Seeking Synergy Solutions

How Cities Can Act on Both Climate and the SDGs

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Partners Behind the Thematic Report

Institute for Global Environmental Strategies (IGES) aims to achieve a new paradigm for civilization and conduct innovative policy development and strategic research for environmental measures, reflecting the results of research into political decisions for realising sustainable development both in the Asia-Pacific region and globally. www.iges.or.jp/en

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Technical University of Berlin's mission statement lays down in writing its self-image as a globally recognized research university with a rich tradition. It aims to further develop science and technology for the benefit of society. The members of the University are committed to the principle of sustainable development. They aspire to meet the requirements of the present, while seeking not to burden future generations. www.tu.berlin/en

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Key Messages

- Although cities are well-positioned to leverage synergies between climate change and the SDGs, knowledge gaps and institutional constraints can make capturing these win-win gains difficult.

- Cities are advised to start working on synergies with demand-side solutions as these not only address the root causes of the climate crisis but improve essential service provision and well-being while making cities more livable.

- Cities can also choose from a broad spectrum of concrete actions including improved cooling (including blue and green infrastructure), building energy efficiency, sustainable mobility, waste management/circularity that will enhance other urban agendas. These reforms not only align with many SDGs, such as health, but also the recent COP28 agreements.

- Cities can also strengthen cross-sectoral and multi-level integration, building urban-rural partnerships and engage in transnational city networks to achieve synergies.

Executive Summary

With more than half the world's population living in urban areas, the decisions cities make now will determine whether the world achieves a resilient net-zero future. Fortunately, cities are not only well-positioned to make these decisions on climate change but align them with a variety of sustainable development goals (SDGs). Because of their potential for innovation, flexibility, and proximity to affected stakeholders, cities provide significant opportunities to leverage synergies between climate action and SDGs and help lower mitigation/adaptation costs while building multi-stakeholder partnerships needed to raise ambitions on the Paris Agreement and SDGs.

Although synergies hold considerable promise in cities, that potential is not always realized. This may be because urban policymakers lack the knowledge of where to begin when framing arguments for synergies. Cities may similarly fail to understand the concrete measures in key sectors with synergistic potential. Finally, cities may confront institutional and governance barriers that prevent forging connections between climate and the SDGs. This paper is intended to help urban policymakers and other interested stakeholders address these three knowledge gaps. Namely, the paper focuses on (i) demand side action as a key entry point; (ii) four sectors and corresponding measures with win-win potential; and (iii) three types of governance reforms that can bring synergies to life in cities.

The entry point with the greatest synergistic potential in cities are demand-side climate solutions. These solutions are appealing because they not only seek to alter upstream behaviors that can harm the climate but also support the provision of essential services. As such, focusing on the demand side can help address the root causes of climate change at the same time as steadily improving the capacity of cities to improve the well-being of its citizens.

The paper details a set of concrete reforms across four sectors that can be used to capture synergies in cities. These includes options for cooling (including blue and green infrastructure); energy efficiency in buildings; interventions to transform transport systems; and making waste management more circular in cities at different levels of development. Actions in each of these areas have strong connections to climate change and the SDGs. Making these connections more visible can help put in motion a cycle of reinforcing interactive dynamics that support transformative changes.

Finally, the paper outlines the kinds of governance and enabling reforms that cities can adopt to effectively implement synergies in cities. These include mechanisms to strengthen cross-sectoral and multi-level integration. An additional set of reforms could focus on building urban-rural partnerships (using an approach known as the Circulating and Ecological Sphere (CES)). Finally, cities are encouraged to look beyond their boundaries to learn from peers by engaging in transnational city networks.

1. Introduction: Why Cities?

Strengthening the nexus between the Sustainable Development Goals (SDGs) and climate planning is imperative for several reasons. Firstly, achieving many of the SDGs depend on progress on climate change and *vice versa*. Secondly, integrated planning (in particular for infrastructure) can deliver development benefits (*e.g.*, improved health, new jobs, expanded green spaces) that offset the costs of greenhouse gas (GHG) mitigation and build resilience. Thirdly, working across climate and other objectives can ensure growing pools of climate-related finance meet other development priorities. Finally, integration can help enhance coordination across government agencies and stakeholder groups, building coalitions that drive transformative change (Amanuma *et al.*, 2018).

Cities have a pivotal role to play in all the above areas. Cities are not only the source of more than 70% of the world's GHG emissions but also home to more than half of humanity. Further urbanization in low- and middle-income countries is generating demand for low-carbon infrastructures now, while leapfrogging to avoiding future gridlock and pollution. By skipping stages of development, for example, by moving straight to renewable energy sources without first building extensive fossil fuel infrastructure, cities can create unique development paths shaped by the benefits and opportunities of emerging technologies such as the digitalization of financial services. Cities are also hubs of innovation driven by the concentration of resources, knowledge sharing, economic opportunities, density of education institutions and significant infrastructure. Cities are on the ground floor for ongoing efforts to improve well-being and quality of life. Moreover, cities frequently possess high concentrations of resources and technology that are critical to outside-the-box thinking and forward-looking planning.

In addition, cities are often more agile than national governments, enabling experimentation and real-time learning needed for impactful and scalable solutions. Cities are also prone to network and contagion effects that can quickly spread solutions (as shown in China) and positive developments could spread from city to city. Further, cities are melting pots of diverse actors – from municipal authorities to citizens to businesses – each playing key roles as agents of transformation. In sum, cities are uniquely positioned to lead the charge in leveraging synergies and limiting trade-offs between the SDGs and climate objectives (Ozawa-Meida *et al.*, 2021).

Although cities are frequently important leaders, they also differ (see Lamb et al., 2019 for a sorting of cities into different types and an organization of associated case studies, see also *"The role of Knowledge and Data"*). As such, synergistic strategies will vary between different types of cities. This is most evident in the differences between rapidly growing cities in Asia and Africa and established cities with often older infrastructure in Organization of Economic Cooperation and Development (OECD) countries. Additional differences include urban form – sprawling versus compact cities, and differences between primary and secondary/intermediary cities. Finally, varying governance capacities, coordination mechanisms, and delegated powers influence whether cities make connections between climate and other SDGs.

Although there is a variation across cities, the good news is that many cities are already taking climate action or responding to the SDGs. More than a thousand cities have adopted climate plans, often featuring GHG strategies that decarbonize their electricity supply and improve building stocks (Bery & Haddad, 2023). In addition, 145 cities have submitted Voluntary Local Reviews (VLRs) as a policy tool to structure local efforts to achieve the SDG. Cities tend to prioritize SDG 11 (Sustainable Cities and Communities) In their VLRs, while establishing what are often natural connections with other relevant goals (see Table 1); for example, since 2018, SDG 13 has gradually increased in importance as a priority in their VLRs. Helsinki is a frontrunner and serves as an illustrative example of a city that is moving quickly to make connections between ambitious climate actions and sustainability imperatives (Box 1).

TABLE 1. Connections between SDG 11 Targets and Other SDGs

Sustainable Cities and Communities	SDG 1	SDG 2	SDG 3	SDG 4	SDG 5	SDG 6	SDG 7	SDG 8	SDG 9	SDG 10	SDG 12	SDG 13	SDG 14	SDG 15	SDG 16	SDG 17
Target 11.1: Safe and affordable housing												✓				
Target 11.2: Affordable and sustainable transport systems												✓				
Target 11.3: Inclusive and sustainable urbanization												✓				
Target 11.4: Protect the world's cultural and natural heritage												✓				
Target 11.5: Reduce the adverse effects of natural disasters												✓				
Target 11.6: Reduce the environmental impacts of cities												✓				
Target 11.7: Provide access to safe and inclusive green and public spaces												✓				

Box 1. The Case of Helsinki

Helsinki is a world-leading city both in terms of climate targets and SDGs. It set a goal of carbon neutrality by 2030 and a goal of carbon negativity from 2040 onwards. Together with New York, Helsinki is a frontrunner in defining and operationalizing its SDG targets and has already submitted its 3rd voluntary local report to UNDESA.

Helsinki has achieved significant milestones in its sustainability and climate action. The city has ambitiously brought forward its carbon neutrality target from 2035 to 2030, underscoring its commitment to addressing climate change. This is complemented by a marked increase in the effectiveness of its climate work. Key achievements include the promotion of energy efficiency in housing companies and the closure of the Hanasaari coal power plant in 2023, signaling a shift towards cleaner energy sources.

Helsinki places a strong emphasis on social sustainability and well-being, directly linking it to the city's basic services. The city is recognized internationally for its prosperity and the high level of basic services related to health, education, and well-being. Despite these achievements, Helsinki faces challenges in areas such as increasing inequality, mental well-being disparities, and issues related to lifestyle, including obesity and unhealthy habits. The COVID-19 crisis and geopolitical tensions have added pressure on social well-being, underscoring the need for a continued focus on these areas. Helsinki's response includes initiatives like the City of Helsinki Welfare Plan, aimed at reducing health and welfare disparities and promoting a good quality of life for all residents.

Despite these successes, Helsinki encounters challenges in sustainable consumption. High meat consumption and prevalent issues related to overweight and obesity are concerns that the city needs to address. Also, the growth of the city and safeguarding nature values have become a key challenge. Affordable and sufficient housing conflicts both with climate targets (embedded CO_2 in buildings) and nature preservation goals. Decarbonizing the transport sector remains a key challenge: Strategies are well defined, but political implementation remains lagging due to the highly politicized interpretation of everything that opposes automobility.

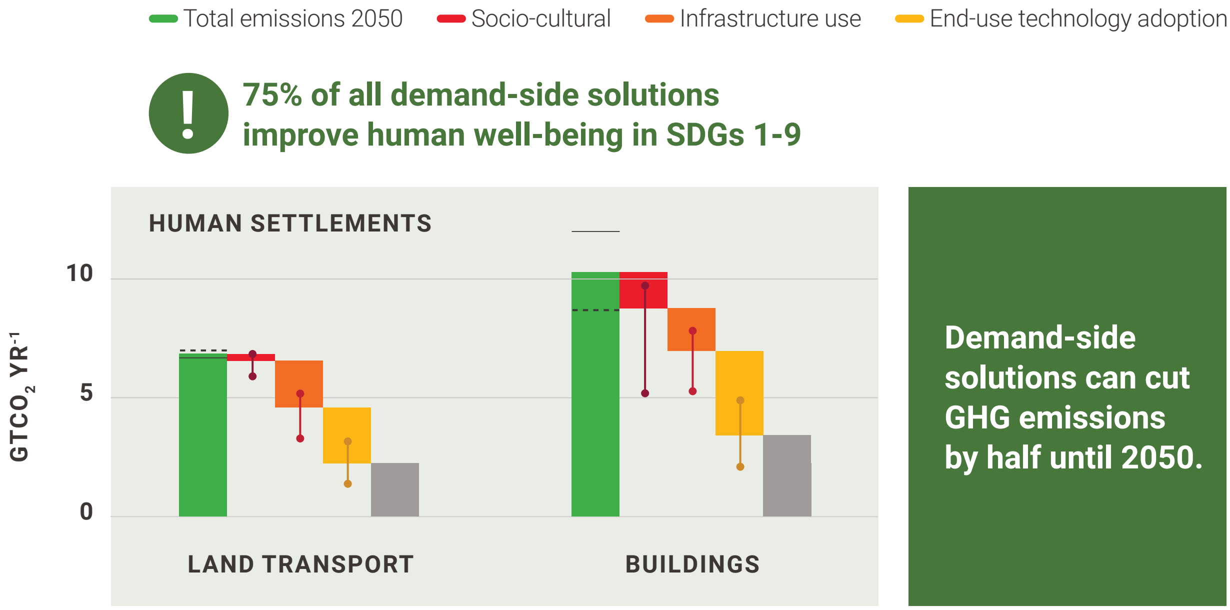
2. An Entry Point for Synergistic Action in Cities: Demand-Side Solutions

A key question for cities is what kinds of solutions they should support to strengthen synergies between the SDGs and climate targets. One of the areas that has significant potential in this regard are solutions that focus on the demand-side. Demand-side solutions are strategies that aim to reduce GHG emissions by influencing the demand for goods and services, consumption patterns, and behaviors. Demand side solutions can achieve immediate and long-term reductions in emissions.

While demand-side action is important, much of the focus has been on the supply side. However, supply side solutions often require more significant infrastructure changes and long-term investment. Demand-side action is crucial for addressing both climate and SDG targets, as emphasized in Chapter 5 of the Working Group III contribution to the IPCC's Sixth Assessment Report (2022) (see Figure 1). Three arguments underscore the central role of demand-side strategies in cities:

- **Reduction in Greenhouse Gas Emissions:** Demand-side measures directly reduce GHG emissions. By cities adopting low-carbon modes of transportation by providing adequate infrastructure, and citizens shifting to plant-based diets, and utilizing energy-efficient technologies, such as heat pumps and electric vehicles, individuals and communities can significantly lower their carbon footprint. The IPCC report highlights that changes in consumer behavior and choices can lead to substantial emission reductions, particularly in sectors like transportation, housing, and food, which are significant contributors to global emissions.
- **Alignment with the SDGs:** Demand-side strategies often align closely with multiple SDGs. For example, shifting to plant-based diets not only reduces emissions (SDG 13) but also promotes health (SDG 3) and sustainable land use (SDG 15). Cities and their public canteens (schools, childcare, city council, etc.) have major leverage here. Similarly, enhancing public transportation and reducing reliance on private vehicles addresses climate goals while also contributing to sustainable cities and communities (SDG 11), reducing air pollution (SDG 3), and potentially reducing inequalities (SDG 10) by providing more equitable access to mobility.
- **Resource Efficiency and Sufficiency:** The emphasis on demand-side solutions fosters a culture of resource efficiency and sufficiency. By focusing on the reduction and optimization of resource use, these strategies encourage a more sustainable and efficient use of energy and land resources. This approach not only aids in mitigating climate change but also supports the broader goals of sustainable development by promoting responsible consumption and production (SDG 12). The IPCC report notes the potential of demand-side actions in reducing pressure on resources and the environment, thereby facilitating a transition to a more sustainable and resilient system. Within human settlements, the metric floorspace per capita will play an important role: if housing demand growth is similar to historical experience, sustainable housing provision at scale will be hardly possible.

FIGURE 1. Demand-side solutions, categorized into socio-cultural factors, infrastructure use, and end-use technology adoption can reduce GHG emissions in cities by 2050 by more than 50% and, at the same time, improve well-being and address SDGs



Source: IPCC, 2022

While all the socio-cultural, infrastructural, and technological adoption options are relevant in cities, infrastructure provision of public services is at the core of urban action, reflecting municipal responsibilities over essential service provisioning, transport, waste, heating, and other infrastructure, and its role in designing public places.

3. Four Synergistic Actions in Cities: Cooling, Buildings, Mobility, and Waste/Circularity

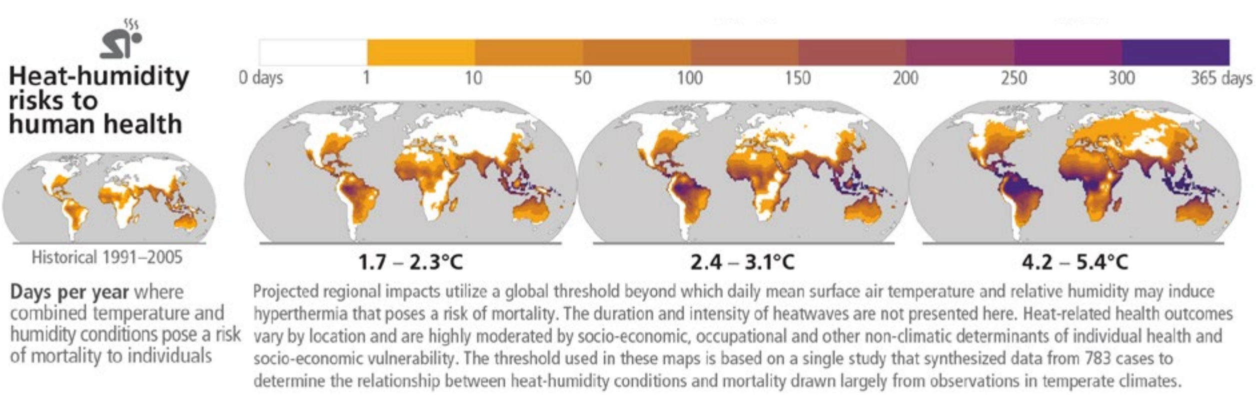
Cities face many challenges that simultaneously affect the climate and other development priorities. By the same token, there are several solutions that can deliver multiple benefits from working across the climate and SDGs. This section details synergistic solutions in four areas: (i) cooling; (ii) buildings; (iii) mobility; and iv) waste management.

3.1 Cooling

Increased global warming will increase hot temperature extremes. In its Sixth Assessment Report (AR6), the IPCC highlighted that the frequency and intensity of heat-related extremes will increase with every further increment of global warming (IPCC, 2021). Even under Paris-agreed global warming targets, the heat-humidity risks to human health (Figure 2) and the frequency and intensity of 10-year and 50-year heat events will rise (IPCC, 2021; IPCC, 2023). At the Paris threshold of 2°C, the frequency 50-year extreme temperature events could increase fourteen-fold, being 2.7°C hotter on average.

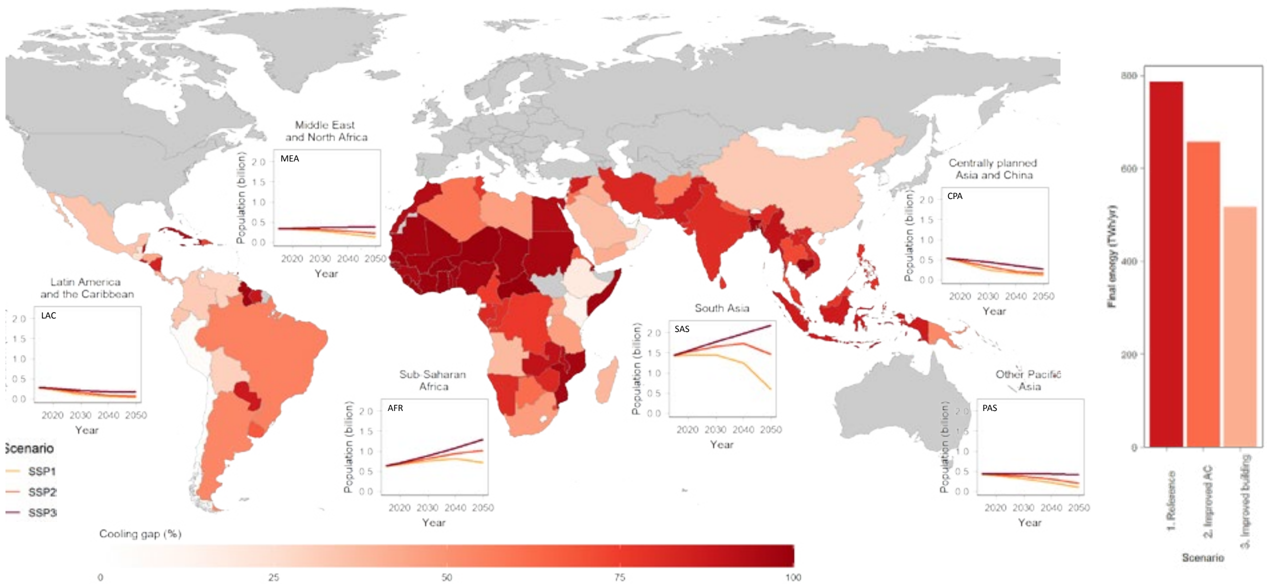
As shown in Figure 2, as global warming levels increase, the annual number of days where temperature levels pose a risk of death will also rise. This rise will increase the exposure of cities to heat-related impacts, particularly among the most vulnerable – children, the elderly, outdoor workers, and individuals with underlying health conditions. Nevertheless, over the next few decades heat islands in most cities will drive heat more than global warming. Thus, in many cities, mitigating or eliminating heat islands can compensate for the impacts of global warming except for extreme heat waves.

FIGURE 2. Every increment of global temperature rise increases the number of days and world regions exposed to heat and humidity related mortality risk



Source: IPCC, 2023

FIGURE 3. Cooling Access Gap across Socioeconomic Scenarios



Source: Mastrucci *et al.*, 2022b

Mitigating heat islands will minimize the need for mechanical cooling and ensure safer thermal conditions for those lacking access to air conditioning, while reducing the acceleration of local (contribution to heat islands) and global (emissions from fossil-based electricity production) warming. Moreover, access to air conditioning, even under optimistic socio-economic development scenarios, is expected to remain low, particularly in the Global South and areas with higher deprivation in the Global North. For example, even under high-income and low-population scenarios, at least 50% of inhabitants within megacities in Sub-Saharan Africa will lack access to air conditioning by mid-century (Figure 3) (Mastrucci *et al.*, 2022a). This projected low accessibility level coupled with higher annual dangerous heat days, exposes these inhabitants to life-threatening conditions. Thus, the more cities and the planet are kept cool, the less the exposure of people and the need for air conditioning, potentially reducing the cooling gap. Furthermore, ensuring that urban environments are designed and built to maximize thermal comfort hours, even in hot weather conditions, reduces air conditioning needs. Nevertheless, air conditioning will still be required, particularly in tropical and subtropical regions, where thermal comfort is essential to maintain optimal sleeping and working environments for inhabitants.

Therefore, climate actions that reduce air conditioning use while maintaining safe thermal conditions are essential. These actions reduce the impacts of air conditioners on local and global warming and offer opportunities to synergize the SDGs by delivering health and economic benefits, pollution reduction, affordable energy services, mitigating disasters, and natural resource management. The following cooling-related climate actions can deliver these synergies.

3.1.1 Blue-Green and Cool Infrastructure

Incorporating blue-green and cool infrastructure in urban planning and design can synergize climate action and sustainable development by enhancing the resilience and livability of cities. Institutional actors within cities can leverage these solutions to deliver multiple benefits and maximize limited resources. Green infrastructure such as urban parks and woodland, as well as cool (reflective) pavements and roofs, regulate urban temperature through shading, airflow modification, and reduction of outdoor air temperature (Privitera *et al.*, 2021). Shading provided by green infrastructure prevents buildings from overheating by blocking and absorbing solar radiation to provide thermal comfort, and reduce cooling-related energy demand, enabling cost savings (SDGs 7 & 11). Shading from street trees also encourages cheap and active mobility (*e.g.*, walking or cycling) by reducing heat exposure in urban areas (SDGs 3 & 11). Cities with large vegetation cover can reduce extreme temperatures during heatwaves and warm spells (SDGs 1 & 11). Beyond their cooling effects, urban vegetation improves air quality in cities by removing air pollutants such as particulate matter while limiting the formation of tropospheric ozone. These actions mitigate risks of respiratory-related illnesses (SDG 3). Local food production co-benefits are also realized when fruit-bearing trees are planted in urban areas (SDG 2).

Furthermore, green infrastructure like parks, street trees and open surfaces enable stormwater infiltration, mitigating flood risk, recharging groundwater, and improving water quality (SDG 6 & 11). This retention process enables sustainable urban water management and protection against drought (SDGs 11 & 15). Public parks offer public benefits by providing areas for recreational activities and physical exercises that improve mental health (SDG 3) and private benefits by raising the property value of houses in their proximity. BGI also offer natural habitats for biodiversity that can aid recovery (SDG 15). However, to actualize these co-benefits in cities, policymakers should ensure green infrastructure is interconnected rather than fragmented. Medellin provides a case study illustrating the multiple benefits of BGI, with an initiative to enhance its resilience against heat islands and promote sustainable development (Box 2). Like green infrastructures, blue infrastructures provide multiple benefits through hydrological functions like evaporation, drainage, and infiltration. These functions enable local cooling and sustainable urban water management (SDG 11). Blue infrastructure like wetlands and mangroves also reduce the impact of storms and floods by reducing wave energy and absorbing floodwaters (SDGs 11 & 15).

3.1.2 Energy-Efficient Cooling in Buildings

Thermal comfort in buildings can be maximized through technologies, designs, and behaviors that aid or prolong thermal comfort or safe thermal conditions while minimizing energy demands. Buildings with high thermal mass, if ventilated thoroughly during cooler nights, can store the coolness during the day. Well-shaded windows during sunlit hours, or poorly insulated roofs and walls, keep thermal gains at bay. Integrating natural ventilation principles in architectural and urban designs can minimize cooling loads by enhancing building airflow. Refurbishing buildings to seal cracks or holes in the building envelope can also prevent heat infiltration or exfiltration of cool air from air conditioners preventing energy wastage and prolonging thermal comfort hours (SDGs 7 & 12) (Munguia *et al.*, 2020). Well-insulated buildings, combined with good shading in sunlit hours, also minimize air conditioning energy demand. Also, promoting energy-efficient windows enables passive cooling by blocking heat into buildings and allowing regular light passage. These interventions

Box 2. Green Corridors Initiative, Medellin

The 50 years of rapid urbanization in Medellin intensified the effects of urban heat islands. To mitigate and adapt to these effects, the city executed a greening program, redefining its urban design model. Since 2016, the city has developed 30 'Corredores Verdes' (Green Corridors) – an interconnected system of green infrastructure across the city. These green corridors have provided wide-ranging benefits beyond cooling, illustrating the nexus between climate action and SDG synergies.

The corridors have reduced exposure to hot temperature events by reducing the average city temperature by 2°C, with an expected further decrease of 4-5°C in the next two decades (SDG 1, 7 & 11). These corridors serve as natural carbon sinks, enabling carbon uptake through plant growth. In a single corridor, new plant growth is estimated to capture 160,787 kg of CO_2 per year (SDG 14). Also, air quality within Medellin has improved due to the corridors capturing pollutants like particulate matter (SDG 3 & 11). Biodiversity like birds and bees has also been recovered, given the presence of natural habitats (SDG 15).

The Green Corridors initiative has received USD 16.3 million in investment. This investment has yielded economic benefits by reducing government expenditure associated with healthcare (SDG 8 & 12). Also, these corridors have provided employment opportunities, reducing unemployment within the city (SDG 8).

Local inhabitants from disadvantaged backgrounds were provided with capacity building, equipping them with skills to be city gardeners and planting technicians (SDG 8). These trained inhabitants help to manage the corridors as part of their full-time work, highlighting the employment opportunities provided by this initiative. These skilled inhabitants have planted over 8,000 trees and palms across the 30 Green Corridors that cover 65 hectares (SDG 15).

The Green Corridors initiative highlights how solutions like green infrastructures can be leveraged to synergize climate action while advancing several SDGs.

Source: C40 Cities, 2019

reduce the need for mechanical space cooling, enabling income savings while providing thermal comfort or safety (SDGs 7 & 11). However, mechanical cooling may still be required under extreme heat and humidity conditions. Policymakers can mitigate the effects of mechanical cooling by introducing energy efficiency standards for air conditioners as well as adopting energy-efficient building design codes that are optimized to keep cooling demand low. Adopting such standards can ensure lower demand for air conditioning while providing thermal safety, thus minimizing local and global warming impacts (SDGs 7 & 11).

Energy-related behaviors can also support energy-efficient cooling in buildings. Using external window blinds prevents heat entry while opening windows at night allows the infiltration of cooler air into buildings and can reduce artificial cooling needs (Khosla et al., 2019). Also, ensuring windows and doors are closed when using air conditioners avoids energy wastage (SDG 12). This action coupled with the economical use of air conditioners can significantly reduce peak cooling energy demand and associated bills (Mastrucci *et al.*, 2019). Wearing lighter clothes, relaxing business dress codes in hot seasons such as the 'CoolBiz' initiative in Japan or using portable fans can also provide thermal comfort and limit mechanical cooling needs. These technological and behavioral actions enhance mental well-being by mitigating anxiety, depression, and stress from chronic thermal discomfort and energy poverty (SDG 3). Moreover, such actions, especially in cities largely dependent on fossil-based energy systems, can limit air pollution and protect natural habitats (SDGs 3, 14 & 15). Finally, keeping residents' thermal comfort with minimal mechanical air conditioning will keep outdoor urban environments cooler through lower heat waste entering the neighborhoods from air conditioners, thus lowering the exposure of vulnerable populations without access to air conditioning or those who must stay outdoors in extreme heat conditions (SDGs 1 & 11).

3.1.3 Indigenous Knowledge and Local Knowledge

Tapping into knowledge from indigenous and local communities can provide insights into building and urban designs that promote thermal comfort or thermal safety while minimizing active cooling needs. Vernacular building and urban designs rely on passive design principles, materials and surfaces that optimize thermal comfort tailored to the local climate. These passive design principles enable natural cooling to reduce heat stress (SDG 1). In hot climates, for example, ceilings are designed to be vaulted rather than flat, allowing hot air to remain above and cooler air below. Apart from their passive cooling benefits, vernacular designs like courtyards or terraces represent common spaces that encourage communal cohesion and inclusive urban development. These designs also promote the use of locally sourced materials, reducing environmental impacts and building development costs. Modern design practices in combination with vernacular materials like adobe and bamboo can improve the resilience of buildings against disasters like flooding (SDG 11). Thus, incorporating vernacular materials into building code standards (e.g., Ghana Building Code (2018) can enhance building resilience and increase the demand for skilled labor in the building sector (SDG 8).

Beyond vernacular designs, vernacular routines and practices in public and private spheres promote non-energy-intensive behaviors that enable natural cooling. In addition, adopting vernacular practices such as changing sleeping and working habits during hot periods such as the Mediterranean 'Siesta', will lessen cooling loads. Shifting working times or locations to cooler periods or areas of buildings can reduce air conditioning needs and save energy-related resources. Also, delaying sleeping schedules compensates for delayed cooling of buildings, providing more time for buildings to cool at night and reducing heat exposure during sleeping hours (Hendel *et al.*, 2017). Designating some public spaces as energy-efficient cooling centers can also enable thermal refuge for more people while reducing energy demand and public expenditure. Regional diets and culinary habits also showcase cooling-related adaptive actions (Mazzone & Khosla, 2021). For example, peppermint leaves in North Africa and China are used for heat-relieving purposes by increasing bodily fluids (Khosla *et al.*, 2022). Combining these vernacular practices can accumulate their cooling potential to deliver substantial benefits that minimize cooling-related energy demands.

3.2 Building Energy Efficiency

Improving the energy efficiency of buildings (heating, lighting, and other appliances) aids demand-side solutions that reinforce synergistic action. High-efficient buildings or passive houses offer multiple health, economic, and environmental benefits. Thus, adopting policies promoting the construction, and particularly the renovation of existing buildings, to high-efficiency standards provides opportunities to achieve synergies.

Introducing transparent energy standards and labels for building appliances and equipment allows consumers to select more energy-efficient appliances that reduce demand and save cost (SDG 7). For example, adopting energy-efficient lighting systems (*e.g.*, LEDs or automated lighting) reduces energy use and bills. Also, promoting passive (high airtightness and adequate ventilation and filtering systems) and active (integrating renewables, upgrading boilers) measures in buildings can enhance heat recovery, minimize heating demands for cost savings, and improve energy security. The energy-demand reductions from efficient appliances and equipment reduce energy-related emissions, protecting marine and terrestrial ecosystems from climate impacts (SDG 14 & 15).

Furthermore, enhancing airtightness, ventilation and filtering systems in buildings enhances indoor air quality and limits the infiltration of outdoor pollutants. Such healthy indoor environments offer physical (lower vulnerability to cardiovascular and respiratory diseases) and mental health benefits (SDG 3) that enhance labor productivity by reducing sick days and improving performance and output quality (SDG 8) (Souran & Ürge-Vorsatz, 2021). Healthy indoor environments also have positive effects on the economy. Increased levels of labor productivity enable economic growth, given higher and enhanced output from workers (SDG 8) and it conserves financial resources by reducing budgetary allocations to healthcare (SDG 8). Economic benefits, through tax rebates, are also achieved, especially in regions with energy labelling programs. For example, buildings in India with Leadership in Energy and Environmental Design (LEED) certification receive energy tariff subsidies.

Building energy management and behavioral approaches can further advance energy efficiency in buildings. Energy monitoring through smart meters ensures supervision of building energy use, particularly during peak demand periods to decrease energy use and avoid peak energy rates (Ruparathna *et al.*, 2016). Switching off heating and lighting systems and enabling power management for equipment (especially in commercial buildings) limits energy demand and wastage. However, modifying energy-related behaviors can be difficult. To encourage these behaviors, policymakers can emphasize such behaviors' economic benefits (*i.e.*, income savings) and promote communication through eco-feedback (Paone & Bacher, 2018). This feedback system enables building occupants to understand the impacts of energy-efficient actions. For example, equating the energy saved to more relatable units like trees can provide a clearer understanding of the impacts of energy-efficient actions.

3.3 Mobility

Cities are likely to vary in how they address the intersection between urban mobility, climate action, and the SDGs. It is, however, clear that cities can generate substantial GHG emission reductions while also improving public health and municipal finances. For example, a study of 120 cities showed that smart combinations of bus rapid transit (BRT) systems, fuel taxes, fuel efficiency measures, and land use can reduce GHG emissions by 22% over 15 years while reducing accidents, improving air quality, and lowering daily transportation expenses for residents (Liotta *et al.*, 2023). Individual (economically motivated) behavioral change, social norming, and urban infrastructure are all relevant in providing the opportunity for low-carbon and sustainable mobility (Javaid *et al.*, 2020).

Here we outline concrete measures cities can adopt to simultaneously achieve climate change mitigation, adaptation, enhance public health, alleviate poverty, and meet other SDGs. We does so by categorizing cities as belonging to different development levels, geographic characteristics, and socio-economic contexts.

One of the keys to achieving multiple benefits will involve actions taken in high-density urban centers. In cities fitting into this group, policymakers would be well advised to expand and modernize public transit networks (subways, buses, trams) to increase efficiency, capacity, affordability, and reliability. In a similar vein, cities in this grouping could look to phase out on-street parking, implement congestion pricing and introduce low-emission zones to discourage private vehicle use and promote electric vehicles (EVs) for public transport. These options can directly reduce emissions, improve air quality, and offer equitable mobility options.

A second city archetype are developing, rapidly urbanizing cities. In these cities, policymakers are likely to accrue multiple gains from investing in affordable and scalable public transport solutions like the BRT systems. BRTs are well suited for dense cities and can be implemented more quickly than traditional rail infrastructure (a BRT can also have the notable effect on land values and land value taxation, which in turn, can help to initially finance the system though they will likely need consistent financing to be sustainable). Policymakers in this grouping of cities will also reap multiple gains from encouraging the use of non-motorized transport (NMT) through safe and accessible pedestrian and cycling infrastructure. In some cities, the promotion of electric two- and three wheelers can help protect the climate while delivering on the SDGs. In rapidly expanding cities, land use regulation is also crucial, prohibiting the development of new housing outside of urban areas; this expansion of cities is responsible for a large share of motorized transport and associated congestion and health costs in inner cities. In sum, there are a range of actions in developing cities that can improve accessibility to jobs and services, crucial for poverty alleviation, health, and reduce carbon footprints.

A third grouping, small to medium-sized cities, may opt for a different set of synergistic interventions. This subset of cities could focus on prioritizing integrated mobility planning that combines public transit with shared mobility services (e.g., bike and car sharing) to enhance connectivity without the need for personal vehicle ownership. These cities may also invest in smart mobility solutions and digital platforms for efficient transit operations (i.e., integrated whole-system ticketing) and encourage public transport use, while providing digital platforms with support from national governments or other public bodies (Bongardt.*et al.*, 2013). These options have the benefit of boosting local economies, reducing emissions, and promoting healthy lifestyles (Creutzig *et al.*, 2019). Hence, mitigation measures in urban transport will pay out mostly in terms of improved health and increased life expectancy.

Finally, coastal cities that are vulnerable to climate change may have a separate set of needs and priorities when it comes to synergies. For this group, policymakers could work on resilient infrastructure projects that protect transport assets against climate risks (*e.g.*, elevating roads, waterproofing subway stations) (see also the previous section on blue-green infrastructure) and promote the adoption of green infrastructure within the transport network (*e.g.*, permeable pavements, green roofs on bus stations). Cities in this group could also enhance the use of electric and hybrid boats for public transport in waterways. The recommended measures ensure the continuity of mobility services during extreme weather events, contribute to mitigation through lower emissions, and support adaptation efforts.

For each city type, focusing on specific urban transport system actions allows for targeted interventions that collectively advance climate mitigation, adaptation, and broader SDGs, reflecting a strategic approach to urban mobility in varying urban contexts.

3.4 Waste Management/Circularity

Different types of cities may also opt for different approaches to reducing waste and improving resource circulation.

In high-density urban centers policymakers could focus on promoting circular economy and lifestyle changes to shrink ecological footprints. They also might introduce low-cost nudges, informational campaigns, and economic incentives to encourage residents to reduce unsustainable consumption. Finally, these developed cities should work with national governments to enforce extended producer responsibility laws, standards and reporting mechanisms that motivate the private sector to complement consumer-side efforts. In addition to increasing motivation, the government's role would be to identify and enforce standards and reporting mechanisms to hold companies accountable and to ensure that those doing business within their jurisdiction are aligned with their overarching sustainability goals. The outlined interventions will pay dividends for the climate, health, and air and water quality while boosting civic pride by enhancing a city's reputation as a sustainability leader.

In developing, rapidly urbanizing cities the approaches may vary. In this case, urban policymakers could concentrate on reduce, reuse and recycling programs and well-designed financial incentives to minimize waste flows and contribute to poverty alleviation. They may also want to build sanitary landfills and waste collection programs to discourage open dumping. In addition, city policymakers could equip landfills with waste gas recovery and energy systems to generate fresh revenue streams. In adopting some the recommended reforms, it will be important that cities in this group engage the informal sector early and often in planning to make them active partners in the transformation of the waste sector. The above actions will help improve the health and the city aesthetic while reducing poverty, generating jobs and helping the climate.

For small to medium-sized cities the waste management options are also likely to vary from the other categories. These cities may be more inclined to emphasize neighborhood composting centers for organic waste and fertilizer resale programs within (urban farming) and beyond city borders. In addition, this subset of cities could promote community-based recycling and offer rewards for neighborhoods that demonstrate innovative solutions to local challenges — for example, Substation 33 in Logan, Australia offers a useful example of e-waste recycling and community upliftment (Substation33, 2023). Finally, to help build support for these options cities will need to engage with existing citizen groups and grassroots networks to illustrate and spread the above good practice solutions. This suite of actions will help build social capital, strengthen regional development (links between urban and rural areas), and curb emissions.

Coastal cities vulnerable to climate change could provide finance for resilient waste management infrastructure such as waste collection vehicles that can support post disaster recovery. They may also rely on a suit of hardware and software solutions to reduce demand for plastic waste (mandatory charges for bags). Contingency plans for waste management in the face of intense storms or flooding may also be helpful in this regard. In combination with many of the previously listed actions, these measures will ensure that unmanaged waste does not exacerbate recovery efforts while building resilience and delivering on many other SDGs.

3.5 Synergies between the Four Concrete Climate Actions and SDGs

All the concrete actions described above are aligned with several SDGs (Table A1 presents some of the more evident connections between the key actions and different SDG targets). Making the connections visible in urban climate plans and other sectoral strategies can help to build support for not only that particular action but more ambitious climate responses generally. Making these connections clearer can also ensure more climate finance flows to development needs. In addition to helping to achieve several SDG targets, the actions presented are closely aligned with outcomes from Global Stocktake at COP 28 (see Box 3). For example, those outcomes called for *"enhancing building energy efficiency"* and *"expanding public transport."* However, there are also some COP28 outcomes that focus on other issues that are not featured herein but also have synergistic potential (marked in italics). Many of these are related to renewable energy. Moving forward, city level policymakers are advised to strengthen connections to both the four areas highlighted in this section and a few additional areas that promise synergies (see Box 3).

Box 3. COP28 Outcomes with Potential Synergies in Cities

Mitigation

- *Tripling renewable energy capacity and doubling energy efficiency (§ 28a).*
- Implementing solar panels on buildings, on balconies, as sun blinds; replacing gas boilers with heat pumps. and integrating wind energy into urban areas.
- Accelerating the reduction of emissions from road transport (§ 28g).
- Expanding electric public transportation options, developing infrastructure for electric vehicles (EVs), and promoting active transport modes (cycling, walking).
- *Phasing out inefficient fossil fuel subsidies (§ 28h).*
- Redirecting subsidies away from diesel and gasoline towards sustainable urban mobility solutions, such as public transit and cycling infrastructure.
- *Doubling the global average annual rate of energy efficiency improvements by 2030 (§ 28a).*
- Enhancing building energy efficiency through retrofitting older buildings and enforcing strict energy efficiency standards for new constructions.
- Implementing smart building technologies to optimize energy use.

Adaptation

- Enhancing climate resilience to water-related hazards (§ 63a).
- Implementing green infrastructure (e.g., rain gardens, permeable pavements) to mitigate the impact of heat waves, manage stormwater and reduce flooding. Upgrading water supply and sanitation systems to be climate resilient.
- Attaining resilience against climate change-related health impacts (§ 63c).
- Designing heatwave response strategies, including cooling centers and green spaces to reduce urban heat island effects. Strengthening healthcare infrastructure to handle climate-induced health crises.
- Increasing the resilience of infrastructure and human settlements (§ 63e)
- Building climate-resilient infrastructure, such as elevated roads and flood barriers. Adopting building codes and urban planning practices that account for future climate risks.

4. Governance for Synergies in Cities

Effectively implementing demand-side actions and working on the four key synergistic areas will not happen in a vacuum. Rather, it requires governance arrangements and other enabling reforms that help break down institutional silos, expand participation and encourage transformational change.

The first set of reforms involves cross-agency coordination. Cities will need to establish interagency coordination mechanisms that generate incentives for cooperation across sectoral remits. Many cities have already established climate planning committees that have the potential to make more explicit links to other SDGs. In addition to featuring other sectoral concerns *(e.g.*, biodiversity or sustainable consumption) in these committees, cities may also want to introduce staffing rotations or establish a dedicated cross-unit collaboration team that encourages exchange. In Berlin, decision making on matters cutting across sectors has been facilitated by the political leadership coalescing at the highest level ('Klimasenat') to decide on difficult matters and accelerate process. Another way of enabling horizontal cooperation is reporting protocols on public budgets that assess climate and other SDGs (Peters, 1998; 2018).

Additional governance reforms most closely relate to the socially oriented SDGs and involve mechanisms that support the active participation of different stakeholder groups and socially just transitions. Such mechanisms include existing climate assemblies that are already being used to inform climate planning but could potentially make stronger links to the SDGs. Another way to facilitate participation involves *'egovernance'* portals that can help solicit inputs, build support, anticipate resistance, and identify compromises. Mechanisms that enable participation not only help ensure connections between climate and SDGs are identified during planning but also boost accountability for implementation. These mechanisms can also ensure that transitions are environmentally sustainable and socially just. This is important because efforts to decarbonize cities through, for instance, blue-green infrastructure, remediation projects to energy-efficient buildings and transit-friendly planning, risks eco-gentrification (Black & Richards, 2020). In all the above cases, efforts need to ensure engagements are sustained as opposed to once-off and include the same government representatives where possible to ensure that trusting state-society relationships (Reed, 2008).

A third area that can help to implement and bring synergistic solutions to scale involve vertical integration. While many cities may be able to pilot solutions with their own resources, cities will often need support from national governments to implement and scale those solutions. This can be achieved with, for example, fiscal transfers or block grants that motivate cities to invest in infrastructure that aligns climate with sustainable development. It may also be achieved with tax incentives that encourage private investments in sectors with synergistic potential. In addition, local governments can reform fuel taxes and other fossil fuel related policies that are crucial drivers of sustainable or unsustainable urban growth (Creutzig *et al.*, 2015). Finally, smaller cities may also work with higher level governments to acquire softer skills and training to fill capacity gaps (Corfee-Morlot *et al.*, 2009).

Further governance and enabling reforms involve working outside the physical boundaries of cities. More specifically, cities may need to work with surrounding rural communities to help implement integrated solutions to the climate and SDGs, leveraging an approach known as the Circulating and Ecological Sphere (CES) to fortify urban-rural linkages. This approach provides a framework for sustainable development that aims to maximize the vitality of all regions through sustainable, equitable and efficient use of the resources of mountainous, agricultural and fishing villages as well as cities in an integrated manner. CES invites regions and localities to rediscover their untapped potential to decarbonized, self-reliant and decentralized locales by encouraging stronger urban-rural connectivity. Integrating the social, economic and environmental dimensions of sustainable development, the Regional CES provides a concrete vision for localization of the SDGs, climate actions and other global agenda (Ortiz-Moya *et al.*, 2021; Takeuchi, 2018).

Finally, cities would be well advised to not only look to rural areas but to other cities for sources of inspiration and learning. The past two decades has witnessed the spread of city networks that, *inter alia*, help to disseminate tools and knowledge on climate and sustainable development planning. It will be increasingly important for cities to engage actively in these networks. At the same time, it would also be helpful if city networks offer the knowledge exchange and material support needed to make synergies actionable in urban contexts (Bery & Haddad, 2023; Heritage & Green, 2013). Actively engaging in these networks can help to amplify the voice of cities and shape the global sustainability agenda.

Recommendations

- A key entry point for synergies are demand-side solutions. Cities are well advised to frame their climate strategies around demand-side behavioral shifts (e.g., shifts in diets, modes of transportation and consumption). Focusing on the demand side will not only address the root causes of the climate crisis but steadily improving service provision and well-being.

- Cities are also encouraged to adopt concrete reforms in four sectors with significant synergistic potential. This includes focusing resources on cooling (including blue and green infrastructure), energy efficiency in buildings, transportation, and waste management. In the transport sector, substantial GHG emission reduction can align with public health benefits and reduced monetary costs for commuters, realizing urban-wide welfare gains. In each of these four areas, making explicit links between climate and other benefits can help accelerate implementation.

- Because synergies will not happen in vacuum, cities will also need to strengthen governance mechanisms and enabling reforms. In many cities, this will require effort to strengthen cross-sectoral and multi-level integration. Building urban-rural partnerships (using a known as the Circulating and Ecological Sphere (CES) can also help break life into cities. Finally, engaging in transnational city networks can help cities learn from each other synergies.

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Appendix

TABLE A1. Synergies between the Four Climate Actions and SDGs

	Blue-Green			Buildings	Mobility			Waste	
Actions/ SDG	**Blue-Green and Cool Infrastructure**	**Energy-efficient Cooling**	**Indigenous Knowledge and Local Knowledge**	**Building Energy Efficiency**	**Compact Cities**	**Public Transport**	**Electric Vehicles (EVs)**	**3Rs**	**Sanitary Landfills with Energy Recovery**
1	Urban parks provide access to natural resources (**1.4**) Open surfaces of urban parks reduce vulnerability to floods (stormwater retention) and drought (groundwater recharge) (**1.5**)		Natural cooling from vernacular designs increases resilience against heatwaves (**1.5**) Vernacular building materials increase resilience against climate-related extremes like floods (**1.5**)	Increasing building efficiency minimizes energy demand and related household expenses on energy services to reduce energy poverty (**1.2**)		Public transportation systems can provide affordable mobility services, enabling income savings (**1.2**) Enables access to basic services (i.e., mobility) (**1.4**)			
2	Fruit-bearing trees improve local food production (**2.1**)				Shorter distances to (super) markets provide more equitable and easier access to food in cities (**2.1**)	Affordable public transport can enhance access to affordable food choices (**2.1**)		Recycling biomass in urban farms can enable sustainable food production (e.g., manure as fertilizers) (**2.4**)	
3	Cooling provided by BGI protects expecting mothers from heat stress and heat-induced mortality (**3.1**) Prevents heat-related deaths amongst vulnerable groups i.e., newborns and children under five years (**3.2**) Recreational functions of urban parks promote physical activities, reduce stress and anxiety, enabling mental well-being (**3.4**) Improved air quality reduces non-communicable mortality (i.e., respiratory-related deaths) (**3.4**) Shading encourages active mobility which can reduce road injuries and death through lesser use of private cars (**3.6**) Street trees improve air quality by reducing air pollutants (**3.9**)	Reduces mental health impacts by reducing energy poverty and chronic thermal discomfort (**3.4**) Improved air quality by reducing air pollutants from energy-related emissions (**3.9**)	Delayed sleeping schedules mitigate non-communicable mortality through reduced heat exposure (**3.4**)	High indoor air quality improves mental well-being and mitigates vulnerability to respiratory-related illnesses and the risk of non-communicable mortality (**3.4**) High-efficient buildings enhance indoor air quality by reducing indoor pollution (e.g., particulate matter, volatile organic compounds) (**3.9**)	Shorter commute time decreases car dependency and promotes physical activity (i.e., walking, cycling) that enables mental well-being (**3.4**) Compact cities can minimize travel time to reduce air pollution from transportation (**3.9**) and exposure to air pollutants, mitigating the risk of respiratory-related mortality (**3.4**)	Mitigates risk of respiratory-related mortality through reduced emissions of transport-related pollutants (**3.4**) Promotes minimal use of private vehicles which can minimize road injuries and death (**3.6**) Curtails private car use which mitigates pollution-related illness or death by reducing emitted pollutants (e.g., carbon monoxide) (**3.9**)	Prevents emissions and pollutants from vehicles, reducing the risk of respiratory-related deaths (**3.4**) and improving air quality (**3.9**)	Reduces pollution and emissions from factories, mitigating the risk of respiratory-related mortality (**3.4**) and improving water and air quality (**3.9**)	Limits emissions of air pollutants (e.g., methane), reducing the risk of respiratory-related deaths in cities (**3.4**) while improving air quality (**3.9**)

	Blue-Green			Buildings	Mobility			Waste	
Actions/ SDG	Blue-Green and Cool Infrastructure	Energy-efficient Cooling	Indigenous Knowledge and Local Knowledge	Building Energy Efficiency	Compact Cities	Public Transport	Electric Vehicles (EVs)	3Rs	Sanitary Landfills with Energy Recovery
4	Shading creates effective learning environments by cooling their surroundings (**4.8**)				Walkable and compact neighborhoods could provide more access to affordable education options (**4.1** and **4.3**)	Affordable public transport access provides more access to education opportunities (**4.1** and **4.3**)			
6	Enables cost-effective access to locally available surface or groundwater through retention (**6.1**) Improves water quality by reducing pollutants carried into water bodies (**6.3**) Promotes water use efficiency through sustainable urban water management (**6.4**) Restores water-related ecosystems through groundwater recharge (**6.6**)	Improves water quality by reducing emitted pollutants that pollute water bodies (**6.3**)		Improves water quality by reducing pollutants from energy-related emissions (**6.3**)	Compact urban design enables lower-cost provision of water-related infrastructure (**6.1**)	Improves water quality by reducing transport-related emissions and pollutants (**6.3**)	Improves water quality by reducing emissions from vehicles (**6.3**)	Wastewater treatment can reduce discharge of wastewater and provide access to safe and affordable drinking water (**6.1** and **6.3**) Wastewater treatment promotes water use efficiency through reuse (**6.4**)	Reduced leaching of harmful substances into groundwater and surface water improves water quality (**6.3**)
7	Promotes access to affordable energy services by reducing cooling-related energy bills (**7.1**)	Promotes access to affordable energy services by reducing energy bills (**7.1**) High-efficient air conditioners promote energy efficiency (**7.3**)	Vernacular designs enable passive cooling and reduce cooling-related energy bills (**7.1**)	Promotes access to affordable energy services through lower energy bills and tax rebates (**7.1**) Integrating renewables into buildings improves energy security (**7.1**) High-efficiency buildings integrate renewable energy sources increasing the global share (**7.2**) Upgrading heating and lighting systems in buildings contributes to energy efficiency (**7.3**)	Compact urban designs enable the delivery of cheaper and affordable electricity (**7.1**)	Cheap price of public transport provides access to affordable energy services (**7.1**) Higher use of public transportation can reduce private car use which enables energy efficiency (**7.3**)	Provides access to modern and sustainable energy services by aiding the transition from conventional cars (**7.1**) EVs enable energy efficiency through the direct conversion of energy into movement unlike conventional cars (**7.3**)	Recycling agricultural waste promotes access to alternate and sustainable energy sources (e.g., biofuel) (**7.1**)	Promotes access to modern energy services by generating electricity or heat for consumption (**7.1**) Contributes to expanding infrastructure for supplying modern and sustainable energy services in developing countries (**7.b**)

	Blue-Green			Buildings	Mobility			Waste	
Actions/ SDG	**Blue-Green and Cool Infrastructure**	**Energy-efficient Cooling**	**Indigenous Knowledge and Local Knowledge**	**Building Energy Efficiency**	**Compact Cities**	**Public Transport**	**Electric Vehicles (EVs)**	**3Rs**	**Sanitary Landfills with Energy Recovery**
8	Provides job opportunities by employing gardeners, park authorities etc. (**8.3**) Promotes access to natural cooling, reducing artificial cooling demand to conserve resources (**8.4**) Enables resource efficiency by minimizing health-related expenditure through improved environmental quality (**8.4**)	High-efficient air conditioners enable economic productivity through technological upgrades (**8.2**) Demand for skilled labor in upgrading the efficiency of cooling-related technologies (**8.3**) Improves resource efficiency by reducing consumption of energy-related resources (**8.4**)	Demand for skilled labor to incorporate vernacular materials in construction (**8.3**) Improves resource efficiency by reducing consumption of energy-related resources for cooling (**8.4**)	Improved labor productivity through enhanced indoor air quality enables economic growth (**8.1**) Demand for skilled workers to renovate or construct high-efficient buildings provides employment opportunities (**8.3**) Lower government expenditure on health care improves resource efficiency (**8.4**) High-efficiency buildings create safe working environments by reducing indoor air pollution (**8.8**)	Walkable and compact, mixed neighborhood provides more access to diverse employment opportunities also for the poor (**8.3**)	Modernizing and scaling public transportation systems provide employment opportunities (e.g., construction workers, bus drivers, subway operators) (**8.3**) Promotes resource efficiency by minimizing consumption of transport-related resources (e.g., diesel, petrol) (**8.4**)	Provides employment opportunities in the engineering, manufacturing and services industries (**8.3**) Promotes resource efficiency by minimizing consumption of transport-related resources (e.g., diesel, petrol) (**8.4**)	Remanufacturing provides opportunities for economic productivity through lower material and energy consumption (**8.2**) Offers Job opportunities associated with repair, renting, and waste (collection, sorting, and recycling) (**8.3**) Recycling, remanufacturing, and reuse (thrift stores) promote resource efficiency in production (**8.4**)	Technological upgrades on landfills increase economic productivity through energy resource recovery (**8.2**) Upgrading landfills provides job opportunities associated with constructing, depositing, and operating sanitary landfills (**8.3**) Sanitary landfills promote safe working environments by reducing workers' exposure to air pollution (**8.8**)
9	BGI are sustainable infrastructures that enable well-being through ecosystem services (**9.1**) Retrofitting industries to incorporate green infrastructures can enable resource efficiency by reducing cooling loads (**9.4**)	High-efficient ACs minimize energy use and function as sustainable infrastructure (**9.1**) Energy-efficient windows and ACs contribute to upgrading infrastructures for sustainability (**9.4**)	Vernacular materials (e.g., bamboo) aid the development of resilient infrastructure (**9.1**)	High-efficient buildings function as sustainable infrastructures (**9.1**) High-efficient buildings enable resource efficiency and promote clean energy adoption by integrating renewables (**9.4**)		Public transportation promotes sustainable and inclusive infrastructure by providing affordable and equitable access (**9.1**)	EVs promote the development of sustainable infrastructures (**9.1**) EVs contribute to upgrading transport-related infrastructures for sustainability (**9.4**)		Landfills with energy recovery systems promote the development of sustainable infrastructures (**9.1**) Advances sustainable infrastructural upgrade and promotes resource use efficiency through resource recovery (**9.4**)

	Blue-Green			Buildings	Mobility			Waste	
Actions/ SDG	Blue-Green and Cool Infrastructure	Energy-efficient Cooling	Indigenous Knowledge and Local Knowledge	Building Energy Efficiency	Compact Cities	Public Transport	Electric Vehicles (EVs)	3Rs	Sanitary Landfills with Energy Recovery
11	Shading from trees contributes to providing cool and habitable dwellings (**11.1**) Street trees provide shading and encourage affordable and sustainable transportation (e.g., cycling) by reducing heat exposure (**11.2**) Urban parks serve as communal spaces enabling sustainable and inclusive urbanization (**11.3**) Reduced exposure to flood impacts through retention of storm and flood water (**11.5**) Reduced environmental impact through lower energy-related emissions for cooling (**11.6**) BGI provides access to green and public spaces (**11.7**)	Prolongs thermal comfort hours in buildings enabling habitable environments (**11.1**) Promotes sustainable urbanization through efficient use of energy-related resources (**11.3**) Reduced environmental impact through lower energy-related emissions for cooling (**11.6**) Supports policies for resource efficiency by delivering mitigative and adaptive benefits (**11.9**)	Cheaper locally sourced materials contribute to affordable housing (**11.1**) Vernacular designs like courtyards and terraces enable communal cohesion and promote inclusive urban development (**11.3**) Incorporating locally sourced materials decreases embedded emissions in buildings to reduce the environmental impacts of cities (**11.6**) Supports policies for inclusion and resource efficiency through local material use (**11.9**)	Access to safe and affordable housing through energy cost savings (**11.1**) Optimal resource use of high-efficient buildings promotes sustainable urbanization (**11.3**) Reduced environmental impacts of cities through lower emissions from energy savings (**11.6**) Delivery of multiple benefits by high-efficiency buildings supports policies promoting resource efficiency (**11.9**)	Shorter travel time enables the use of affordable and sustainable transportation (e.g., walking, cycling) (**11.2**) Higher density improves integration of different social groups which promotes inclusive urban development (**11.3**) Reduces car dependency and associated emissions to minimize the environmental impact of cities (**11.6**) High-density designs of compact cities mitigate urban sprawling and limit the loss of green areas (**11.7**)	Provides access to safe and affordable transport systems (**11.2**) Reduced environmental impact of cities through lower emissions from lesser use of private cars (**11.6**)	Promotes access to sustainable transport systems (**11.2**) Promotes transition from combustion engines to minimize the environmental impact of cities (**11.6**)	Reduces the environmental impact of cities through activities promoting lesser consumption, reuse, or recycling (**11.6**)	Promotes access to safe housing by mitigating exposure to air pollutants (**11.1**) Provides an alternate energy source to limit emissions from fossil-based energy sources and reduce the environmental impact of cities (**11.6**)
12	Urban cooling provided by BGI enables sustainable use of energy-related resources (**12.2**)	Minimizes primary energy use and emissions by reducing cooling loads (**12.2**) High-efficient ACs prevent energy wastage through optimal energy use (**12.2**)	Natural cooling from vernacular designs and practices reduces cooling demand to enable efficient use of energy resources (**12.2**)	Conserves biotic resources through reduced consumption, enabling sustainable use of natural resources (**12.2**) Energy-efficient lighting and mechanical systems prevent energy wastage through optimal energy use (**12.2**)	Compact urban designs can reduce energy wastage associated with transmission and distribution losses (**12.2**) Compact urban designs limit the consumption of building and infrastructure materials (**12.2**)	Public transportation minimizes the consumption of fossil-related resources for transportation (**12.2**)	Conserves natural resources by mitigating the need for fossil resources for transportation (**12.2**)	Promotes natural resource conservation by prolonging use to limit virgin production (**12.2**) Reuse and remanufacturing contribute to reducing production-related waste (**12.5**)	Energy recovered from landfills minimizes waste generation (**12.5**)

	Blue-Green			Buildings	Mobility			Waste	
Actions/ SDG	Blue-Green and Cool Infrastructure	Energy-efficient Cooling	Indigenous Knowledge and Local Knowledge	Building Energy Efficiency	Compact Cities	Public Transport	Electric Vehicles (EVs)	3Rs	Sanitary Landfills with Energy Recovery
14	Stormwater retention reduces marine pollution (**14.1**) Protects marine ecosystems by reducing ocean acidification through lower emissions from cooling-related energy demands (**14.2**) Reduced ocean acidification through lower emissions from reduced cooling demands (**14.3**)	Protects marine ecosystems by reducing ocean acidification through lower emissions from optimizing energy use (**14.2**) Prevents ocean acidification through lower emissions from reduced cooling demands (**14.3**)	Passive cooling from vernacular designs limits cooling-related energy emissions to protect marine ecosystems (**14.2**) and mitigate ocean acidification (**14.3**)	Reduces ocean acidification and protection of marine ecosystems through lower emissions from reduced energy-related emissions (**14.2** and **14.3**)	Shorter commuting distances minimizes transport-related emissions, reducing ocean acidification risks and protecting marine ecosystems (**14.2** and **14.3**)	Mitigates ocean acidification and protects marine ecosystems by reducing transport-related emissions (**14.2** and **14.3**)	Mitigates ocean acidification and protects marine ecosystems by reducing transport-related emissions (**14.2** and **14.3**)	Recycling waste provides opportunities to reduce marine pollution (**14.1**) Mitigates ocean acidification and protects marine ecosystems by reducing production-related emissions (**14.2** and **14.3**)	Provides alternate energy source which reduces energy-related emissions, mitigating ocean acidification and protecting marine ecosystems (**14.2** and **14.3**)
15	Green infrastructures attract biodiversity enabling their recovery (**15.1**) Planting of trees in cities contributes to reforestation and afforestation (**15.2**) Biodiversity protection through the creation of natural habitats in cities (**15.5**) Multiple ecosystem services provided by BGI encourage ecosystem integration into local government planning (**15.9**)	Natural habitat protection through reduced air pollution by minimizing energy-related emissions (**15.5**)	Natural habitat protection through reduced air pollution by minimizing energy-related emissions (**15.5**)	Reduced extraction of biotic resources limits forest degradation (**15.3**) and protects natural habitats (**15.5**)	Natural habitat protection through lower emissions from energy services (**15.5**)	Protects natural habitats through reduced pollution and emissions from vehicles (**15.5**)	Protects natural habitats through reduced pollution and emissions from vehicles (**15.5**)	Protects natural habitats through reduced pollution and emissions from production (**15.5**)	Reduced emissions and air pollutants protect natural habitats (**15.5**)

About the Expert Group on Climate and SDG Synergy

Co-conveners

United Nations | Department of Economic and Social Affairs

United Nations Framework Convention on Climate Change

The report is part of the series of four Thematic Reports contributing to the final, Synthesis Report, which together constitutes the 2024 edition of the Global Report on Climate and SDG Synergy led by the Expert Group on Climate and SDG Synergy. Co-convened by the United Nations Department of Economic and Social Affairs (UNDESA) and the United Nations Framework Convention on Climate Change (UNFCCC) Secretariat in May 2023, the Group consists of 14 renowned experts from diverse thematic and geographic backgrounds. Its task is to provide up-to-date analysis and recommendations based on scientific evidence and innovative approaches on how to tackle climate and SDG action in synergy. The Group is composed as follows:

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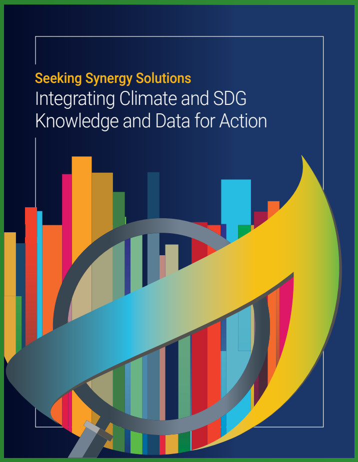

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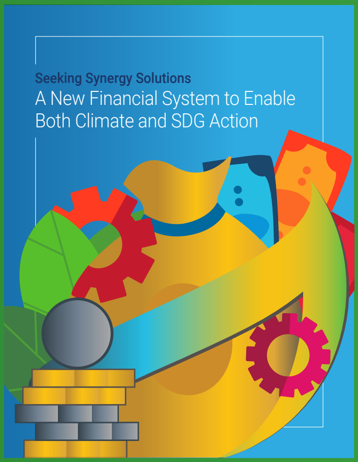

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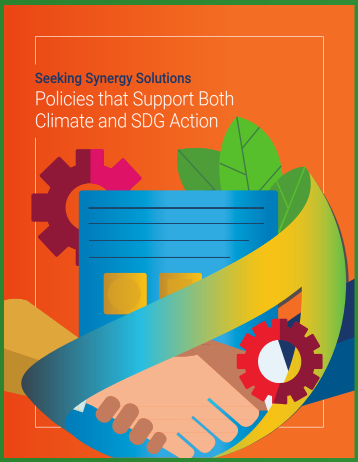

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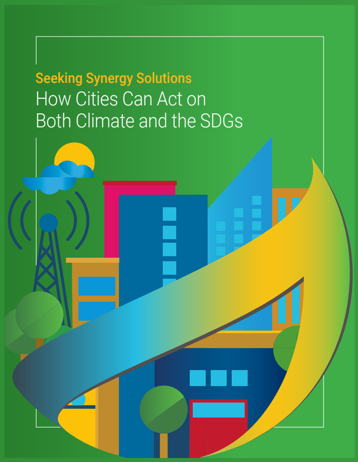

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