions as one of their top five enablers. Less common enablers within the regional top fives include the importance of data on the local impacts of climate change for Latin American cities, and the positive role of laws or policies requiring local action in Asian cities.

FIGURE 22 | ENABLERS OF SUCCESSFUL CLIMATE MITIGATION STRATEGIES: GLOBAL RESULTS



Inter-municipal Environmental Networks

The issues of funding and leadership have been discussed earlier in this report. As another key enabler, the role of inter-municipal networks is a varied one that requires further discussion. Cities are members of multiple inter-municipal environmental networks. An average city is a member of 2.3 such networks. Most are active members in these associations; 41% of cities report regular ongoing participation on a more than annual basis in events or programs sponsored by regional, national, or international environmental networks. Nearly three quarters of respondents (73%) report that their local government participates in such events at least once a year. These results are roughly consistent across all regions.

To determine what specific advantages cities derive from network membership, participants were presented with a variety of potential benefits covering issues of access to funding, expertise, and technology; opportunities for learning and networking; and issues of political capital. Respondents were then asked to identify and rank the three most important benefits for their municipality. The top three benefits that emerged were:

- access to technical expertise,
- opportunities to learn directly from practitioners from other cities, and
- opportunities to network and form personal connections with practitioners from other cities.

These results are perhaps not unexpected, given that network events often intentionally focus on precisely these three elements of technical training, inter-city learning, and networking. The high ranking given to networking with practitioners in other cities compliments the similarly high importance given to internal networking between the person/team responsible for climate planning and staff within other local government agencies (see section IV above).

Benefits associated with access to funding and technology make up the middle rankings here, while those associated with political capital – either in the form of providing members with a green public image, or providing participating staff with increased internal legitimacy within their local government – were ranked lowest. When linked back to the needs and motivations that cities report in relation to their climate change programs, these findings point to possible opportunities for inter-municipal climate and environmental networks going forward. Cities have signaled the importance of both the political capital attached to taking action on climate change, and the challenges imposed by a lack of funding for both staff and program implementation. There appears to be room for stronger network support around these issues.

Other Sources of Information and Guidance

Inter-municipal environmental networks are only one aspect of the varied external networks that cities maintain to access information and guidance for their climate change initiatives. To understand how local sources of knowledge compare with the support derived from cities' broader connections, respondents were asked to rank the degree to which their city relied on an extensive list of groups and organizations for information and guidance related to their climate change planning activities (in terms of both adaptation and mitigation). These groups included

TABLE 3 | TOP 5 ENABLERS OF CLIMATE MITIGATION STRATEGIES: REGIONAL RESULTS

Region	Value	Response Rate
Canada	Leadership from senior management (i.e. Departmental Directors)	67%
	Adequate funding for climate change staff or consultants	60%*
	Leadership from Mayor or senior elected officials	60%*
	Adequate funding for projects or programs	53%*
	Support from local, regional, national, or international local government networks	53%*
USA	Leadership from Mayor or senior elected officials	77%
	Leadership from senior management	52%
	Support from the general public	46%
	Support from local, regional, national, or international local government networks	45%
	Adequate funding for climate change staff or consultants	44%
Latin America	Leadership from senior management (i.e. Departmental Directors)	57%
	Leadership from Mayor or senior elected officials	50%*
	Support from the general public	50%*
	Municipal infrastructure projects	50%*
	Access to data on local impacts of climate change	50%*
	Funding from a higher level of government supporting local action on climate change.	50%*
	Support from local, regional, national, or international local government networks (i.e. ICLEI, UCLG).	50%*
Europe	Leadership from Mayor or senior elected officials	74%
	Leadership from senior management (i.e. Departmental Directors)	57%
	Leadership from Mayor or senior elected officials	53%*
	Access to local emissions data	53%*
	Adequate funding for climate change staff or consultants	47%
Africa	Leadership from Mayor or senior elected officials	70%
	Leadership from middle management	60%*
	Support from local, regional, national, or international local government networks (i.e. ICLEI, UCLG).	60%*
	Environmental disasters (flood, drought, storm, heatwave etc.)	60%*
	Leadership from senior management (i.e. Departmental Directors)	50%*
	Municipal infrastructure projects	50%*
Asia	Leadership from Mayor or senior elected officials	67%
	Leadership from senior management (i.e. Departmental Directors)	58%
	Support from local, regional, national, or international local government networks (i.e. ICLEI, UCLG).	54v%
	Environmental disasters (flood, drought, storm, heatwave etc.)	50%
	Law or policy from a higher level of government requiring local action on climate change.	46%
Australia & New Zealand	Funding from a higher level of government supporting local action on climate change.	60%
	Adequate funding for projects or programs	57%*
	Leadership from senior management (i.e. Departmental Directors)	57%*
	Leadership from middle management	57%*
	Increase in the price of energy	57%*

** tied result*

both those that were locally active (such as local businesses or municipal departments themselves), and those based abroad (such as internationally active NGOs, development banks, or UN agencies). These rankings were done on a scale from 0 "not at all" to 4 "a great deal". Figure 23 displays the percentage of cities ranking each group as either a 3 or 4.

There is considerable variation in the importance of these groups as sources of information and guidance. The top three were: professional contacts in other local governments (66%), local government departments (64%), and regional or state agencies (57%). Looking across the top ranking groups more generally, it is clear that professional contacts within government agencies and the networks that facilitate them are critically important. Cities learn from other cities, and government agencies learn (in large part) from other government agencies.

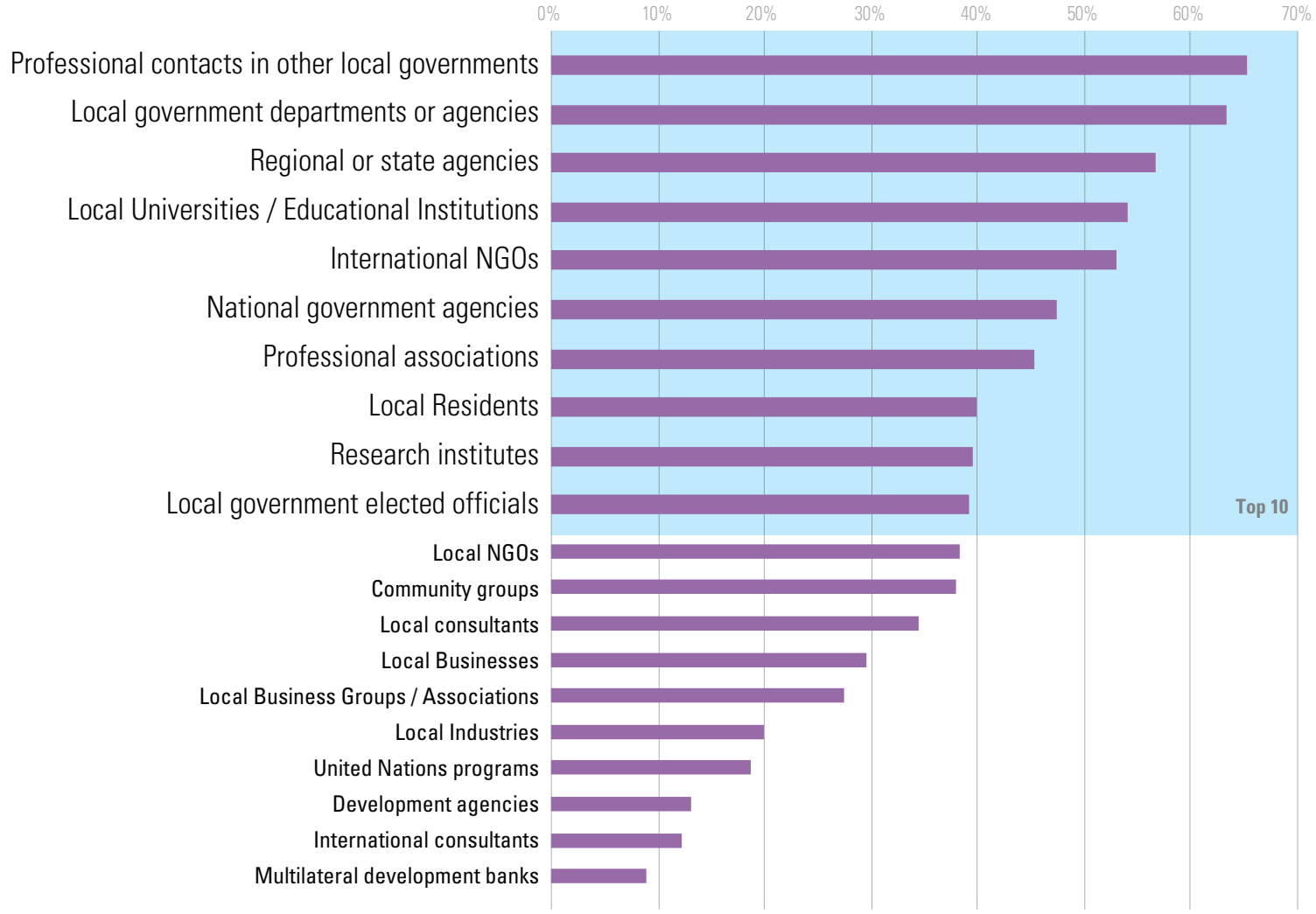
Another key relationship exists between cities and academic and research institutions of different kinds. The position of local universities and educational institutions among the top five shows that local governments and academic institutions have managed to create meaningful connections around the issue of climate policy and suggests that researchers are meaningfully engaging local governments in their work. Universities play an important role across all geographical areas, but there is still significant regional variation with the lowest rankings for their importance coming from Asia (32%), and the highest from Latin America (77%). This is bolstered by lower but still important numbers of cities (40%) that rate research institutes as significant sources of information and support.

When local partners from the private sector, NGOs, or communities are considered, we see further confirmation of patterns already noted earlier. Local NGOs and community groups are identified as being significant sources of information and guidance by slightly less than 40% of respondents. This percentage is notably higher in Africa (60%), Latin America (54%), and Asia (52%). Australia and New Zealand, at 20%, report the lowest percentage of cities who rely significantly on local NGOs for information and guidance.

Private sector actors, in contrast, are all clustered towards the lower end of the rankings. Globally 30% of cities signal that they rely significantly on local businesses to inform and guide their climate change efforts, 28% on local business groups and associations, and 20% on local industry. Asia is a key exception here, with between 33% and 40% of cities ranking the private sector as a significant influence in this area. The highest ranking for private sector actors comes from Latin America, where 58% signal the significant importance of local business associations and groups.

It is important to note that the global average rankings mask the regional importance of certain key organizations. As sources of information and guidance, UN programs (e.g. UN-Habitat, UNEP, UNDP) and development agencies (e.g., DANIDA, DFID, USAID), were ranked very highly by cities in Asia, Latin America, and Africa. Multilateral development banks (e.g. World Bank, ADB) were also ranked very highly in Asia and Latin America. Similarly, 100% of cities in Africa and Latin America report that they significantly relied on international NGOs (such as ICLEI) to help inform and guide their climate change programs.

FIGURE 23 | SOURCES OF INFORMATION & GUIDANCE FOR CLIMATE PLANNING: GLOBAL RESULTS



Box 6: Key Findings

- The top three **enablers** of urban mitigation plans and programs are: **leadership** from the **mayor** or other elected officials, **leadership** from **senior management**, and support from local government **networks** (i.e. ICLEI, ICLG).
- The top three benefits local governments derive from membership in municipal environmental networks are: access to **technical expertise, learning directly** from practitioners in other cities, and opportunities to **network** and form personal ties with other practitioners.
- As sources of information and guidance for climate planning work, local governments report that the **three most important** are: **professional contacts** in other local governments, local government **departments** or agencies, and **regional or state agencies**.

VIII Summary and Conclusions

Urban responses to climate change are increasing in scope, scale, and complexity. Aware of the dual imperative to reduce emissions and prepare for the impacts of climate change, 73% percent of cities are engaging with both adaptation and mitigation. To understand and address their greenhouse gas emissions, 85% of cities have conducted emissions inventories, and 78% of cities have plans in place with specific targets and planned actions to reduce their emissions. Inventories generally cover both corporate and community emissions, and a majority of cities (56%) report that their mitigation plans target both types of emissions. A significant number of cities (44%) however, have plans that are mostly or entirely limited to reducing corporate emissions alone. The three most common areas where local governments reduce emissions are local government buildings, local government vehicle fleets, and waste reduction. Less than a quarter of cities have been able to facilitate measurable reductions in the private sector.

Internally, cities are producing dedicated climate change plans while also mainstreaming climate change into other local government plans (i.e. sectoral, long range, or sustainable development plans). A comparison of cities' initial and current approaches to climate change planning shows a global increase in this type of mainstreaming. For 63% of cities this work is being led by either a small team or a single individual. But they do not work in isolation; global results show a general dominance of integrative and collaborative mitigation planning processes over more isolated and siloized approaches. The agencies that contribute most heavily to designing and implementing climate change plans are those responsible for environmental planning, land-use planning, solid waste management, water, and transportation. Those that contribute the least are locally operated electrical utilities, and the agencies responsible for health, and economic development. Tactics for building internal networks between departments are the most effective strategies for encouraging inter-departmental engagement with climate change. Most cities however are not adopting tried and true measures to support innovation – either generally, or more specifically around climate change policies and programs.

Within the broader urban community, local governments report that civil society groups and residents are strong supporters of climate change policies and programs. Forty-eight percent of cities report that civil society groups are actively engaged with designing and implementing local responses to climate change. The private sector is rated far lower across all measures of support or engagement. Rather than strong opposition, results point to a more neutral disengagement with the issue of climate change on the part of business and industry.

The top three motivations for cities to begin climate mitigation planning are: generating political capital, meeting local development goals, and responding to climate-associated risks. The top three overall (non climate change related) priorities

for cities are: attracting business, creating jobs, and improving community facilities. Cities report that climate mitigation policies make little or no contribution to the majority of their non-environmental local development priorities. One key exception is increasing access to basic services, which is reported to work in synergy with climate mitigation.

The lack of functional synergies between mitigation efforts and local development priorities is particularly acute for priorities related to economic goals. Globally, 82% or more of cities report that their mitigation efforts have contributed little or noting to their city's economic development. These results join the already mentioned lack of emissions reductions from the private sector, and the lack of engagement in climate planning and implementation on the part of local businesses, industry, and local government units working on economic development. Taken together, this suggests that cities have yet to truly engage with the commonly discussed difficulty of aligning environmental and economic objectives.

Regional Variations

The results summarized above are broadly consistent for cities around the world, although there are also some important regional differences. Cities in Africa are the most likely not to have conducted an emissions inventory. They are also the least likely to have made measurable emissions reductions. Emissions reductions in Africa are highly uneven: globally African cities are the most likely to report having made reductions in the areas of landfill gas capture (along with Canadian cities) and residential energy use, but they also report no reductions at all in many other areas. African cities are most likely to report that their mitigation plans are created by core climate staff (or consultants) with little or no input from other parts of the local government. Despite these setbacks, African cities are the most likely to report that their mitigation programs have made an important contribution to attracting business. They also report the highest level of active engagement from local NGOs and community-based organizations, and the second highest levels of general support from local industry.

Asian cities show similar results to their African counterparts in the areas of emissions inventories, measurable emissions reductions, and siloized approaches to mitigation planning. However, on all three they come in closer to global trends. Asian cities are the only respondents to signal that mitigation programs have made a significant contribution to improving healthcare. Asia is also the only region where a high percentage of cities report that local government agencies responsible for economic development contribute significantly to climate change planning. Asian cities also report the highest rate of general support from local industry. Overall, Asian cities report the lowest level of external lobbying for stronger climate action by non-governmental actors, but also the highest rates of participation in implementation from the private and civil-society sectors. This may indicate underlying differences in the way that networks of governance are configured around climate change in Asian cities.

Latin American and European cities are leading efforts to expand the scope of urban emissions inventories. Twenty-five percent of Latin American cities and 20% of European cities report that they are including upstream emissions in their inventories. Latin American cities are also leaders (along with Canadian cities) in

reductions related to increased use of public transportation. Latin American cities are also unique in the important role played by local academics and researchers in shaping local climate change plans. Local universities and research institutes there are credited with being a significant source of political pressure and a key source of information and guidance.

In terms of the mainstreaming of climate change within other municipal plans, North America contains the two most significant regional variations. Canadian cities report among the highest levels of mainstreaming. They also report the biggest shift, having moved strongly away from an initial approach to climate planning that showed among the lowest levels of mainstreaming. In contrast, the United States reports the second lowest levels of mainstreaming (after Africa) and the least change in levels of mainstreaming between initial and current climate change plans. Cities in the United States are also the most likely to report that they are conducting only mitigation planning (at 41%). Taken together, these results position American cities at the margins of a general global trend towards the integration of adaptation and mitigation planning, and the mainstreaming of climate change planning across municipal agencies.

North American cities are the most likely to report that they only have a single staff member working on climate change. Cities in Canada, Australia and New Zealand are significantly less likely to report high levels of internal support from elected officials and local government staff. Their responses in this area are as much as 28 percentage points lower than the global average. Cities in Australia and New Zealand are also the most likely to report that their emissions inventories focus solely on corporate emissions (at 74% compared to 22% globally). This is reflected in the fact that these cities are also among the most likely to report having made corporate emissions reductions, and among the least likely to report measurable reductions to community emissions.

Challenges for Planning and Implementation

Cities report that their climate change work is affected by multiple, varied, and significant challenges that are dominated by a core group of hurdles affecting cities worldwide. The top three challenges facing cities are a lack of access to funding for implementation, competition between climate change and other local priorities, and a lack of funding to hire sufficient staff to work on climate change. Overall, challenges related to insufficient financial or human resources are the most problematic for cities. Institutional challenges related to the work of mainstreaming of climate change and the limits of local government jurisdiction are the second most common. Challenges associated with information and awareness are less severe. A lack of information on the local impacts of climate change impedes climate change planning in 40% of cities, while a lack of information on local emissions is significantly less common (27%). This signals that access to basic information necessary for adaptive planning and increasing urban resilience remains an important challenge for a large number of cities. More problematic than basic scientific information on emissions or impacts, is an understanding of their relevance and the ways in which local governments can address the issue (both identified as significant problems by over 50% of cities). This points to the need to focus not only on providing more and better scientific data, but also on providing support for the processes through which this data is transformed into knowledge and action. Least problematic, overall, are challenges related to

political or institutional leadership.

Regionally, there are a series of significant variations from global trends. Canadian cities are the most likely to report important institutional and leadership related challenges. The percentage of Canadian cities reporting institutional difficulties surpassed those of all other regions for eight out of the ten institutional challenges covered in the survey. Cities in Asia, Europe, Latin America, and the United States are less likely to report that their climate change plans face significant institutional challenges. A lack of staff or staff time is a major issue for all cities in the survey, but Australia and New Zealand are particularly affected, with 77% of cities reporting a major challenge in this area (compared to 66% globally). African cities are the most likely to report challenges in the areas of information and awareness. On average, 61% of African cities report significant problems here, compared to 36% globally. Access to the necessary technology for planning and implementation is also a significant problem for African cities, as is a lack of necessary skills within the local workforce to implement local government climate change plans. Although not a significant challenge globally, a shortage of skills in the local workforce also appeared as an important challenge for Asian and Latin American cities.

Conclusions

The results discussed here show both the evolution of urban responses to climate change and the significant challenges that cities still have before them. Worldwide, cities are pursuing adaptation and mitigation planning in an integrated fashion and mainstreaming it across local government agencies. They are also producing plans that target a broad selection of corporate and community emissions. They are conducting their planning in a collaborative manner that incorporates multiple governmental and non-governmental actors. This work is enabled by strong leadership, and support from local government networks. Pioneering cities are expanding the scope of local greenhouse gas emissions inventories, and expanding the scope of local networks of climate governance to include civil-society and private sector actors. These are inspiring findings, and some – such as the shift towards an increased mainstreaming of climate change or an engagement with adaptation planning – have occurred over a relatively short period of time.

More problematically, the strongest cross-cutting finding in the survey is the lack of engagement of economic actors (both public and private) in the design and implementation of urban responses to climate change. There will be clear limitations to what cities can accomplish if they do not effectively connect their economic and environmental priorities, and actively incorporate economic actors into local networks of urban climate governance. The lack of synergies in this area is the most severe example of a more general inability to effectively link mitigation policies to the achievement of other local development priorities. Furthermore, although significant numbers of cities have forged strong partnerships with the civil-society and private sectors, many have not. There remains much potential for local governments to more effectively facilitate the participation of these groups in designing and implementing climate change strategies. Addressing these issues may help cities to reduce the impact of the persistent challenges posed by the limited financial and human resources available to address climate change.

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