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WORKING PAPER

ASSESSING LOW-CARBON STRATEGIES OF LOCAL GOVERNMENTS THROUGH THE LENS OF CLIMATE POLICY COVERAGE

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EXECUTIVE SUMMARY

Highlights

- This study established the City Climate Policy Assessment Framework—based on the framework of the American Council for an Energy-Efficient Economy's *City Clean Energy Scorecard* and an investigation of 12 sample cities in China and abroad—to fill the gap in the assessment of city climate policies.
- The assessment framework covers the seven key areas of city climate policies, including community-wide initiatives, building policy, transportation policy, energy and water utilities, waste management, local government operations, and green finance, aiming to provide references and lessons to aid cities in climate policymaking.
- Cities' circumstances influence the choice of their climate policies. The sample cities have the most comprehensive policy coverage in terms of local government operations and energy and water utilities, and show greater variability in areas such as community-wide initiatives, building policy, and transportation policy.
- National and provincial policies and targets have a driving effect on cities. Nevertheless, most sample cities are more ambitious than their countries and have issued stand-alone codes and targets or more stringent standards.

CONTENTS

Working Papers contain preliminary research, analysis, findings, and recommendations. They are circulated to stimulate timely discussion and critical feedback, and to influence ongoing debate on emerging issues.

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- We recommend that cities set sectoral goals that align with overall objectives, requiring relevant data to support decision-making, and establish institutional mechanisms for information disclosure to hold accountable entities responsible. The gap in investment in low-carbon development in cities is still big—cities need to foster a vivid market for more investment in the field of climate change.

Context

Cities are the main battleground for China to meet its climate targets. Cities are centers of population agglomeration and major contributors to energy-related carbon emissions. Chinese cities have shown their climate ambitions. Almost all low-carbon pilot cities propose reaching carbon peaking before 2030.

Cities need green, low-carbon policy systems and institutional mechanisms. Currently, the path of carbon neutrality in Chinese cities is still unclear, and the trajectories of low-carbon development are not the same. Tracking developments and recent trends in city climate policy coverage and summarizing city low-carbon strategies can inspire urban decision-makers to innovate and provide lessons for other cities.

Existing research lacks attention to and assessment of climate policy at the city level. Many studies evaluate climate actions and policies from a global and national perspective, but there is little research on city climate policies, and their applications are not widespread, and a lack of assessment of climate policy coverage in Chinese cities.

Assessment framework

This study aims to fill the gap in the assessment of urban climate policies and promote peer learning among cities. Based on the framework of the *City Clean Energy Scorecard* and the climate policies of 12 sample cities, it proposes an index system that can be applied to assess city climate policy coverage. This system would encourage cities to enhance their climate ambitions and improve their capacities toward carbon neutrality as well as help establish a fair, reasonable, cooperative, and win-win global climate governance system.

The assessment framework is mainly used to reflect the comprehensiveness of city climate policy coverage. It covers the areas included in the *City Clean Energy Scorecard*, including community-wide initiatives, building policy, transportation policy, energy and water utilities, and local government operations, and adds green finance and waste management. Due to the impact of climate on cities' energy structures, energy efficiency, and carbon emissions, we considered the distribution of Chinese cities in climatic zones—mainly in temperate and cold zones—when selecting sample cities. Considering data availability, we prioritized cities from English-speaking countries and with high administrative rankings (such as capitals and municipalities directly under the central government) to make the indicators and data collection more comprehensive.

Recommendations

Cities need to optimize tracking of climate action progress to refine their climate goals and planning. Cities have different levels of performance across various policy areas, and there are also big gaps in performance level across cities. Cities with sound climate policies have clear and synergized energy-saving and emissions-reduction targets in each field. Therefore, cities need to optimize the data collection for the status quo in each field before they can set goals and measures according to local conditions, and establish information disclosure systems to implement supervision of and constraints on accountable entities.

Financial instruments are critical to the low-carbon development of cities and can contribute to various action areas. From supporting distributed photovoltaic systems within the community and investing in building energy-saving renovation projects to establishing climate investments and financing project catalogues, municipal governments are actively adopting incentives such as subsidies, taxes, and investments to promote their low-carbon transformations. There is a huge funding gap to address climate change. Municipalities need to guide diverse sources of funds and innovative financial products and services as well as build a sound policy support system and market environment.

National policies help shape those of cities, but cities generally have stronger climate ambitions and can promote peer learning. The policies of higher-level administrative units contribute partly to a city's score, but the overall proportion is relatively low. Cities often set stand-alone goals and plans, and many city plans go beyond national goals and are more stringent than national standards.

RESEARCH BACKGROUND AND OBJECTIVES

Cities are the main battleground for China to meet its "Carbon Peaking and Carbon Neutrality" ("Dual Carbon") commitments. From 2005 to 2010, cities are estimated to have contributed about 60–85 percent of energy-related carbon emissions, ranking as the top carbon emitter in the country (Dhakal 2009; Shan et al. 2017; Tong et al. 2018). Two policy documents, *Working Guidance for Carbon Peaking and Carbon Neutrality in Full and Faithful Implementation of the New Development Philosophy by the Central Committee of the Communist Party of China and The State Council* and *Action Plan for Carbon Peaking before 2030*, have prioritized the green and low-carbon transition as one of China's seven key tasks. Theyalso emphasize the importance of low-carbon solutions and standards in establishing a management system of urban and rural planning (CC and SC 2021; State Council 2021). However, the pathway of urban low-carbon development remains unclear, with a lack of internal motivation, effective supervision, assessment, and incentives. Therefore, it is necessary to build a green and low-carbon city development policy framework and supportive institutional mechanism during the 14th and 15th Five-Year Plans (GOCC and GOSC 2021; MHURD 2022).

Since the launch of "Low-Carbon Pilot City" in 2010, Chinese cities have committed to meeting their low-carbon targets. Among the 87 pilot cities in three phases, 82 have pledged to meet carbon peaking before 2030, including 75 big or medium-sized cities above the county level (Yang et al. 2020; Xu 2022). *The Code of Practice for City Examination and Evaluation in Spatial Planning*, released in 2021, recommended using the reduction rate (%) of carbon dioxide emissions per unit of gross domestic product (GDP) and the energy consumption per 10,000 yuan of GDP as indicators for assessment (MNR 2021). However, such pilots focus more on the targets and pathways, while other country-level assessments rely mainly on quantitative indicators such as emissions intensity. There's an absence of qualitative research on guidance and assessment of low-carbon urban development and climate policy formulation.

Evaluating the coverage of city climate policies is helpful for tracking the changes in urban climate policy over time, capturing the latest trends, encouraging urban leaders to innovate continuously, and establishing best practices. However, most of the research thus far has adopted quantitative indicators to assess the progress of climate action at the national and city levels (Boehm et al. 2022; Tan et al. 2017; Azizalrahman and Hasyimi 2018), or built a national-level climate policy database, such as the policy database of the International Energy Agency,[1] the Climate Policy Database maintained by the NewClimate Institute,[2] and the Integrated national climate and energy policies and measures database established by the European Environment Agency.[3] Current index systems contain very little qualitative assessment of policy coverage while the granularity of policy categories is missing (Lee and Painter 2015; Deetjen et al. 2018; Reckien et al. 2018). Among the exceptions include the Climate Policy Database, which analyzes the comprehensiveness of Group of 20 countries' policy coverage, and the American Council for an Energy-Efficient Economy's *City Clean Energy Scorecard*, which annually assesses 100 US cities on their clean energy strategies deployed by city governments,[4] one of the few comprehensive frameworks focusing on both policies and cities. The *City Clean Energy Scorecard* analyzes local policies and actions of 100 US cities to advance energy efficiency in buildings and transportation and scale up the use of renewable energy in five policy areas: community-wide initiatives, building policies, transportation policies, energy and water utilities, and local government operations. These policy categories are also consistent with the main emission sources in Chinese cities (buildings and construction account for about 50 percent of emissions; traffic, 10 percent; and water supply, sewage treatment, and solid waste treatment about 3.5 percent in total). However, the scorecard focuses on only US cities, and some US-centric classifications are not applicable to Chinese cities, such as utilities operated by private investors. In addition, priorities like waste management and green finance that are crucial to urban low-carbon development are not included in the scorecard, but the Chinese government has put them at the top of its agenda.

Since there is a lack of clear decarbonization measures and customized assessment tools for local governments to monitor their progress in reaching carbon peaking and carbon neutrality, World Resources Institute (WRI) and partner institutions jointly built Citysphere.net, a city data platform, to visualize the low-carbon progress and strategies of thousands of cities in the world, including the policy assessment results from

this study. Based on the *City Clean Energy Scorecard*, this study leverages information in existing climate policy databases and reviews the climate policies of sample cities in China and abroad to build a preliminary framework to assess climate policies, with the potential to apply the framework to other cities on Citysphere. Due to data availability constraints, the assessment framework in this study focuses on just the coverage of climate policies. It does not consider policy implementation, costs, effects, and policy impacts, or cover aspects like climate adaptation and forestry carbon sink. Evaluating the coverage of current city-level climate policies can help city governments identify potential areas for improvement and raise climate ambitions. At the same time, the research summarizes low-carbon strategies and best practices, makes it easier for Chinese and international cities to exchange experiences, provides references for Chinese stakeholders to formulate action plans and low-carbon strategies, builds up cities' low-carbon transition capacities, and encourages cities to proactively make low-carbon transition plans.

ASSESSMENT FRAMEWORK

2.1 City Climate Policy Assessment Framework

The City Climate Policy Assessment Framework ("the Framework") is meant to fully capture and record the policies, best practices, and innovative measures employed by local governments, taking into account the differing local policy environments and providing lessons for decision-makers and stakeholders in other cities. To identify key areas of urban climate policies and build an index system for the Framework, we used the *City Clean Energy Scorecard*, an integrated assessment framework of city-level policies, as a reference (see Box 1).

The Framework has a much wider scope than the *City Clean Energy Scorecard*, aiming to eventually cover all cities on the Citysphere platform. The objective is also not limited to energy efficiency, but also includes cities' climate action targets, implementation plans, and supportive measures. To build the Framework, we first identified key areas of city climate policies by studying the framework and scoring methods of the *City Clean Energy Scorecard* as well as urban emission sources. For example, since solid waste is a major source of urban greenhouse gas (GHG) emissions, and many cities have included waste management in their climate action plans we made waste management a level 1 indicator. Second, since the financial sector is also necessary to support climate actions in both developing and developed countries, we included green finance as a level 1 indicator. Third, as our assessment scope expands to cities all over the world, after reviewing the climate policies of the sample cities, we deleted the scorecard indicators that are applicable to only the United States, and supplemented these with practices explored by other cities, but not yet covered by the Scorecard. For example, the Framework includes near-zero-carbon and zero-carbon community pilot

Box 1 | **City Clean Energy Scorecard**

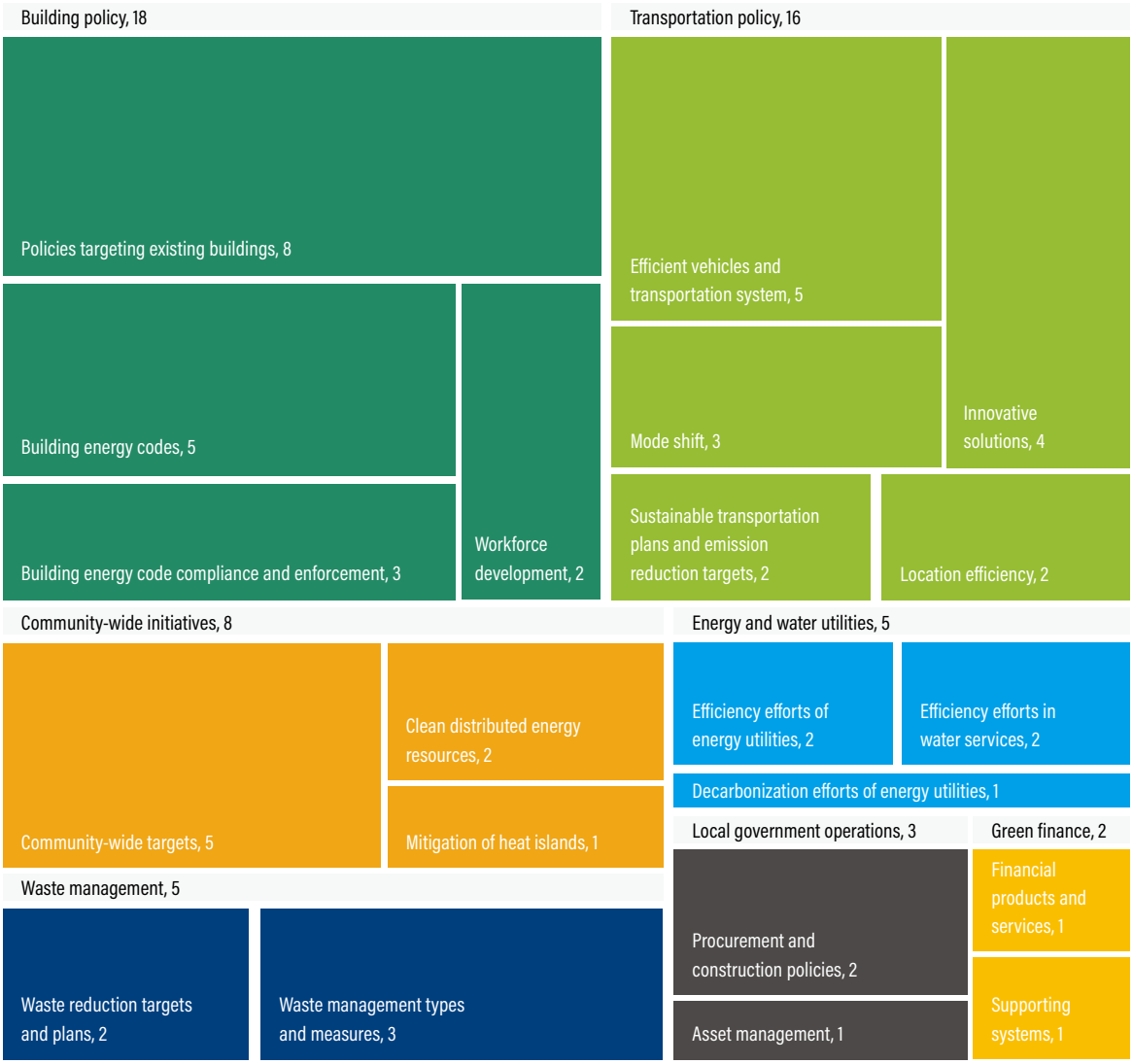
Framework: The index system is divided into three levels, including five level 1 indicators ("policy areas")—community-wide initiatives, building policies, transportation policies, energy and water utilities, and local government operations—24 level 2 indicators, and 69 level 3 indicators. The maximum points for a city is 100.

Selection of indicators: The three-level indicator system covers the city-specific policies, actions, and public services that advance energy efficiency. The selected indicators are well adapted to the policy context of different US cities. All three levels of indicators measure six dimensions of policies, namely, directly reduce energy consumption at the end use; accelerate the adoption of the most energy-saving technologies; provide funding for energy efficiency projects; set long-term energy efficiency plans; enforce codes or standards, and reduce market, regulatory, and information barriers to energy efficiency projects.

Scoring method: Different maximum points are set for each indicator, and cities can earn between 0 and the maximum number of points for each indicator.

Source: Based on information from Samarripas et al. (2021).

Figure 1 | **Distribution of points by policy area in the City Climate Policy Assessment Framework**



Note: The numbers in the figure represent the maximum number of points a city can earn in each policy area.

Source: Adapted from Samarripas et al. (2021, 12).

projects as level 2 indicators under "community-wide initiatives." The Framework, as outlined in Figure 1 and described below, covers seven policy areas, including 21 level 2 indicators and 57 level 3 indicators (see Appendix A, Table A-1, for a list and description of all indicators).

(1) Community-wide initiatives

Community-wide initiatives refer to city-level targets related to reducing energy consumption, increasing the use of renewable energy, and cutting GHG emissions, as well as issuing industry- and sector-specific measures. This level 1 indicator consists of three level 2 indicators and eight level 3 indicators, covering climate action goals, distributed clean energy and resource-related targets, and the target-setting of climate mitigation at the city level.

(2) Building policies

The building sector is a major energy consumer in cities, which makes it an important sector in energy savings and emissions reductions. Taking China as

an example, the carbon emissions of the whole life cycle of buildings totaled 5.08 billion tons in 2020, accounting for 50.9 percent of the country's overall emissions (PCBEE 2022). Building policy, as a level 1 indicator, includes 4 level 2 indicators and 18 level 3 indicators, which mainly examine the benchmark of, compliance with, and implementation of energy efficiency and renewable energy policy in urban new and existing buildings, as well as workforce development.

(3) Transportation policies

Transportation is a major emitter in cities. In 2021, it was responsible for about 37 percent of energy consumption at end use (IEA 2022). This level 1 indicator includes 5 level 2 indicators and 16 level 3 indicators, which mainly look into sustainable transportation planning and its integration with land use planning, transportation mode shift, the promotion of clean vehicles, and public transport. Additional points are given to cities that encourage innovative policies such as congestion pricing, zero-emission zones, and Mobility-as-a-Service (MaaS).[5]

(4) Energy and water utilities

Energy and water utilities can be valuable partners for cities by helping decarbonize them. Cities consume two-thirds of the world's energy while contributing 70 percent of carbon emissions (UN-Habitat 2020). In the building, transportation, and waste sectors, more than one-quarter (27.5 percent) of emission reduction potential depends on power supply decarbonization (Coalition for Urban Transitions 2021). Regarding water utilities, more than 22 million tons of carbon dioxide came from China's urban water supply in 2020, and 34 million tons of carbon dioxide equivalent were discharged from urban sewage treatment (Xue 2022; PCBEE 2022). This level 1 indicator includes three level 2 indicators and five level 3 indicators, which capture the efficiency and decarbonization of energy facilities as well as the efficiency of water facilities.

(5) Waste management

Solid waste treatment is also a major source of GHG emissions. It is estimated that the GHG emissions from solid waste treatment in 2016 amounted to 1.6 billion tons of carbon dioxide equivalent, accounting for 5 percent of global total emissions (Kaza et al. 2018). This level 1 indicator includes two level 2 indicators and five level 3 indicators, which measure whether there are waste reduction targets and tasks in city policies, and independent management policies and incentives.

(6) Local government operations

Local governments can take the lead in climate action by improving their own energy use in their operations. This level 1 indicator includes two level 2 indicators—government procurement & construction policies and asset management—and three level 3 indicators to review government performance in this area.

(7) Green finance

In recent years, green finance has been under the spotlight with regard to climate change, and it is repeatedly emphasized as critical to supporting a low-carbon urban transition. However, developing countries generally suffer from funding shortages and less diversified financing measures. Therefore, other cities' experiences can help local governments identify the entities, measures, and mechanisms that attract investment and financing. This level 1 indicator includes two level 2 indicators and two level 3 indicators, which examine the local financial products and services provided, as well as cities' supporting systems, to assess their performance in green finance.

Based on the level of government that releases policies and the clarity of objectives, each level 3 indicator can receive 1, 0.5, or 0 points (see Table 1). To maintain the comparability of scores if new indicators and policies are added, all level 3 indicators are given the same weight of importance. Points for all indicators are added for each policy area to give a city's final score at the level 1 indicator level, making it easier to compare the comprehensiveness of each city's climate policies across policy areas. We then divided the level 1 score a city received by the total number of points available for that policy area to show the extent to which that city has addressed the topic. For example, Singapore scored 14 for the level 1 indicator "building policies" out of 18 possible points for that indicator, giving Singapore a coverage score of 77.8 percent. To qualitatively assess a city's score, we divided policy coverage scores into quintiles: 0–20 percent = "low," 21–40 percent = "relatively low," 41–60 percent = "medium," 61–80 percent = "relatively high," and 81–100 percent = "high."

Table 1 | **Scoring method**

SCORE	DESCRIPTION
0	There is no relevant content in city policies
0.5	There are some relevant contents in city policies, but not comprehensive enough; or there is no relevant content in city policies yet, but the superior administrative authority or the country, has such policies
1	There are relevant content in city policies, and the coverage is relatively comprehensive

2.2 Selection of sample cities and data collection

A city's climate influences the energy efficiency, energy structure, urban planning, facilities construction, building emissions, transportation emissions, and the environment, thus determining the city's priorities of climate action (Huang and Feng 2016). Therefore, when selecting sample cities, we considered their distribution across climatic zones in China, which are primarily temperate and cold zones.[6] Considering data availability, we prioritized English-speaking countries and countries where WRI international offices are based, as well as cities with high administrative rankings (such as capitals and municipalities directly under the central government), to make the indicators and data collection more comprehensive. In all, we selected 12 cities (three Chinese and nine international) as key sample cities (Figure 2). We collected and reviewed a total of 114 policy documents at different levels of government with an average of 9.5 policy documents per city from 2002 to 2022, of which more than two-thirds were issued in 2017 or later. We reviewed policy papers published up to and including August 2022. See Appendix C for a summary of city policies.

Figure 2 | **Distribution of sample cities and their climatic zones**

Source: Drawn by the authors based on the research of Beck et al. (2018).[h] Pers. Comm. 2022a.

We divided data collection into two stages. We conducted the first round of research using search engines Google and Baidu and the official websites of city governments. For example, to research China's city-level climate targets, we searched on Baidu using the keywords "carbon emission target/GHG emission target" + "city name" (such as Shanghai), preferencing results from the website of that city's Municipal People's Government. For international cities, we used English keywords and city names, and prioritized the results from official city government websites. For city-level policies that could not be obtained, we referenced the policies of the superior administrative authority or the country. For example, we could not find some city-level policies for Guilin, so used the policies of Guangxi Province, in which it's located, instead. After the first round of data collection, we revised the index system. We added two level 1 indicators, waste management and green finance, and some level 3 indicators under community-wide initiatives, building policies, and transportation policies. Based on the revised index system, we conducted an additional search for city policies to help ensure we captured all available documents. However, due to the language barrier and lack of local data support, the data we collected may not cover all activities in the cities.

ASSESSMENT RESULTS

3.1 Overall performance

The sample cities with the highest policy coverage are London, Shanghai, and Shenzhen. In London, climate action policies are coordinated and climate goals are the same across policies, especially in buildings and transportation. Shanghai has well-established policies to help create an low-carbon and sustainable city with detailed guidance on community-wide initiatives and waste management. Shenzhen's policies are comprehensive but not very detailed, outperforming others in waste management and energy & water utilities. See Appendix C for more detail regarding the policy coverage of all 12 cities in each action area, which is also available on Citysphere.net.

In terms of action areas, cities have the highest policy coverage rates in local government operations and energy & water utilities. Cities with higher coverage rates on community-wide initiatives, building policies, and transportation policies also outperform their peers in general as these areas include more indicators and are more diverse (see Table 2).

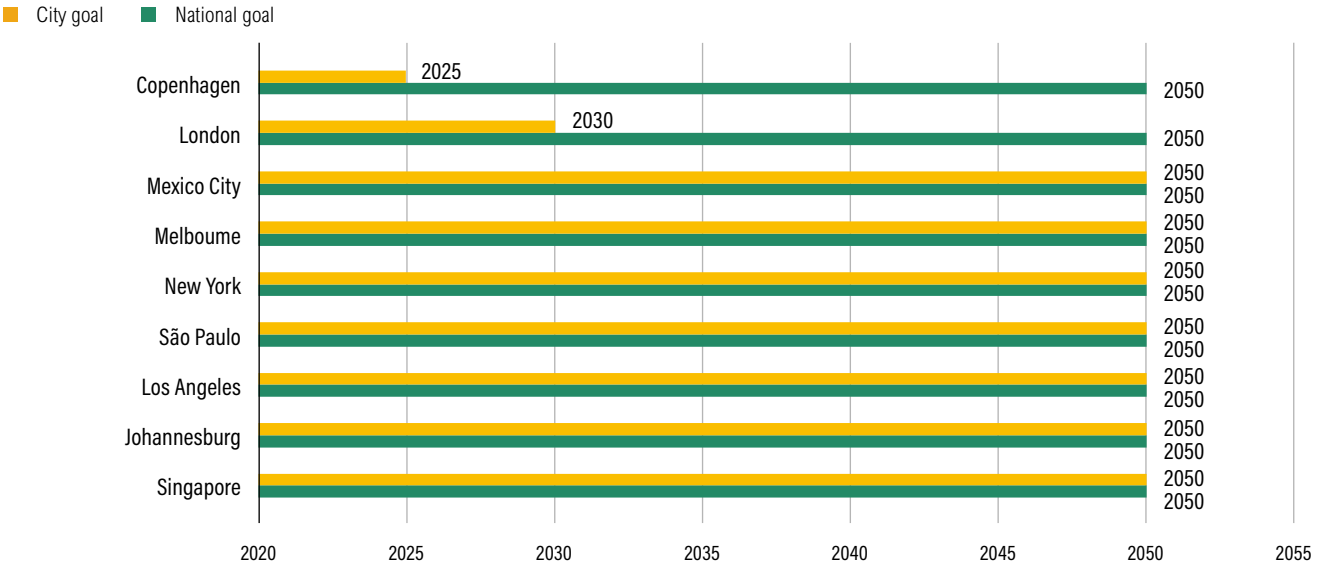
Table 2 | **Cities' policy coverage assessment across action areas**

CITY	COMMUNITY-WIDE INITIATIVES	BUILDING POLICIES	TRANSPORTATION POLICIES	GREEN FINANCE	WASTE MANAGEMENT	ENERGY AND WATER UTILITIES	LOCAL GOVERNMENT OPERATIONS
Shenzhen	High	Relatively high	Relatively high	High	High	High	High
Shanghai	High	Relatively high	Relatively high	High	High	High	High
London	Relatively high	High	High	Medium	High	High	High
Singapore	Relatively high	Relatively high	Relatively high	High	High	High	High
New York	Medium	Relatively high	Relatively high	High	High	High	High
Los Angeles	Relatively high	Relatively high	Relatively high	Medium	High	Relatively high	High
Copenhagen	High	Medium	High	Medium	High	Medium	High
Johannesburg	Relatively high	High	Medium	High	Relatively high	Medium	Medium
Guilin	Medium	Relatively high	Medium	Relatively high	Relatively high	Relatively high	High
São Paulo	Relatively high	Relatively low	Relatively high	Relatively high	High	Relatively high	Medium
Melbourne	Medium	Medium	Medium	Medium	Medium	Relatively high	High
Mexico City	Relatively high	Relatively low	Medium	High	Relatively high	Medium	High

Note: We categorized cities on how comprehensive their policies are in each policy area based on how many points they scored across the indicators. Cities are ranked by the total points they scored, from the highest on top.

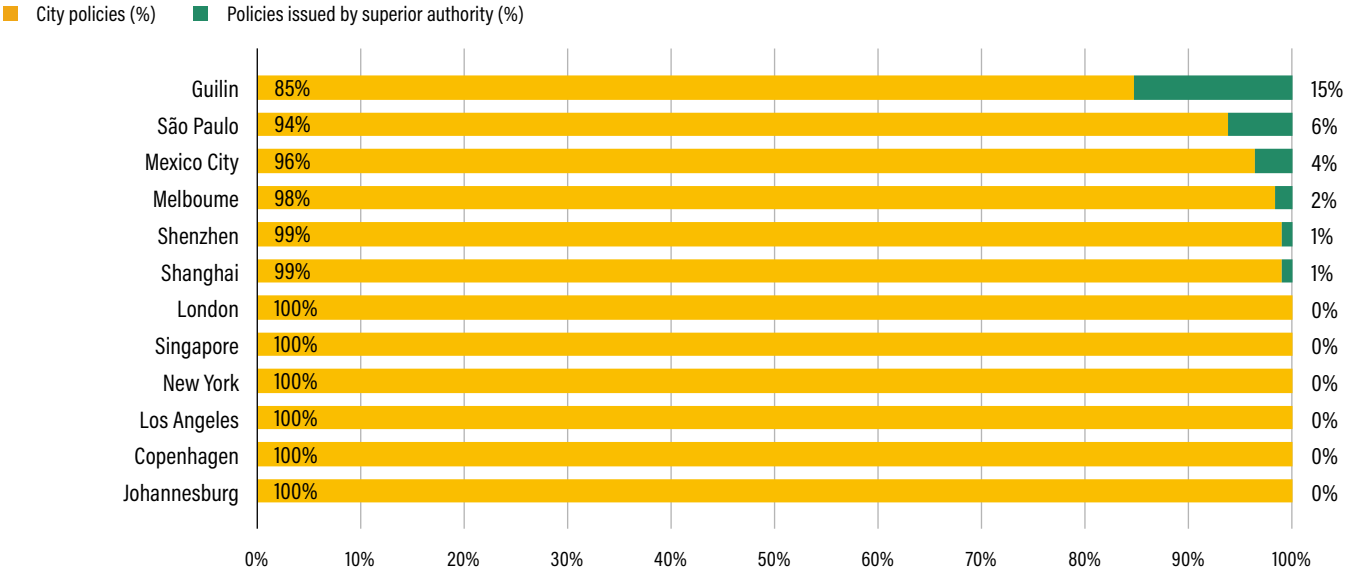
National policies also help shape cities' climate ambitions. Cities have at least the same targets as their countries in achieving carbon neutrality and net-zero goals, while some cities aim higher. For example, the carbon neutrality targets of Copenhagen and London are more than 20 years ahead of the respective national goals (Figure 3). In terms of indicator scores, local policies account for more than 85 percent of cities' overall scores (Figure 4). To help achieve national and superior administrative authority targets, most cities have issued stand-alone local policies, such as building energy efficiency standards and total GHG emissions and intensity reduction targets, among others. For example, based on the newly released national green building standard, Shanghai has established more targeted local standards featuring specific provisions and assessment requirements relevant to the city.

Figure 3 | **Comparison of carbon neutrality targets between cities and their countries**



Source: Adapted from Lang et al. (2023).

Figure 4 | **Proportion of policies issued by city versus superior administrative authority**



Source: Authors.

3.2 Action areas

Community-wide initiatives

Among community-wide initiatives, climate goals and community shared solar programs are the most widely adopted actions. As shown in Figure 5, all 12 cities have set city-level climate goals, among which more than three-quarters plan to achieve carbon neutrality or net-zero emissions before 2050, and 11 have set renewable energy targets. Chinese cities have not yet set stand-alone target years for carbon neutrality, but they have pledged to meet the 2060 carbon neutrality target set by the central and provincial governments. Meanwhile, they will also restrict high-emission and energy-intensive industrial projects and roll out low-carbon pilots, "Eco-city" and "Sponge City," to promote community-wide initiatives.

Cities have initiated diverse measures on distributed energy. Shanghai, Shenzhen, and Singapore plan to boost their distributed energy systems. Copenhagen is building up its district heating network with an effort to widely apply wind and photovoltaic (PV) power generation, while cities such as Los Angeles, Johannesburg, and New York are committed to building microgrids and smart grids.

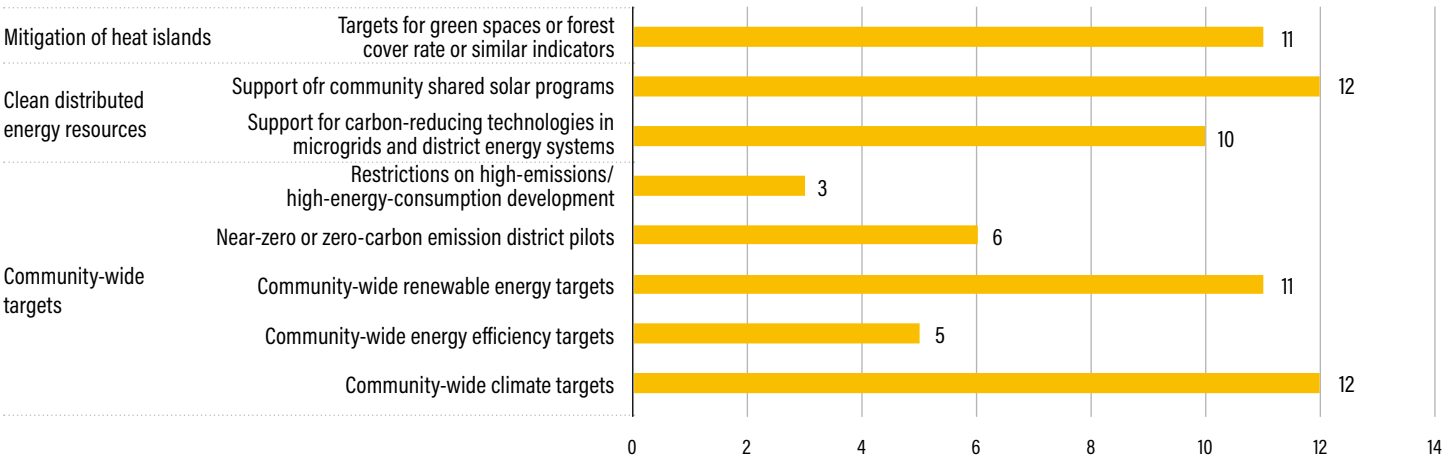
In addition, many cities have set targets for green spaces to mitigate the urban heat island effect through increasing forest coverage, expanding park green area, improving rooftop greening, and expanding blue-green space, among other actions.

Building policies

Almost all cities have issued energy efficiency standards or codes for buildings, requiring residential and commercial buildings to improve their energy efficiency, consume less energy, and adopt renewable energy (see Figure 6). More than two-thirds of cities intend to build more facilities (including charging infrastructure) to promote the adoption of electric vehicles. Although national building standards and codes will influence a city's building policies, most cities have already exceeded the minimum requirements of their national governments by adopting measures like building energy efficiency certifications and green building labels. For example, London's city government stipulates that all buildings must meet level C or above of the Energy Performance Certificate for Buildings before 2050, while Johannesburg has set specific zero-carbon and zero-water footprint indicators to achieve the goal of having city-wide zero-emission buildings by 2050. In many cities, measures are first adopted for public buildings before being extended to others.

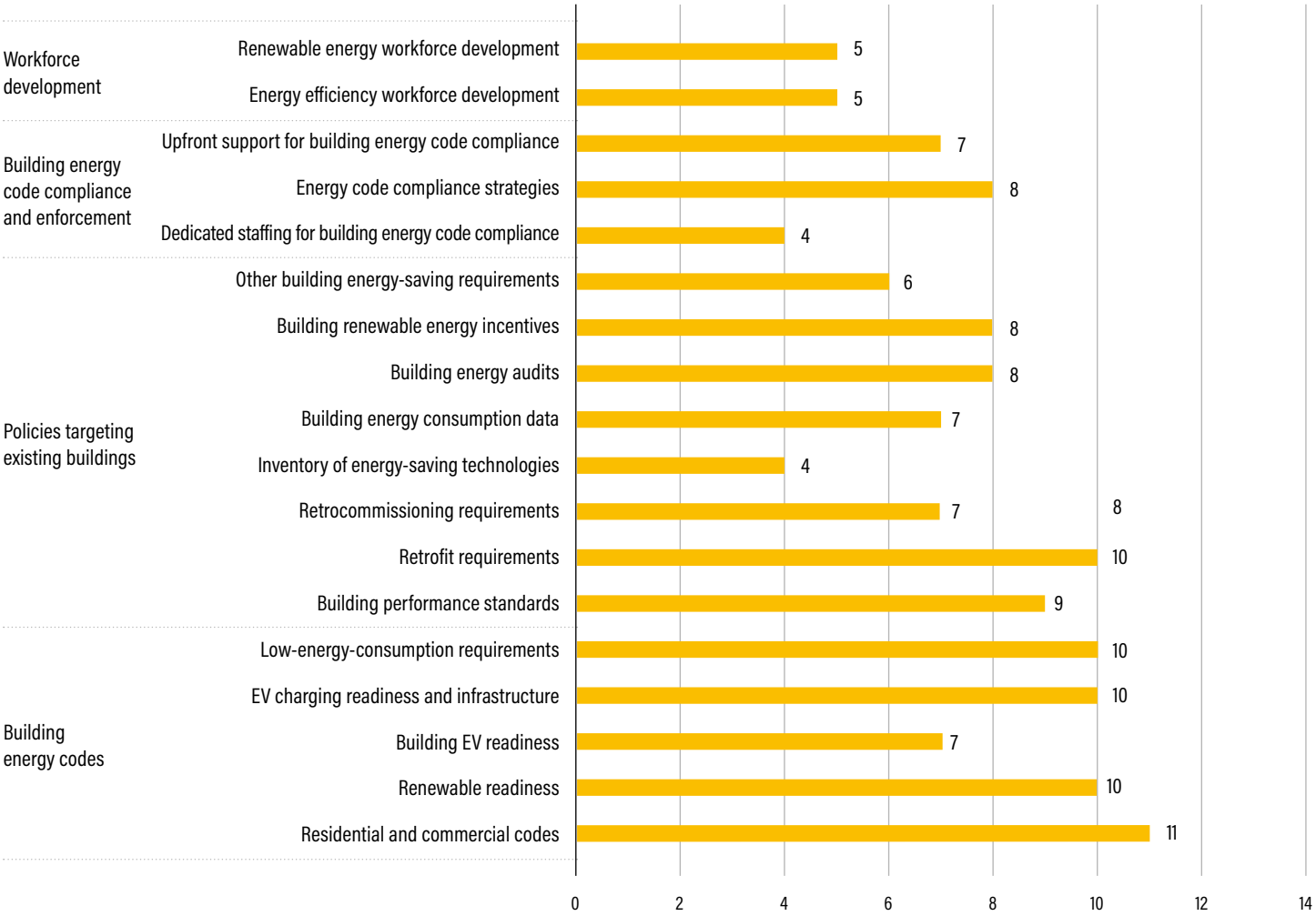
For existing buildings, most cities have formulated performance standards, retrofit requirements, and energy audits, with incentives for green buildings development. For example, New York restricts the GHG emissions of existing buildings according to local legislation, while London supports the heating renovation of residential and commercial buildings through policies, striving to connect 460,000 buildings into the district heating network before 2030. In addition, cities are employing various incentives, such

Figure 5 | Number of sample cities with community-wide initiatives



Note: EV = electric vehicle.

Figure 6 | **Number of sample cities with building policies**



Note: EV = electric vehicle.

as subsidies, tax cuts, and financing policies, to promote clean energy and green building projects like rooftop PV installation.

The workforce is typically a less concerned area in city policies. This includes professionals to implement building energy-saving laws and regulations, as well as a sufficient number of skilled workers in renewable energy and energy efficiency in the building sector. But we have a few pioneers in this area. For example, London has proposed to train its city officials and staff to carry out RE:FIT, a program to retrofit the city's public sector buildings; Shanghai encourages industry associations to organize green building business training; Johannesburg provides free or affordable training programs on green building technology; and New York has put forward workforce development requirements for community solar energy projects. Such training, though taking different forms and using diverse business models, plays a positive role in capacity building in renewable energy and energy efficiency.

Johannesburg and London have instituted the most comprehensive building policies, followed by New York and Shanghai. These four cities have all set long-term goals of carbon reduction or zero-carbon emissions in the building sector, and use a series of means such as bank interest rate cuts, subsidies, and tax cuts to encourage the construction of green buildings. However, even in cities with the most extensive policy coverage, there is still room for improvement. For example, in the

overlapping area of building and transportation policies, Johannesburg could consider providing charging infrastructure for electric vehicles in buildings.

Cities demonstrate various levels of policy coverage in the building sector Compared with cities in temperate zones, those in tropical and cold zones are more active in building retrofit and renewable energy. For example, New York requires new buildings to install PV panels on rooftops or carry out roof greening measures, while Singapore requires existing buildings to meet minimum environmental standards when installing or retrofitting cooling systems. This indicates that cities have fully considered their climate and regional characteristics when customizing building policies to promote low-carbon development in the building sector.

Transportation policies

Cities can effectively reduce GHG emissions from the transportation sector by improving services, accessibility, and efficiency. Most sample cities have sustainable transportation planning in place. Cities like Singapore, Shanghai, and Shenzhen have formulated stand-alone transportation plans; others, like London, New York, and Los Angeles, have incorporated their sustainable transportation planning into urban master plans or climate action plans. Nevertheless, only a few cities have directly set vehicle miles traveled (VMT) targets or clear reduction targets for GHG emissions in the transportation sector. For example, London, New York, and Los Angeles have all set emission reduction targets in transportation, but only Los Angeles has clearly put forward the VMT targets per capita for 2025, 2035, and 2050.

Local governments play a key role in promoting zero-emission vehicles, and building a smart, efficient, and convenient transportation network. Cities can raise the efficiency of a vehicle itself and encourage people to purchase energy-saving cars by providing subsidies, tax incentives, parking concessions, and free licenses to EV or hybrid car buyers. In addition, cities can increase the proportions of electric buses and rail transit in public transport. Moreover, through technological innovation and by building more charging infrastructure, the whole transportation system can be made more efficient. For example, Copenhagen plans to employ a smart transportation system to regulate traffic flows during different time periods and adopt LED (light-emitting diode) streetlamps by 2025.

Regional commute and mobility decisions are the main factors affecting energy use in transportation. Policymakers can make better use of land, appealing to intensive development. For example, New York has several special-purpose districts for the creation of mixed-use development to improve the efficiency of land use, while other cities, through traffic-oriented planning, work to improve the accessibility of bus stops in residential areas to solve the "last mile" problem.[7]

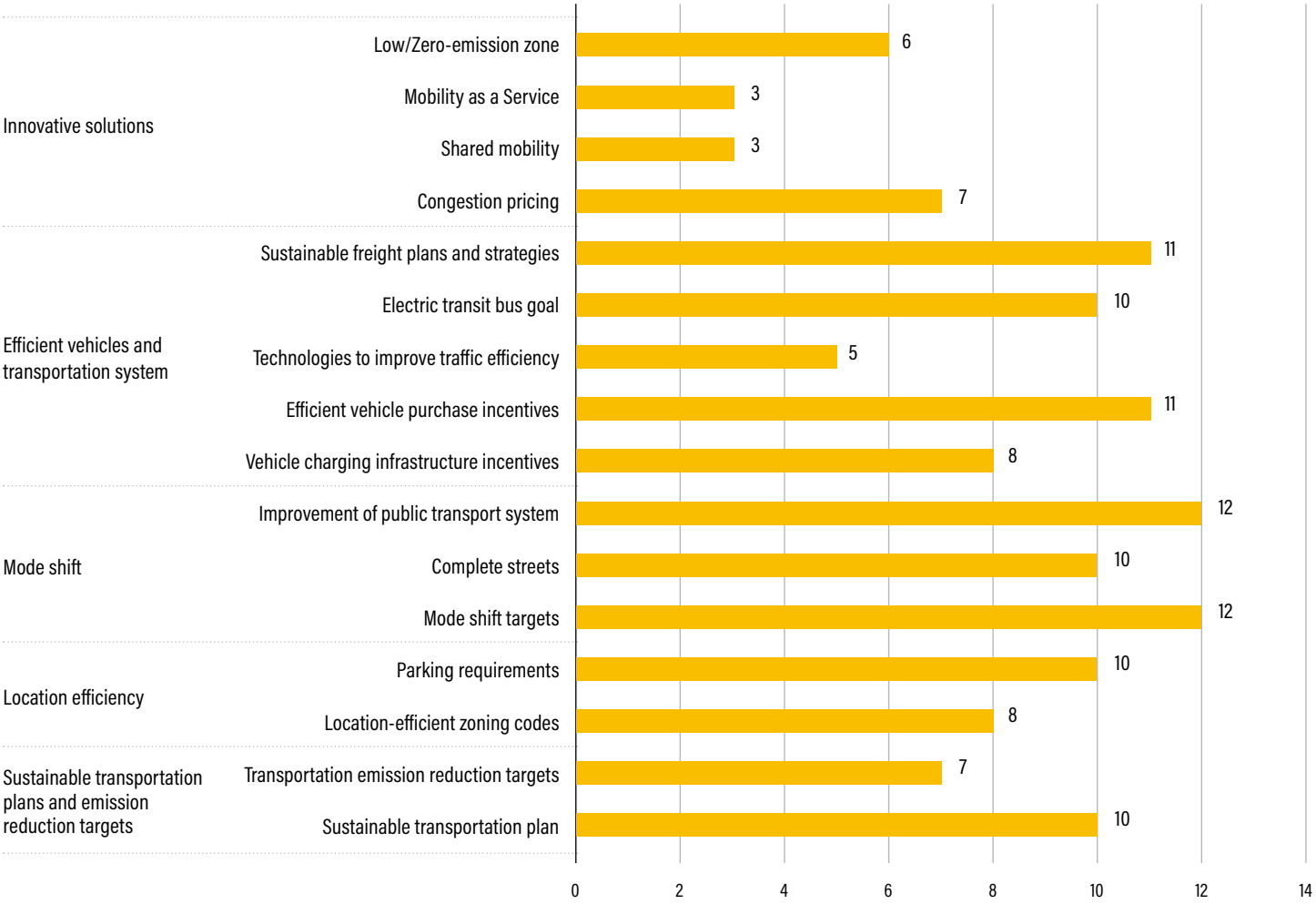
Similarly, cities can also influence residents' travel behavior. Local governments should take the lead in making it easier for residents to access various travel options and in creating safe, non-vehicle-dependent neighborhoods, including by providing comprehensive public transport and a slow travel system, as well as complete streets.[8] For example, Copenhagen has not only built bicycle-friendly complete streets, but also made great efforts to promote cycling culture, increase the share of green mobility in the community road network, and integrate bus lanes, bicycle lanes, sidewalks, and commercial streets; and London is improving its neighborhood facilities/services through the "Healthy Streets" project, encouraging residents to travel on foot. In addition, many sample cities have created 15-minute and 20-minute neighborhoods,so residents don't have to travel far to access services.

In terms of innovative solutions, there is still room for improvement. For example, less than half of cities have policies and platforms on shared mobility, Mobility-as-a-Service, and smart transportation. However, while few in number, some cities are exploring traffic demand management such as zero (ultra-low) emission zones and congestion charging. For example, Shenzhen is working to define a low-emission zone for motor vehicles and exploring the application of hydrogen fuel cells.

Cities' transportation priorities depend in part on their climatic zone. In terms of climate adaptability, electric vehicles may not be suitable for tropical and cold cities, but cities in these zones are still actively phasing out fuel-based vehicles. For example, Copenhagen plans to phase out all diesel vehicles by 2025. Cities in temperate zones are making efforts to build more EV chargers. For example, Shenzhen is working to supply more EV chargers for new energy vehicles with a target of 2025.

The number of sample cities with transportation policies is shown in Figure 7.

Figure 7 | **Number of sample cities with transportation policies**



Note: VMT = vehicle miles traveled; GHG = greenhouse gas.

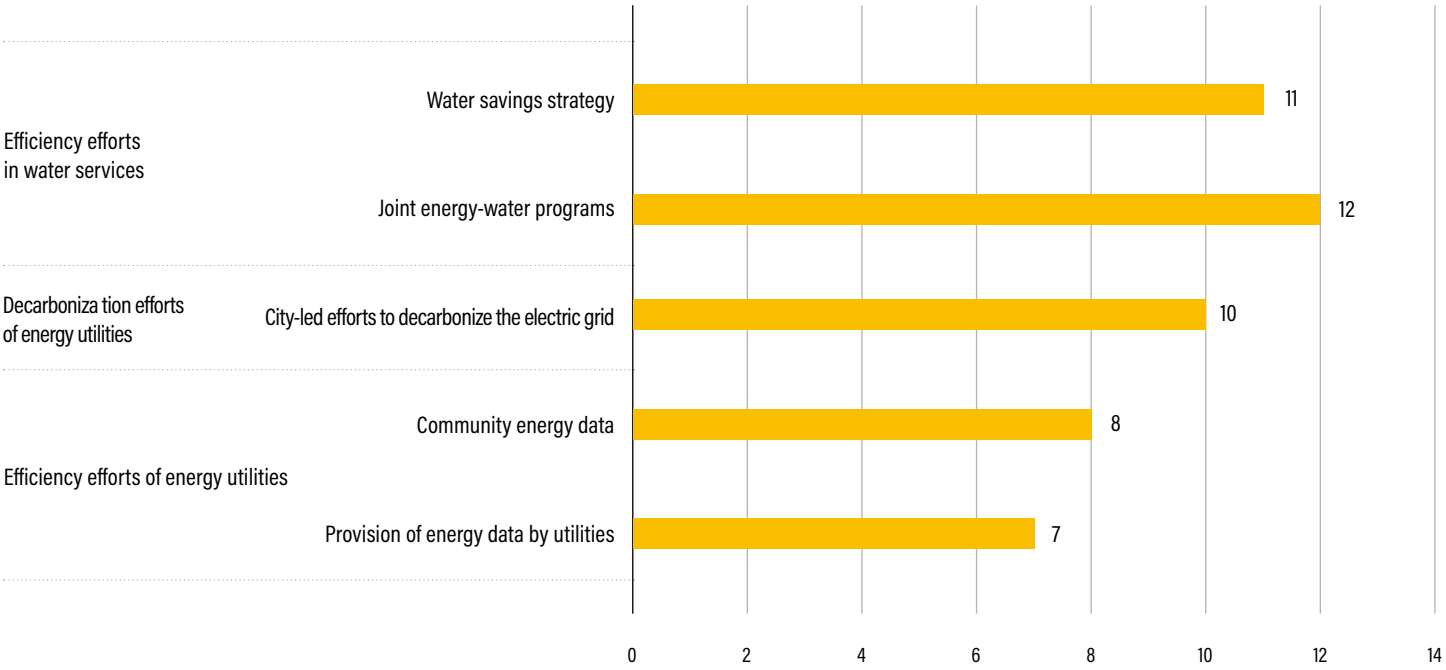
Energy and water utilities

By increasing the output of renewable energy, cities and public utilities can achieve decarbonization and climate targets. For example, Los Angeles set the goal of 100 percent renewable energy utilization by 2027. To honor their climate commitments, countries and cities are working together with energy utilities to purchase more renewable energy until they reach full renewable energy usage and zero-carbon power generation. In 2022, the United Kingdom power grid embarked on a decarbonization journey, while New York accelerated its electric grid decarbonization by launching projects, cooperating with organizations on renewable energy programs, and formulating policies.

Energy data monitoring is an important step in decarbonization. For example, authorities in Los Angeles, Melbourne, and São Paulo provide annual reports on energy use or water discharge. At the community level, cities including New York and London have created open data platforms to regularly release community energy data, and cities including Shenzhen and Shanghai require that buildings or public institutions be monitored for their energy usage and that their energy data be summarized and submitted to city authorities before being published regularly.

Drinking water and sewage treatment facilities can raise the efficiency of energy and water utilization in the whole system and for users. For example, in New York, multiple stakeholders cooperate to save water and energy: The municipal water department launchs water-

Figure 8 | **Number of sample cities with energy and water utilities policies**



Note: VMT = vehicle miles traveled; GHG = greenhouse gas.

saving initiatives, energy companies install energy-saving facilities, and the US national grid provides equipment. National and municipal environment departments can also formulate policies to encourage residents to save water. For example, Johannesburg raises residents' awareness of water conservation through educational campaigns, while Singapore provides subsidies to residents to buy efficient home appliances.

The number of cities with energy and water utilities policies is shown in Figure 8.

Waste management

The level of waste management depends largely on local policies and measures. Usually, cities manage their waste through stand-alone waste policies, waste reduction targets, and recycling targets. Take London as an example. The city plans to recycle 65 percent of its urban waste by 2030 and reduce 20 percent of food waste per capita by 2025. Most cities have customized regulations to manage domestic and solid waste, or have included an earmarked chapter on waste management in environmental policies.

To meet their targets, cities adopt various compulsory and incentive measures for different types of waste. For example, Singapore released the *Zero Waste Masterplan* in 2019 to regulate food waste, discarded electronic devices, and the discarding and recycling of waste packaging (MEWR, 2019); New York guides and encourages public participation in garbage collection campaigns by providing financial incentives to adhere to policy.

Cities studied have similar scores in terms of working to achieve zero carbon in waste management. Copenhagen, London, Los Angeles, New York, Shenzhen, and Singapore all have well-established waste management systems, objectives, and measures. More specifically, for example, Shenzhen issued *Shenzhen's 14th Five-Year Plan for "Zero Waste" City Implementation Measures*, which set quantitative targets of waste reduction and recycling, covering eight major types of waste. It actively builds a "waste-free city" by taking citywide waste-reduction, resource-recycling, and classified-collection actions (SMBEE, 2022).

The number of sample cities with waste management policies is shown in Figure 9.

Figure 9 | **Number of sample cities with waste management policies**

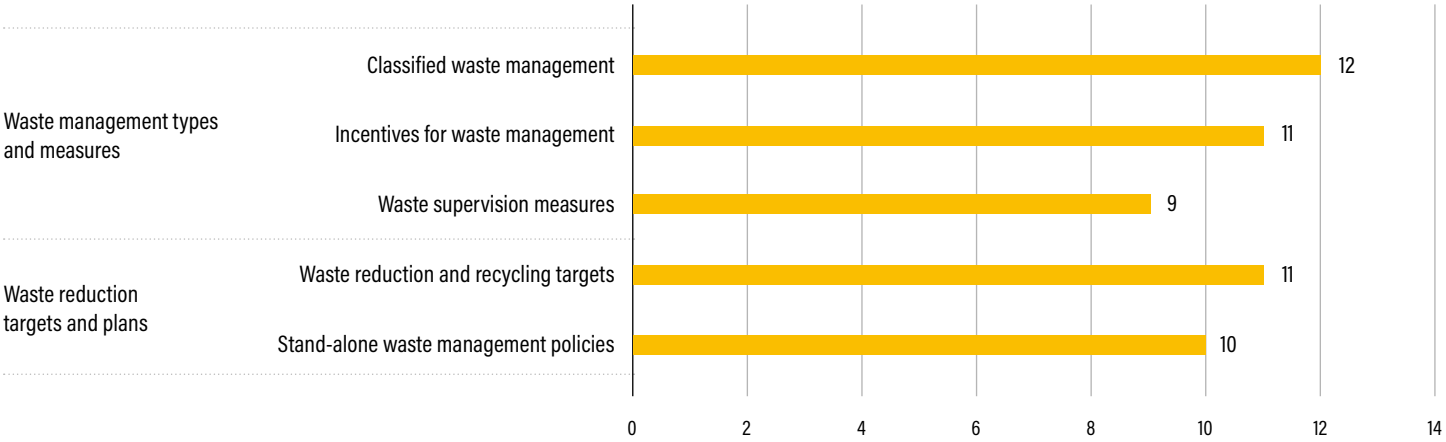
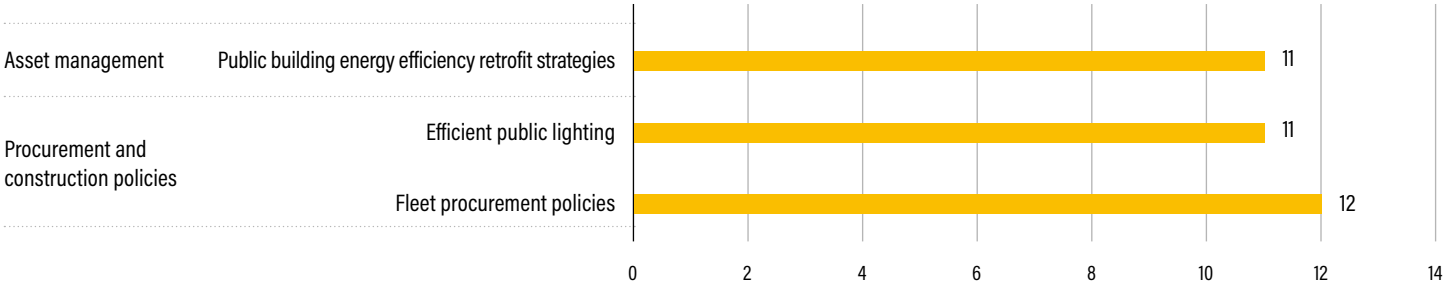


Figure 10 | **Number of sample cities with local government operations policies**



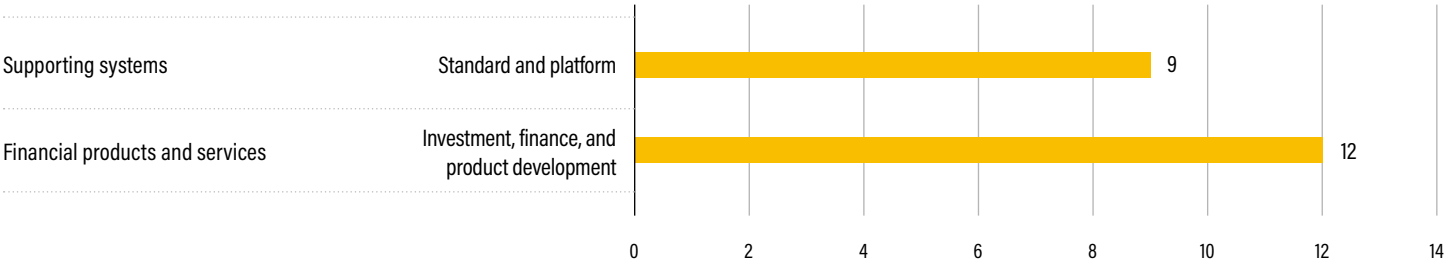
Local government operations

Local governments have taken the lead in climate action by optimizing energy use in their daily operations. Take London as an example. The city plans to achieve zero emissions for city vehicles by 2025, and this reflects a similar level of ambition among other cities studied. To reach such goals, local governments should incorporate energy efficiency and renewable energy into public procurement and infrastructure projects, with an emphasis on energy management in public assets and investments. If new policies and technologies are employed in routine practices like fleet procurement, the utilization rate of clean energy in the whole operation of local governments will improve. For example, from 2030, the city government of Johannesburg will procure only electric vehicles.

Although energy consumption in public institutions usually accounts for a relatively small proportion of overall energy use, by improving energy efficiency and renewable energy use, local governments can not only showcase their determination to reduce GHG emissions, but also play an exemplary role in inspiring more communities to take action (Ribeiro et al. 2017). For example, in 2011, the Shenzhen municipal government issued *The Shenzhen Public Administration Energy Saving Measures*, which aims to lead the public sector in energy-saving practices (Shenzhen Municipal Government, 2011).

Most sample cities have well-rounded policies regarding their local government operations (Figure 10). They not only take full consideration of decarbonization in the public sector, but have also adopted a series of measures for public institutions, including procuring green and electric vehicle fleets, enacting efficient public lighting policies, and making efficiency improvements to and retrofitting municipal buildings and public institutions. Specific actions taken vary by city. For example, Los Angeles focuses on airports, ports, and municipal buildings by using digitalization and smart technologies to meet its goal of achieving carbon neutrality by 2030, while Shenzhen conducts green retrofitting of public institutions and requires data reports on their energy consumption.

Figure 11 | **Number of sample cities with green finance policies**



Green finance

Cities provide a variety of financial products and services to address climate change, including green funds, green bonds, green credit, and carbon financial products. Multiple city governments have established climate funds, aiming to improve energy efficiency and facilitate the clean energy transition. Led by local governments, these funds usually establish public-private partnerships, pooled through local and national governments with capital coming from the European Union and private funds, as well as direct investment by banks, businesses, and individuals. For example, in 2018, the mayor of London launched the £500 million Mayor of London's Energy Efficiency Fund to deliver new low-carbon technology and upgrade existing infrastructure, with an investment period up to 20 years. It is thus far the United Kingdom's largest earmarked investment fund, of which nearly 90 percent of the capital is coming from the private sector. In Los Angeles, transition funds are provided for less developed communities for clean energy and capacity building.

Cities studied also encourage all stakeholders to engage in climate financing by building supportive systems, including by issuing standards, launching institutional frameworks, and building project catalogues and data platforms. Compared with the direct provision of financial products and services, supportive systems in sample cities are still under early exploration. A quarter of the cities have not yet defined such policies, while only half of them have formulated local policies. For example, New York and Singapore have created data platforms to disclose the progress and amount of climate investment and financing, and Chinese cities facilitate climate investment and financing by building green project databases. Shanghai and Shenzhen have kicked off local emission trading system markets to encourage voluntary GHG reductions as the country has not yet undertaken legally binding obligations to limit and control GHGs.

The number of sample cities with green finance policies is shown in Figure 11.

CONCLUSION AND DISCUSSION

4.1 Summary

Based on the *City Clean Energy Scorecard* and climate policies of 12 sample cities in China and abroad, we have built the City Climate Policy Assessment Framework for cities around the world, with a focus on the qualitative assessment of policy coverage. This assessment framework covers seven key areas: community-wide initiatives, building policies, transportation policies, energy and water utilities, waste management, local government operations, and green finance. It fills the gap in the qualitative assessment of city climate policies with an objective scoring method, providing a reference for other cities in climate policymaking. In the future, the Framework can be further extended to other cities on Citysphere, and the cross-year policy coverage of the same city can also be compared and analyzed.

Based on an analysis and assessment of the climate policy coverage of our 12 sample cities, we find the following:

- **Cities have more ambitious climate targets than countries.** 83 percent of the sample cities have set an earlier target year for carbon neutrality than their respective countries. In this

study, more than 85 percent of the cities' overall scores come from stand-alone policies, rather than the national policies. Cities are also pioneers in undertaking climate action pilot projects (such as zero-carbon communities and climate funds), which can be replicated in other cities, thereby boosting the overall climate ambitions of their peers and even countries.

- **Cities have clear general objectives, but many lack sectoral goals.** While cities with high policy coverage have set sector-specific goals in alignment with the overall carbon neutrality targets, most of them still lack clear goals and strategies.
- **There is an absence of data and information disclosure mechanisms in cities.** For example, many cities have no means and requirements in place for real-time monitoring of energy data, which makes tracking policy implementation hard. A lack of information disclosure also makes it difficult to hold stakeholders accountable.
- **There is a lack of financial support and an insufficient workforce to achieve the urban low-carbon transition.** The city-level green financial support system has not yet been formed. Although developed countries have mobilized more resources from private capital, developing countries still face a huge financing gap and often lack diverse sources of funding. In addition, most cities have not started to build a dedicated workforce to help the city achieve the low-carbon transition.
- **There are significant differences in cities' local contexts, which affect their low-carbon strategies.** For example, per capita GDP has a positive but insignificant correlation with policy coverage. Cities in developing countries focus more on improving energy efficiency and enacting restrictions on high-consuming industries than developed countries. City policies are not significantly varied due to their climatic zones, but cities in tropical and cold temperate zones are generally more proactive than those in temperate zones with regard to building efficiency retrofits and renewable energy.

4.2 Inspiration for city decision-makers

While there are significant differences across the 12 samples cities in terms of their degrees of development and policy coverage, the cities share some commonalities that can serve as recommendations for urban decision-makers:

Set up sector-specific goals and strategies: Common targets—for either the entire city, government agencies, or specific economic sectors—include reducing emissions, raising energy efficiency, and using more renewable energy. Such targets can not only lay a solid foundation for future strategy, but also contribute to GHG emission targets at the national level. With the help of research institutions, and based on GHG emission inventories by sector, city governments can set up phased emission targets and pathways.

Enhance data and information disclosure: Data are the cornerstone for setting science-based goals and following up to monitor implementation progress. City governments need to join with research institutions to obtain relevant data for decision-making. Local governments and public institutions can set an example by urging stakeholders to disclose such data so as to create a favorable environment for the green and low-carbon transition.

Build up a financial support framework: There is still a big funding gap to address climate change, especially in developing countries, which cannot be filled through just in-budget municipal finance. City governments should attract various funds to invest in climate change, fully leveraging a market-based mechanism to provide diversified green financial products and services. City governments should also build platforms and a policy support framework to disclose more information related to climate investment and financing.

Prioritize workforce development: Cities need a capable labor force in setting climate goals, formulating implementation plans, and tracking progress. It is urgent for governments to attract more talent to the climate field. They should cooperate with universities, research institutions, and third parties to provide diversified training and education to their workers to help prepare for the low-carbon future of cities.

Learn from the peers: Demographics social and

economic endowment, climate conditions, geographical location, and other variables will all impact cities' low-carbon strategies. By learning from cities with similar conditions, policymakers can leverage valuable policy experience and case studies to improve their own climate ambitions.

4.3 Discussion and outlook

Although the Framework fills the gap in evaluating climate policies at the city level, there are still some limitations and uncertainties associated with our methodology, which may be improved in the future.

First, the results are not statistically representative due to the limited number of sample cities. The language barrier and the level of transparency of the policies may also impact the data reliability and limit the extent to which the results can be generalized to other cities. In the next iteration of this study, the sample size should be increased to cover more cities with different characteristics, sizes, and development levels, so that the research results will be more representative and applicable to a wider range of cities. Local resources should be leveraged to improve data integrity and accuracy.

Second, due to the availability and comparability of data, it is difficult to form a unified standard for the scoring method. At present, all level-3 indicators share the same weight, leading to the diverse weights of the level 1 indicators, so the total scores are not comparable. In future revisions of indicators and weights, sectors should be weighted based on their relative contribution to urban emissions, as well as expert opinions, should be considered, so as to ensure the comparability and accuracy of assessment results.

Third, this study focuses on policy targets and coverage, but the structural integrity of policies, the policymaking process, costs, efficiency, implementation, and impact are not considered. In the future, the research can be further extended to cover these areas with specific case studies.

Finally, the current assessment framework focuses on climate mitigation, rather than adaptation, without much consideration of efficiency and equity of policies. In the future, policies on climate adaptation and resilience of cities will be incorporated to make the Framework more comprehensive. Furthermore, inclusiveness in the urban transition will also be considered to assess how just the sustainable development strategies are.

APPENDIX A. INDICATORS OF THE CITY CLIMATE POLICY ASSESSMENT FRAMEWORK

Table A-1 | **Description of all indicators in the Framework**

LEVEL 1 INDICATORS	LEVEL 2 INDICATORS	LEVEL 3 INDICATORS	INDICATOR DESCRIPTION
Community-wide initiatives	Community-wide targets	Community-wide climate targets	There are energy saving targets at the city level, related to government and public institutions, such as GHG emission reduction targets and target year.
		Community-wide energy efficiency targets	There are energy consumption targets, such as energy use per capita, energy use per unit GDP, and total energy consumption.
		Community-wide renewable energy targets	The city has targets for renewable energy, such as power generation and the proportion and installed capacity of renewable energy.
		Near-zero or zero-carbon emission pilot zones	Pilot zones and projects may include, but are not limited to, industrial parks, communities, and campuses, among others.
		Restrictions on high-emission/high-energy consumption development	Restrictions used to curb the unregulated kick-off of high-emission projects and encourage the low-carbon industrial transition.
	Clean distributed energy resources	Support for carbon reduction technologies in microgrids and regional energy systems	The city has formally adopted policies, regulations, or agreements that require or support the sharing of regional energy systems and/or microgrids, including energy technologies to reduce carbon footprints, such as electric vehicles and fuel cells.
		Support for community shared solar programs	The city has formally adopted policies, regulations, or agreements that require the establishment of community solar energy systems, or the city has formally committed to providing policies or financial support to establish community-scale solar systems.
	Mitigation of urban heat island effects	Targets for green space or forest coverage rate	To mitigate the adverse effects of heat islands, the city has set green space targets in its urban planning and policies to increase vegetation coverage, such as increasing green space areas in parks and forest coverage.
Building policies	Building energy codes	Residential and commercial codes	The city has formulated clear laws, regulations, and standards for civil buildings, such as residential and commercial, to standardize the energy efficiency of buildings.
		Renewable readiness	The city has put forward requirements for supporting facilities for renewable energy for new residential or commercial buildings, such as requirements for the minimum installation area of rooftop solar PV panels, vertical facade, or sloping roof.
		Building EV readiness	The city has put forward requirements for supporting facilities for electric vehicles for new residential or commercial buildings, such as requirements for parking spaces and charging piles for electric vehicles in communities and buildings.
		EV charging readiness and infrastructure	The city has put forward requirements for charging infrastructure for new residential or commercial buildings, such as the planning of charging facilities and the requirements of cables and installed capacity to support electric vehicles.
		Low-energy-consumption requirements	The city requires new residential, commercial, and municipal buildings to meet the requirements of a green building label or low energy consumption standards.

Table A-1 | **Description of all indicators in the Framework**

LEVEL 1 INDICATORS	LEVEL 2 INDICATORS	LEVEL 3 INDICATORS	INDICATOR DESCRIPTION
Building policies	Policies targeting existing buildings	Building performance standards	Phased requirements for energy saving and emission reduction have been set for buildings.
		Retrofit requirements	Existing buildings must be renovated—such as by upgrading lighting—to reduce energy use.
		Retrocommissioning requirements	Buildings must be upgraded on a schedule or based on the stage of building operation to improve the operation efficiency of building equipment.
		Inventory of energy-saving technologies	The government provides the inventory of energy-saving technologies to encourage owners to renovate.
		Building energy consumption data	Owners of commercial and residential buildings are required to measure, report, and share their energy use.
		Building energy audits	Qualified professionals are required to conduct on-site inspections to determine possible upgrading schemes, so as to improve operational efficiency. Audit requirements can be part of a stand-alone or benchmark policy.
		Building renewable energy incentives	Financial or non-financial incentives are used to encourage the application of PV power generation in the building sector.
		Other building energy-saving requirements	Other innovative energy-saving requirements that do not fall into the above-mentioned categories are used.
	Building energy code compliance and enforcement	Dedicated staffing for building energy code compliance	At least one full-time employee is required to assess the implementation of energy laws and regulations.
		Energy code compliance strategies	Building performance tests, scheme reviews, and on-site inspections are required.
		Upfront support for building energy code compliance	The city provides free support to prepare stakeholders to better understand energy-saving laws and regulations, such as free training for builders, developers, and owners.
	Workforce development	Energy efficiency workforce development	The city provides vocational training programs related to building energy efficiency improvements and energy-saving policies and gives policy support or funding for third-party training.
		Renewable energy workforce development	The city has labor market development programs related to renewable energy policies, or provides funding for third-party training.
Transportation policies	Sustainable transportation planning and emission reduction targets	Sustainable transportation plan	The city has a stand-alone sustainable transportation plan, which may also be a part of a more extensive plan.
		Transportation emission reduction targets	The city has set reduction targets for vehicle miles traveled or GHG emissions.

Table A-1 | **Description of all indicators in the Framework**

LEVEL 1 INDICATORS	LEVEL 2 INDICATORS	LEVEL 3 INDICATORS	INDICATOR DESCRIPTION
Transportation policies	Location efficiency	Location-efficient zoning codes	The city has adopted a zoning code with efficient use of land and space, as well as its applicability (for the whole jurisdiction or some blocks).
		Parking requirements	The residential parking policy limits residential units to no more than one parking space.
	Mode shift	Mode shift targets	The city has set targets for the proportions of all mobility modes, which increase the proportion of green transport such as public transit, walking, and cycling, and reduce the use of private cars.
		Complete streets	The complete streets policy focuses on planning and design of streets, as well as the integrity of street functions, ensuring safe and convenient streets for all transportation modes.
		Improvement of public transport system	The city has improved its public transport system, including bus service, public infrastructure, and bus rapid transit system, among others.
	Efficient vehicles and transportation system	Vehicle charging infrastructure incentives	The city or public utilities provide incentives to support the installation of public or private electric vehicle charging infrastructure.
		Efficient vehicle purchase incentives	The city or public utilities have incentive plans for the purchase of energy-efficient vehicles; or city has launched a public-private partnership project to offer discounts for the purchase of electric vehicles.
		Technologies to improve traffic efficiency	The city increases transportation efficiency or improves green traffic by technical means.
		Electric transit bus goal	The city or its transportation sector has set a goal for increasing the number of EV buses (excluding hybrid vehicles).
		Sustainable freight plans and strategies	The city has stand-alone sustainable freight plans or multi-modal transport plans and various strategies to improve freight efficiency.
	Innovative solutions	Congestion pricing	Congestion charging refers to charging extra fees for vehicles driving on congested roads during peak hours.
		Shared mobility	The city encourages people to share transportation by renting in groups or as individuals, such as carpooling, bike-sharing, or using electric scooters, to realize more flexible, economical, and sustainable travel modes.
		Mobility as a Service	The city encourages or provides an integrated mobility service platform for on-demand travel to integrate different modes of travel services.
		Low/Zero-emission zones	There are defined zones in the city where the use of vehicles with emissions is managed through restrictions or the collection of charges.

Table A-1 | **Description of all indicators in the Framework**

LEVEL 1 INDICATORS	LEVEL 2 INDICATORS	LEVEL 3 INDICATORS	INDICATOR DESCRIPTION
Energy and water utilities	Efficiency efforts of energy utilities	Provision of energy data by utilities	The city improves its data disclosure methods for public utilities or has reached data-sharing agreements with them.
		Community energy data	The city requires the disclosure of comprehensive energy use information regarding electricity and natural gas in the whole city for planning and assessment; or the city has energy use data of the whole city for internal planning purposes, but has not publicly disclosed them yet.
	Decarbonization of energy utilities	City-led decarbonization of electric grids	The city actively participates in renewable energy projects, formulates local policies, and partners closely with utility companies to jointly decarbonize local public utilities.
	Efficiency efforts in water services	Joint energy-water programs	The local water and/or energy authorities have enacted integrated water-energy saving measures.
		Water savings strategy	The city has set formal water-saving targets or a long-term strategy aimed at reducing the water consumption of the whole city.
Waste management	Waste reduction targets and plans	Stand-alone waste management policies	The city has stand-alone laws and regulations or plans for waste management.
		Waste reduction and recycling targets	Waste reduction and recycling targets have been set for the city and public institutions.
	Waste manegement types and measures	Waste supervision measures	Everyone must abide by mandatory measures, such as a plastics ban or hazardous waste supervision and management, or they will face penalties.
		Incentive measures for waste management	There are incentives to encourage waste reduction, recycling, and reuse, or there is earmarked funding to support the establishment of a circular economy, among others.
		Classified waste management	Local policies have been issued for classified waste management.
Local government operations	Procurement and construction policies	Fleet procurement policies	The city has formulated a strategy to increase purchases of fuel-efficient and low-emission vehicles.
		Efficient public lighting	The city requires public institutions to use high-efficient and energy-saving lighting systems, or has similar policies, such as upgrading to LED lighting systems and smart control.
	Asset management	Public building energy retrofit strategies	The city evaluates public buildings to determine what energy-saving renovations should be made, and provides funding to upgrade and optimize their operation to realize energy savings and emission reductions.
Green finance	Financial products and services	Investment, finance, and product development	The city invests more resources, encourages financial institutions to develop green financial products and services, and guides funding to invest in the climate field by market-oriented means.
	Supporting systems	Standard and platform	The local government issues standards and builds institutional mechanisms, project catalogues, and data platforms to encourage climate financing.

Notes: GHG = greenhouse gas; GDP = gross domestic product; PV = photovoltaic; LED = light-emitting diode.

APPENDIX B. BACKGROUND INFORMATION OF THE SAMPLE CITIES

Table B-1 | **City background variables**

CITY	COUNTRY	CONTINENT	CLIMATIC ZONE	PERMANENT POPULATION (10,000)	GDP PER CAPITA (US$)	TARGET TYPE[9]	POLICY STAGE
Copenhagen	Denmark	Europe	Cold zone	63	91,599	Carbon neutrality	Policy document
Melbourne	Australia	Oceania	Temperate zone	516	15,367	Net zero	Policy document
Los Angeles	United States	North America	Temperate zone	390	76,285	Net zero	Policy document
New York	United States	North America	Cold zone	880	89,835	Net zero	Legislated
Mexico City	Mexico	North America	Temperate zone	920	8,432	Carbon neutrality	Policy document
Singapore	Singapore	Asia	Tropical zone	569	60,729	Net zero	Policy Document
London	United Kingdom	Europe	Temperate zone	900	75,641	Zero carbon	Policy document
São Paulo	Brazil	South America	Temperate zone	1232	11,691	Net zero	Legislated
Johannesburg	South Africa	Africa	Temperate zone	578	60,762	Net zero	Policy document
Shanghai	China	Asia	Temperate zone	2488	23,859	Unset	Not available
Shenzhen	China	Asia	Temperate zone	1763	24,396	Unset	Not available
Guilin	China	Asia	Temperate zone	493	6,497	Unset	Not available

APPENDIX C. CITY POLICY SUMMARY

CONTENTS

SHANGHAI

China, Asia

In terms of low-carbon development and sustainable cities, Shanghai has sound policies. Shanghai stands out due to its complete and detailed community initiatives and waste management policies. For buildings and local government operation categories, however, Shanghai lacks top-level design for adapting to climate change at the city level, climate adaptation targets and implementation guarantee mechanisms are not fully reflected in the architecture and local government actions, and the policy system needs to be strengthened.

Community-wide initiatives

●●●●● High

As of the climate change targets, Shanghai has detailed policies. Besides strictly implementing national policies, Shanghai also sets its own targets for reducing carbon emissions and energy intensity as well as raising the proportion of clean energy. Meanwhile, the city has regulations promoting renewable energy (wind and photovoltaic power generation), launching low-carbon pilot projects, and capping emissions in key industries. Shanghai has also set specific goals for urban green space and aims to become an ecological and sponge city.

Buildings

●●●●○ Relatively high

Shanghai has formulated the policy of green buildings with many indicators. It covers renewable energy utilization standards, installation of electric vehicle (EV) charging facilities, ultralow energy consumption building standards, and requirements for energy-saving renovation of buildings. According to the Shanghai Green Building "14th Five-Year Plan", after 2025, all new buildings in Shanghai will be green buildings. In addition, Shanghai provides training for managers of green buildings and for energy conservation of public institutions. However, Shanghai has not done much in monitoring the implementation of such policies. For example, no full-time staff have been

allocated to supervise whether buildings comply with the energy consumption standards, and there are no specific strategies or earmarked top-down support for compliance.

Transportation

●●●●○ Relatively high

Shanghai has drafted an integrated plan for sustainable low-carbon transportation with quantitative targets. The city also has taken multiple actions and implemented policies for low-carbon public transportation. For example, the *Shanghai Planning Guidance of 15-Minute Community-Life Circle (Trial)* provides detailed guidance and requirements for the transportation planning of the city, including green travel, energy-saving and low-carbon transportation, EV charging facilities, and incentives to purchase EVs. Moreover, Shanghai also tries to optimize the overall energy structure of the city, promoting new energy fuels, introducing policies of green freight, and piloting zero-emissions or low-emissions zones in ports. However, Shanghai has yet to introduce a peak-hour congestion charge or a policy to reduce parking spaces for motor vehicles.

Energy and water utilities

●●●●● High

Shanghai requires buildings to monitor and report their energy data. Such energy usage data can be input into a database of urban energy conservation and carbon reduction to compile reports on the energy consumption of public buildings. The Shanghai government is also committed to realizing the goal of decarbonizing the power grid by optimizing the energy structure, including promoting natural gas and applying carbon reduction technologies. As for energy and water conservation, Shanghai has introduced various water-saving policies and water-recycling projects.

Waste management

●●●●● High

Shanghai released the *Shanghai Waste Management Regulations* in 2019, stipulating the details of source reduction, delivery, collection, transportation, disposal, recycling, supervision, and management of domestic waste. Shanghai has also formulated other policies, such as on recycling solid waste. However, it has yet to set quantitative targets for waste recovery or reduction.

Local government operations

●●●●● High

Shanghai has set policies and targets for campaigns regarding urban vehicle procurement, urban public lighting, the energy-saving renovation of urban buildings, and more. It also enacted the purchasing of green goods, the phasing out of outdated high-energy fleets, and the upgrading of traditional streetlights to light-emitting diode (LED) lighting. However, Shanghai's policies for the energy-saving renovation of buildings focus on public institutions only, which can be limited.

Green finance

●●●●● High

Shanghai has set up a carbon emissions trading system and introduced carbon services. It has proactively launched low-carbon and zero-carbon pilot projects.

Table C-1 | **Shanghai policy list**

POLICY	LINK	AREA	ISSUANCE YEAR
Shanghai's 13th Five-Year Plan for Energy Conservation and Climate Change [b]	https://www.shanghai.gov.cn/nw41430/20200823/0001-41430_51762.html	Community-wide initiatives	2017
Shanghai's 14th Five-Year Plan for Ecological Environmental Protection [b]	https://www.shanghai.gov.cn/202120zfwj/20211022/ab9992ce686541509d9b09162eee9b45.html	Community-wide initiatives Green finance	2021
Implementation Plan of Shanghai on Accelerating the Establishment and Improvement of Green, Low-carbon and Circular Development Economic System	https://www.shanghai.gov.cn/202122zcjd/20211122/54c2d03d962b4c21957d5ae8b992d895.html	Community-wide initiatives	2021
Shanghai's 14th Five-Year Plan for Resource Conservation and Circular Economy Development [b]	https://english.shanghai.gov.cn/nw12344/20220509/a00971c96ede444eade8000cb9c12766.html	Community-wide initiatives	2022
Shanghai's 14th Five-Year Plan for Housing and Urban-Rural Development Management [b]	https://zjw.sh.gov.cn/ghjh/20211109/a3b03c1ee247418ebce706bd0b08da10.html	Community-wide initiatives	2021
Shanghai Green Building Management Measures [a]	https://www.shanghai.gov.cn/nw12344/20211108/8e8b6be4f4d04ff588b76cbea9b6c1e6.html	Buildings	2021
Shanghai Public Administration Circular Economy Development Plan [b]	https://www.shanghai.gov.cn/nw12344/20220118/405667a886cf4132b38f0776b777acc3.html	Buildings Local government operations	2022
Shanghai's 14th Five-Year Plan for Green Buildings [b]	https://zjw.sh.gov.cn/ghjh/20211109/a3b03c1ee247418ebce706bd0b08da10.html	Buildings	2021
Shanghai's 14th Five-Year Plan for Transportation [b]	https://www.shanghai.gov.cn/nw12344/20210721/ca22dbbbafb64f719f8b9350e151d879.html	Transportation	2021
Outline of the 14th Five-Year Plan for National Economic and Social Development of Shanghai Municipality and the Long-Range Objectives for the Year 2035 [b]	http://www.caam.org.cn/chn/9/cate_104/con_5233099.html	Transportation	2021
Shanghai's Implementation Measures for Encouraging the Purchase and Use of New Energy Vehicles [b]	https://www.shanghai.gov.cn/nw12344/20210210/432b54af74bb48b093d6b0108b2eb286.html	Transportation	2021
Shanghai Waste Management Regulations [a]	https://www.shqp.gov.cn/mac/tzgg/20191031/604406.html	Waste management	2019
Shanghai Water Supply Plan (2019-2035) [b]	https://swj.sh.gov.cn/ghjhua/20200910/f1ad9739169a4804a9d6332704e147cc.html	Energy and water utilities	2019

Notes: [a] Laws and regulations
[b] Planning documents
[c] Other projects or third party evaluation

LONDON

United Kingdom, Europe

Among climate action related policies, London's performance in the community-wide initiatives category is the strongest. Its policies indicate a strong consistency in terms of aiming for the same targets. Policies are prominent in the buildings and transportation categories.

Community-wide initiatives

●●●●○ Relatively high

London's 2050 net zero emissions goal sets the vision for a clean and sustainable future. Based on its *Zero Carbon London: A 1.5˚C Compatible Plan, London Environment Strategy* and other polices, several low-carbon emissions and renewable energy actions will be carried out. Also, the city is planning to be the world's first national park city, adding a substantial amount of green space in the near future.

Buildings

●●●●● High

London requires all buildings to acquire an energy performance certificate (EPC) and move to EPC level C by the end of 2050. Multiple strategies are building up EV readiness and promoting the roll out of related infrastructure. Additionally, London carries out a series of programmes, including RE:FIT and RE:NEW, to help households lower energy use and phase out inefficient boilers. In a long term, the *Retrofit London Housing Action Plan*, in alignment with the *London Plan 2021*, is going to work with existing schemes and provide training for building control officers and trades people to help London's new properties meet the zero-emissions goal.

Transportation

●●●●○ Relatively high

Public transportation is already in good condition in London. An ultra-low emissions zone rolled out in 2019 after the establishment of different low-emissions zones. London highlights its Healthy Street framework in multiple strategies to encourage a modal shift towards green mobility and to improve health and reduce health inequalities in neighborhoods. The city has various EV infrastructure requirements and is shifting to electric taxis and buses for cleaner streets.

Energy and water utilities

●●●●● High

London's energy consumption is high. To tackle the high energy consumption problem, London issued several retrofitting policies focus on reducing energy consumption of heating systems. For its electricity grid, both national and local levels take decarbonization actions. For water utilities, London has specific goals: reducing residents' water usage from 149 liters per capita per day to less than 105 liters per capita per day.

Waste management

●●●●● High

London has goals, policies, and punitive measures to promote waste sorting. On the commercial side, London cafés have been banned from using single-use plastic cups and are being encouraged to offer incentives for customers to use reusable cups.

Local government operations

●●●●● High

The Greater London Authority is a leader in achieving the net zero vision among public institutions. Its car fleet will be zero emissions by 2025, and all other fleets, including heavy vehicles, will be zero emissions by 2050. Also, publicly owned properties have been reducing carbon emissions over the past few years.

Green finance

●●●○○ Medium

The mayor of London has set up the *Mayor of London's Energy Efficiency Fund (MEEF)*, accounting 50 million British pounds funding, to encourage low-carbon technology advancement and existing low-carbon infrastructure refurbishment. For example, the Greenwich Council has used the fund to upgrade streetlights to more energy-efficient LED lighting systems.

Table C-2 | **London's policy list**

POLICY	LINK	AREA	ISSUANCE YEAR
1.5°C Action Plan [b]	https://www.london.gov.uk/sites/default/files/1.5_action_plan_amended.pdf	Community-wide initiatives Buildings Local government operations Green finance	2018
Solar Action Plan [b]	https://www.london.gov.uk/sites/default/files/solar_action_plan.pdf	Community-wide initiatives	2018
London Environment Strategy [b]	https://www.london.gov.uk/sites/default/files/london_environment_strategy_0.pdf	Community-wide initiatives Buildings	2016
Housing Standards [a]	https://www.london.gov.uk/sites/default/files/housing_standards_malp_for_publication_7_april_2016.pdf	Buildings	2018
London Plan 2021 [b]	https://www.london.gov.uk/sites/default/files/the_london_plan_2021.pdf	Buildings Transportation Energy and water utilities	2021
RE:FIT [c]	https://www.london.gov.uk/programmes-strategies/environment-and-climate-change/energy/low-carbon-accelerators/retrofit-accelerator-workplaces	Buildings Local government operations	2009
Guidance Notes for Design Code [b]	https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/957207/Guidance_notes_for_Design_Codes.pdf	Buildings	2021
Retrofit London Housing Action Plan [b]	https://www.londoncouncils.gov.uk/download/file/fid/28083	Buildings	2021
RE:NEW [c]	https://www.london.gov.uk/sites/default/files/renew_brochure_jun_2017.pdf	Buildings	2017
Mayor's Transport Strategy [b]	https://www.london.gov.uk/sites/default/files/mayors-transport-strategy-2018.pdf	Transportation	2018
Mayor of London's Energy Efficiency Fund (MEEF) [c]	https://www.london.gov.uk/programmes-and-strategies/environment-and-climate-change/climate-change/zero-carbon-london/mayor-londons-energy-efficiency-fund	Green finance	2018

Notes: [a] Laws and regulations
[b] Planning documents
[c] Other projects or third party evaluation

COPENHAGEN

Denmark, Europe

Copenhagen is committed to achieve carbon neutrality by 2025. Its road map for climate action focuses on building Copenhagen into a "bicycle city" to reduce carbon emissions from the transportation sector. It also emphasizes reducing emissions from heating systems in the energy sector.

Community-wide initiatives

●●●●○ Relatively high

Copenhagen has set detailed energy-saving and emissions-reduction targets. Sectors such as commercial and residential buildings are required to reduce their energy use in heating and electricity. In energy infrastructure, the city emphasizes the importance of a distributed heating system and has installed a significant amount of wind and solar facilities for power generation.

Buildings

●●●○○ Medium

Copenhagen's building policies in terms of climate action coverage is medium. A retrofitting policy indicates that photovoltaic panels will be installed on residential buildings, which will replace oil-based heating facilities.

Transportation

●●●●● High

The city government will build Copenhagen into a bicycle-friendly city with new supporting facilities. In urban road planning, the PLUSnet system was proposed in the city's *Bicycle Strategy 2011–2025*, which provides a simple and convenient commuting network for cyclists. At the same time, synergized policies were introduced to deploy parking facilities for Cargo Bikes so citizens can replace their use of vehicles. Copenhagen aims to meet a target of 75 percent bicycle trips by 2025.

Energy and water utilities

●●●○○ Medium

Copenhagen's policies focus on wastewater treatment and plan to plant more vegetation to consolidate water.

Waste management

●●●●● High

Copenhagen has solid targets and effective policies. For the business sector, only certified waste collectors can collect and dispose of waste. For residential buildings, the classification and recycling of plastics are required. Moreover, the city government hopes to sort and recycle textiles in the future. In waste treatment, biomass energy recovered from waste can be used to provide community-based heating in Copenhagen.

Local government operations

●●●●● High

The Copenhagen municipal government plans to replace its vehicles with electric, hydrogen, or biofuel vehicles, and it will procure more green products by 2025. The municipal government has replaced most energy-consuming lighting facilities. Between 2013 and 2016, lighting system power consumption decreased by 55.5 percent compared with 2010.

Green finance

●●●○○ Medium

Copenhagen has not issued a strong strategic plan. Its green investment mainly comes from the municipal budget, European Union funds, and the private sector.

Table C-3 | **Copenhagen policy list**

POLICY	LINK	AREA	ISSUANCE YEAR
CPH 2025 Climate Plan [b]	https://kk.sites.itera.dk/apps/kk_pub2/index.asp?s=CPH%2025	Community-wide initiatives Buildings Green finance Energy and water utilities Local government operations	2020
Urban Nature [c]	https://urbandevelopmentcph.kk.dk/urban-planning/urban-nature	Community-wide initiatives	2015
Copenhagen Municipal Plan 2019 [b]	https://kp19.kk.dk/sites/default/files/2021-03/Kommuneplan%2019%20Engelsk%2003.pdf%22%7d	Buildings	2019
Green mobility [b]	https://kk.sites.itera.dk/apps/kk_pub2/index.asp?mode=detalje&id=1123	Transportation	2013
Bicycle Strategy 2011-2025 [b]	https://kk.sites.itera.dk/apps/kk_pub2/index.asp?mode=detalje&id=823	Transportation	2011
Circular Copenhagen - Resource and Waste Management Plan 2024 [b]	https://kk.sites.itera.dk/apps/kk_pub2/index.asp?mode=detalje&id=1991	Waste management Energy and water utilities	2019

Notes: [a] Laws and regulations
[b] Planning documents
[c] Other projects or third party evaluation

SÃO PAULO

Brazil, South America

São Paulo has set targets in its climate change policies that focus on conserving green spaces, but they are slightly insufficient in green buildings. São Paulo State's climate change plan covers a wide range of sectors, thus making up for the deficiencies in São Paulo's urban policies. Documents analysed for this working paper are guidance documents and are not legally binding.

Community-wide initiatives

●●●●○ Relatively high

São Paulo is committed to achieving zero-carbon emissions by 2050, in line with the Paris Agreement. The state government of São Paulo plans to provide more electricity from solar energy and bioenergy, to vigorously develop renewable energy, and to increase solar power generation. The city government of São Paulo also focuses on conserving ecology and biodiversity, and promotes the construction of ecoparks.

Buildings

●●○○○ Relatively low

São Paulo's policies have lagged behind for buildings. At present, the city is still in the planning stage for issuing regulations, including energy-efficiency standards. The International Finance Corporation (IFC) provides Excellence in Design for Greater Efficiencies (EDGE) certificates for buildings and assesses their energy-saving performance.

Transportation

●●●●○ Relatively high

São Paulo encourages citizens to use bicycles. It has set up zero-emissions zones and plans to upgrade sidewalks to encourage walking. As for EVs, the São Paulo City Hall issued Decree No. 15,997/14 in 2014 stipulating that the purchase of electric, hybrid, and hydrogen-powered vehicles can enjoy an Imposto sobre a Propriedade de Veículos Automotores (IPVA) tax cut of 50 percent and a charge exemption from the São Paulo rotating circulation system.

Energy and water utilities

●●●●○ Relatively high

São Paulo focuses on the management and purification of water resources, and it hopes to improve the management of energy data for more efficient use of resources. In water resources management, São Paulo will adopt more nature-based solutions. At present, the Córrego Limpo project helps the São Paulo municipality recycle water.

Waste management

●●●●● High

São Paulo formulated the *Municipal Solid Waste Master Plan (São Paulo PRGIRS)*, which is supported by the National Solid Waste Law issued in 2010. Such policies are linked to the 3R (Reduce, Reuse and Recycle) to boost the circular economy. The São Paulo state government plans to provide incentives to businesses to reduce waste generation in meeting its zero-waste goal.

Local government operations

●●●○○ Medium

Public institutions in São Paulo will set up energy-efficiency standards, thus guiding them to buy more energy-saving products and provide more efficient services. São Paulo city expects to adopt zero-emissions vehicles for its municipal fleets by 2040. In 2021, the state government put forward its LED lamp replacement target.

Green finance

●●●●○ Relatively high

The city government of São Paulo will set up a fund with higher standards to support climate action projects. The state government plans to boost low-carbon infrastructure through investments and tax exemptions, and it will provide incentives to navigate private enterprises to protect forests and green space.

Table C-4 | São Paulo policy list

POLICY	LINK	AREA	ISSUANCE YEAR
Plan Climate SP [b]	https://www.prefeitura.sp.gov.br/cidade/secretarias/relacoes_internacionais/en/news/?p=313244#:~:text=Plan%20Clima%20SP&text=The%20Plan's%20objectives%20are%20to,vulnerabilities%20for%20an%20adaptation%20process	Community-wide initiatives Buildings Transportation Local government operations	2019
São Paulo State Climate Action Plan [b]	https://smastr16.blob.core.windows.net/home/2021/10/cop26_english.pdf	Community-wide initiatives Green finance Local government operations	2021
GBC CASA & CONDOMÍNIO [c]	https://worldgbc.org/article/home-green-home-the-pathway-to-transform-brazils-residential-sector/	Buildings	2017
Law 15,998/14 [a]	https://www.esss.co/en/blog/trends-electric-vehicle-development/	Transportation	2014
The Municipal Solid Waste Master Plan (São Paulo PRGIRS) and National Solid Waste Law [a]	https://www.ccacoalition.org/sites/default/files/resources/2016_strategy_organic_waste_diversion_sao_paulo.pdf	Waste management	2015
Córrego Limpo Program [c]	https://www.prefeitura.sp.gov.br/cidade/secretarias/licenciamento/desenvolvimento_urbano/participacao_social/comissao_de_seguranca_hidrica/index.php?p=300890	Energy and water utilities	2007

Notes: [a] Laws and regulations
[b] Planning documents
[c] Other projects or third party evaluation

MELBOURNE

Australia, Oceania

Melbourne's urban policy focuses on transportation as well as energy and water utilities. In terms of transportation policy, the city of Melbourne takes the 20-minute neighborhood as the axis to transform the travel mode, replan the block, and develop green space. Policies related to energy, water, and utilities show that Melbourne will launch a green power pilot project to explore the possibility of decarbonization of the grid.

Community-wide initiatives

●●●○○ Medium

Melbourne has developed detailed initiatives to achieve carbon neutrality, but the coverage is narrow. Large investments have been attracted to low-carbon technologies to reduce direct emissions from high-emissions sectors such as industry, mining, and manufacturing. The city also encourages the use of clean energy in power generation as much as possible.

Buildings

●●●○○ Medium

Melbourne's buildings policies are detailed but the coverage is limited. Melbourne has introduced mandatory energy-efficiency regulations for all kinds of buildings, requiring owners to provide energy bills for water, electricity, and gas as well as a five-star energy rating system for all new residential buildings to be incorporated into relevant regulations. In addition, detailed energy-saving rating systems for buildings and suggestions for retrofitting offices have been published. However, there is a lack of policies such as professional development.

Transportation

●●●○○ Medium

Melbourne has set up sustainable development transportation goals and published policies. To make the city more attractive and convenient, Melbourne is shifting into a "20-minute neighborhood" with efficient and safe transportation. Many roadside parking and road spaces have been reallocated for walking, cycling, and green space to encourage citizens to change their travel modes. Melbourne has also issued policies to encourage new EV purchases at a discounted price and the installation of convenient chargers.

Energy and water utilities

●●●●○ Relatively high

Australia's Department of Climate Change, Energy, the Environment and Water compiled and released data such as official energy statistics and rating plans. To decarbonize the power grid, Melbourne will launch a pilot program of green power in its urban area to feed more renewable energy to the power grid. Australia has also incorporated its national water rating and labeling program for water-saving fittings and appliances in building codes to use water more efficiently in newly built and renovated buildings, and Melbourne will continue to implement a sustainable water management plan according to its own water resources strategy.

Waste management

●●●○○ Medium

Melbourne adopts a waste classification system from Victoria state government to support government, industries, and communities to reduce and safely manage their waste. Waste should be processed in the order of "Avoidance, Reuse, Recycling, Recovery of energy, Treatment, Containment and Disposal."

Local government operations

●●●●● High

Melbourne emphasizes environmental sustainability and business practices in government procurement policies. In public lighting, the *City of Melbourne Lighting Strategy* was introduced with intelligent lighting technology (LED) adopted to reduce energy consumption. All public departments and institutions are required to gradually improve their energy performance and take energy use into account when purchasing or leasing buildings and equipment.

Green finance

●●●○○ Medium

Melbourne's green finance is based on national strategy. Australia launched a carbon pricing plan according to the *Clean Energy Act 2011* to control emissions and develop clean energy technologies to support economic growth.

Table C-5 | **Melbourne policy list**

POLICY	LINK	AREA	ISSUANCE YEAR
Plan Melbourne 2017-2050 [b]	https://www.planning.vic.gov.au/__data/assets/pdf_file/0025/628234/plan-melbourne-2017-2050-summary.pdf	Community-wide initiatives Transportation	2017
Melbourne 2030: Planning for sustainable growth [b]	https://www.planning.vic.gov.au/policy-and-strategy/planning-for-melbourne/melbournes-strategic-planning-history/melbourne-2030-planning-for-sustainable-growth	Buildings Waste management	2002
National Australian Built Environment Rating System (NABERS) [c]	https://www.nabers.gov.au/about/what-nabers	Buildings	2017
Electric Vehicle Charging Infrastructure Policy 2020 [b]	https://www.maribyrnong.vic.gov.au/files/sharedassets/public/smart-cities/electric-vehicle-charging-infrastructure-policy-final-september-2020.pdf	Transportation	2020
Clean Energy Act 201[1] [a]	https://www.centreforpublicimpact.org/case-study/carbon-tax-australia/	Green finance	2011
Guidelines for Waste Management Plans [b]	https://www.melbourne.vic.gov.au/sitecollectiondocuments/waste-management-plan-guidelines.pdf	Waste management	2021
Energy data [c]	https://www.energy.gov.au/government-priorities/energy-data	Energy and water utilities	2013
City of Melbourne Lighting Strategy 2021 [b]	https://www.melbourne.vic.gov.au/SiteCollectionDocuments/public-lighting-strategy-2021.pdf	Local government operation	2021
Energy Efficiency in Government Operations (EEGO) Policy [b]	https://www.energy.gov.au/sites/default/files/energy-efficiency-in-government-operations-policy-2007_0.pdf	Local government operation	2007
Procurement Policy [b]	https://www.melbourne.vic.gov.au/SiteCollectionDocuments/procurement-policy.pdf	Local government operation	2021

Notes: [a] Laws and regulations
[b] Planning documents
[c] Other projects or third party evaluation

MEXICO CITY

Mexico, South America

Mexico City, which is one of the most polluted cities in Latin America, has made great efforts to develop renewable energy in response to climate change. It has launched many cooperative projects with global governmental and nongovernmental organizations.

Community-wide initiatives

●●●●○ Relatively high

Mexico City has set specific numerical targets for energy consumption. Many projects were completed before 2016, including the installation of photovoltaic streetlights in Chapultepec Park, San Juan de Aragón Park, and the Environmental Education Center. Cooperating with the U.S. Agency for International Development, Mexico City also carried out a low-carbon development project Mexico Low Emissions Development (MLED) program to provide funding to install solar boilers.

Buildings

●●○○○ Relatively low

Mexico City has advanced awareness of reform. At the legislation level, Mexico has issued the *National Model Energy Conservation Code* (IECC-Mexico). By setting up the Sustainable Buildings Certification Program, the city provides tax cuts and other incentives to facilitate green buildings. With the support of World Resources Institute, Mexico City's government carried out an audit on some pilot buildings through the public environment fund. This project provides the government with strategic experiences for its future building renovation.

Transportation

●●●○○ Medium

Mexico City strongly encourages green trips by building bicycle-friendly infrastructure to cultivate a culture of cycling. Meanwhile, the city government promotes the deployment of bus rapid transit (BRT) with two major networks, namely Metrobus and Mexibus, in operation now. In terms of EVs, the city plans to completely ban diesel vehicles by 2025. To encourage people to buy EVs, the government offers a portfolio of preferential and favorable policies for taxation and daily travel.

Energy and water utilities

●●●○○ Medium

Mexico City has well-established policies and projects in water conservation. In its short-term plan, the Mexico City government will repair water pipe leakage to save water and improve the utilization of water resources. At the same time, it aims to better use water by installing rooftop rainwater collection facilities.

Waste management

●●●●○ Relatively high

Since January 2021, Mexico City has completely banned the use of disposable plastics, with a focus on recycling and management of solid waste.

Local government operations

●●●●● High

Mexico City will start with the lighting system to reduce the energy consumption of municipal buildings. In the long run, it will gradually shift to only purchasing environment-friendly products.

Green finance

●●●●● High

The Mexico City government set up a *Climate Change Fund* (FACC) in 2015 and introduced funds in cooperation with the Rockefeller Foundation. At the end of 2021, relevant tax laws were revised by Mexico to encourage the private sector to reduce pollutant emissions and provide more clean energy.

Table C-6 | **Mexico City policy list**

POLICY	LINK	AREA	ISSUANCE YEAR
PACCM Progress Report 2016 [b]	http://www.data.sedema.cdmx.gob.mx/cambioclimaticocdmx/images/biblioteca_cc/PACCM-ingles.pdf	Community-wide initiatives Buildings Transportation Green finance Energy and water utilities Local government operations	2016
EcoTAG [c]	https://cms.law/en/int/expert-guides/cms-expert-guide-to-electric-vehicles/mexico	Transportation	2014
Plastic Ban [a]	https://wwf.panda.org/wwf_news/?2824816/Mexico-City--Urban-Solutions-2021	Waste management	2021

Notes: [a] Laws and regulations
[b] Planning documents
[c] Other projects or third party evaluation

SINGAPORE

Singapore, Asia

Singapore has integrated and systematic climate change and carbon reduction policies and actions. On its official government website, all kinds of indicators are available by category, with detailed documents for climate policies related to each category of indicator. Relevant authorities have also issued policy manuals and guidance.

Community-wide initiatives

●●●●○ Relatively high

Singapore has set ambitious quantitative targets for carbon emissions and renewable energy, but in terms of energy efficiency, the government only aligns its goal with SDG7. Meanwhile, Singapore has introduced a series of policies to support urban low-carbon microgrids and distributed energy with many ongoing projects. In solar technology, the Singapore government has in place incentives and projects for solar energy installation and innovative technology.

Buildings

●●●●○ Relatively high

Singapore's Building and Construction Authority (BCA) presents policies and regulations for the urban green building certification, benchmark, and rating, but it has no specific incentives, requirements, or actions for applying renewable energy in buildings and whether or not buildings are considered EV-friendly. At the same time, the BCA has also issued regulations on the low-energy design of green buildings, mandatory submission of energy data, and the energy-saving renovation of existing buildings, and it offers a reward for higher energy efficiency.

Transportation

●●●●○ Relatively high

Singapore government issued *Land Transport Master Plan 2040: Bringing Singapore Together*, putting forward targets for clean energy vehicles and a higher proportion of public transport. It not only encourages the procurement of new EVs, but it also actively builds charging infrastructure for EVs. At the same time, the city strongly supports public transportation and transit-friendly infrastructure to be a "20-minute town" and a "45-minute city." However, no policies or regulations have been found that restrict motor vehicle parking spaces.

Energy and water utilities

●●●●● High

Singapore has no policies on disclosing community-level energy data, but it has set the goal of decarbonizing the power grid and has developed detailed measures. To conserve and utilize water resources, Singapore boasts well-established wastewater treatment technology, setting requirements for residents, public institutions, and businesses while providing financial support to households for water-saving facilities. It also has in place policies to protect and recycle water resources.

Waste management

●●●●● High

The Singapore government issued a *Zero Waste Masterplan* and quantitative targets for reducing urban waste and improving recycling efficiency. The plan specifies different environment-friendly treatments for various types of waste; to reduce or recycle domestic waste, the Singapore government has launched many activities, calling on the reduction of waste generated by consumers, businesses, and service providers.

Local government operations

●●●●● High

Singapore's government follows the principle of sustainable procurement for government procurement and construction projects. It adopts EV fleets and encourages the public sector to purchase energy-saving electronic equipment. Singapore has no regulations on the use of energy-saving lamps in urban public lighting

systems; instead, it has released a strategy of energy-saving lighting of urban public buildings. For municipal buildings, the BCA has issued a complete document to provide guidance on the energy-saving renovation of existing buildings.

Green finance

●●●●● High

Singapore's government has introduced a carbon tax and a carbon credit for a low-carbon and green city, encouraging businesses to reduce their own carbon emissions.

Table C-7 | **Singapore policy list**

POLICY	LINK	AREA	ISSUANCE YEAR
Charting Singapore's Low-carbon and Climate Resilient Future [b]	https://unfccc.int/sites/default/files/resource/SingaporeLongtermlowemissionsdevelopmentstrategy.pdf	Community-wide initiatives Transportation Energy and water utilities Local government operations	2020
Singapore's Climate Action Plan [b]	https://www.mse.gov.sg/resources/climate-action-plan.pdf	Community-wide initiatives	2016
Singapore's Long Term Low Emissions Development Strategy [b]	https://www.nccs.gov.sg/media/publications/singapores-long-term-low-emissions-development-strategy/	Community-wide initiatives	2022
BCA Green Mark scheme [c]	https://www1.bca.gov.sg/docs/default-source/docs-corp-buildsg/sustainability/3rd_green_building_masterplan.pdf?sfvrsn=4824d4ff_0	Buildings	2005
Singapore Green Building Masterplan (SGBMP) [b]	https://www1.bca.gov.sg/buildsg/sustainability/green-building-masterplans	Buildings	2006
Land Transport Master Plan 2040: Bringing Singapore Together [b]	https://www1.bca.gov.sg/buildsg/sustainability/green-building-masterplans	Transportation	2019
Carbon Tax [a]	https://www.nccs.gov.sg/singapores-climate-action/mitigation-efforts/carbontax/	Green finance	2022
Zero Waste Masterplan [b]	https://www.mse.gov.sg/resources/zero-waste-masterplan.pdf	Waste management	2019
Regulatory Requirements for Existing Buildings [b]	https://www1.bca.gov.sg/docs/default-source/docs-corp-buildsg/sustainability/existingbldgretrofit.pdf	Energy and water utilities	2017
Existing building retrofit [a]	https://www1.bca.gov.sg/buildsg/sustainability/regulatory-requirements-for-existing-buildings	Local government operations	2010

Notes: [a] Laws and regulations
[b] Planning documents
[c] Other projects or third party evaluation

GUILIN

China, Asia

Policies in Guilin emphasize the city's tourism industry. For example, transportation and infrastructure outlooks mainly serve tourists. Policies for ecological environment, green finance, circular economy and so forth are in lack. Guilin is short of local policies in general and complements this insufficiency by following provincial and national policies. Most of the open-source policies are published during 2010 to 2015, digitalized information is scarce.

Community-wide initiatives

●●●○○ Medium

Guilin uses provincial policies to supplement its local policy insufficiency. It does not have local policies for GHG or new energy utilization. For Urban Island effect, Guilin has no concrete goals, nor does its policies mention this aspect. Positively, the city plans to roll out more green space and solar power pilot community's report can be traced back to 2013.

Buildings

●●●●○ Relatively high

Guilin has rather sophisticated local policies to support the evaluation, regulation and audit of buildings. It uses provincial documents to compensate the deficiency of local policies. For EV-related infrastructure, it answers national callings, promoting EVs proactively and planning to phase out more chargers and other infrastructure.

Transportation

●●●○○ Medium

Guilin's transportation policies are relatively comprehensive and focus on regional communication. Its future plans emphasize mobility to nearby cities, tourists' convenience, and highway construction, which present a vehicle-centered planning. Under the green mobility trend, Guilin expects a public transportation modal shift and will retrofit electric buses. It lacks policy outlooks in 15-minutes neighborhood or pedestrian-friendly designs.

Energy and water utilities

●●●●○ Relatively high

Guilin has quantified goals and detailed action plans to reduce energy and water usage based on the city's landscape. In terms of water resources, its ad hoc plans focus on water preservation and utilization of the Li River.

Waste managements

●●●●○ Relatively high

There are as many as 8 different types of garbage in Guilin for separate recycling. The municipal government expects to achieve a harmless treatment rate of more than 95% of domestic waste and a recycling rate of 100% for waste products.

Local government operations

●●●●● High

Although Guilin has no local policies, its performance is solid with an adherence to national and provincial strategies. The government has responded to the national guidance with implementations and achieved significant outcomes.

Green finance

●●●●○ Relatively high

Guilin has established a green finance reform and innovation pilot zone for the region. In the next few years, a green stock exchange will be established in Guilin to provide green financial products, loans, insurance and other services. At the same time, the Guilin Green Project Bank will cooperate with ASEAN to achieve mutual recognition of standards.

Table C-8 | **Guilin policy list**

POLICY	LINK	AREA	ISSUANCE YEAR
Guangxi's 13th Five-Year Plan for Greenhouse Gas Emissions [b]	http://www.gxzf.gov.cn/zfwj/zzqrmzfbgtwj_34828/2017ngzbwj_34829/t1506541.shtml	Community-wide initiatives Green finance	2017
Guilin City Plan (2010-2020) [b]	https://www.doc88.com/p-900533844958.html	Community-wide initiatives	2010
Guilin Civil Building Energy Conservation Management Measures [b]	https://www.guilin.gov.cn/zfxxgk/fdzdgknr/jcxxgk/zcwj/202005/t20200521_1809494.shtml	Buildings	2011
Guilin Urban Planning Management Technical Regulations (2019) [b]	https://wenku.baidu.com/view/e95cf54e3086bceb19e8b8f67c1cfad6185fe963.html?_wkts_=1694162426915&bdQuery=%E6%A1%82%E6%9E%97%E5%B8%82%E5%9F%8E%E5%B8%82%E8%A7%84%E5%88%92%E7%AE%A1%E7%90%86%E6%8A%80%E6%9C%AF%E8%A7%84%E5%AE%9A+%282019+%E5%B9%B4%29	Buildings	2019
Design Standard for Energy Saving of Public Buildings in Guangxi [a]	http://zjt.gxzf.gov.cn/zfxxgk/fdzdgknr/wjtz/t13694180.shtml	Buildings	2022
Opinions of Guilin Municipal People's Government on Prioritizing the Development of Urban Public Transport [b]	https://www.guilin.gov.cn/ggfw/mslyggbmfw/jtcxggfw/ggjtcxjtcx/wyk/202208/t20220805_2349726.shtml	Transportation	2017
Guilin's 14th Five-Year Plan for Transportation [b]	https://www.guilin.gov.cn/zfxxgk/fdzdgknr/jcxxgk/zcwj/202212/t20221220_2424968.shtml	Transportation	2022
Guanxi's 14th Five-Year Plan for the development of financial industry [b]	http://www.gxzf.gov.cn/zfwj/zxwj/t11036874.shtml	Green finance	2021
Guilin Air Pollution Prevention and Control "Hundred Days" Action Plan (2018) [b]	http://govinfo.gxgllib.org.cn:8017/gxglfz/govShow5915018-E7FE9E10DBC01F593FB20F1B335FB3FF-TC0000000005.htm	Waste management	2018
Guilin's Two-year Plan for the Construction of Ecological and Environmental Protection Infrastructure (2019-2020) [b]	https://www.guilin.gov.cn/zfxxgk/fdzdgknr/jcxxgk/zcwj/202005/t20200521_1810929.shtml	Waste management	2019
Guilin's 14th Five-Year Plan for National Economic and Social Development and Outline of Vision 2035 [b]	https://www.guilin.gov.cn/zfxxgk/fdzdgknr/jcxxgk/zcwj/202109/t20210903_2117345.shtml	Community-wide initiatives Energy and water utilities	2021
Guilin's Pilot implementation plan for the construction of water ecological civilization [b]	http://eco.cri.cn/20181030/ce378083-9af7-21cc-b410-9a0768b2c2ae.html	Energy and water utilities	2015
Energy Conservation Law of the People's Republic of China [a]	http://www.npc.gov.cn/npc/c12435/201811/045c859c5a31443e855f6105fe22852b.shtml	Local government operations	2018
Energy Conservation Regulations for Public Institutions [a]	http://www.gov.cn/zhengce/2020-12/27/content_5574520.htm	Local government operations	2017

Notes: [a] Laws and regulations
[b] Planning documents
[c] Other projects or third party evaluation

LOS ANGELES

United States, North America

Los Angeles's policies feature in its strong dedication to develop solar power, cool neighborhoods, EVs, and water-saving strategies. It has a novel EV car-sharing program to facilitate public transportation electrification. The city also shows strong connections with academia, such as the Los Angeles 100% Renewable Energy Study (LA100).

Community-wide initiatives

●●●●○ Relatively high

Los Angeles, ranked as the number one solar city in America for six out of the past seven years, has a strong competency in its community solar systems. It aims to install more solar and storage projects for Angelenos under its *Feed-in-Tariff* solar projects. By 2045, the city is expected to achieve 100 percent renewable electricity with the deployment of wind and solar power.

Buildings

●●●●○ Relatively high

Under the *Los Angeles Green Building Code*, Los Angeles Building Code, and *pLAn 2019*, buildings are reducing their energy use, and EVs are robustly promoted. Los Angeles has comprehensive low-energy-use requirements and building performance standards, and it is going to invest heavily in building retro-commissioning. By 2020, more than 12,000 EV chargers had been installed, and more were expected in the coming years. The city also plans to update its building code to accommodate the increasing need for EVs.

Transportation

●●●●○ Relatively high

Los Angeles aims to meet the goal of 100 percent zero-emissions vehicles in the city by 2050. It plans to facilitate a modal shift and to increase EV readiness accordingly. Residents are encouraged to walk and cycle more. *Executive Directive No. 25* proposes the active street program, and pLAn 2019 aims to increase the city's average walk score to 75. Los Angeles provides EV rebates and is going to electrify 100 percent of its bus and metro system by 2030. Congestion pricing is on the agenda, and the city is exploring its potential implementation.

Energy and water utilities

●●●●● High

Los Angeles has intensive water-related policies. Executive Directive No. 5 lists detailed requirements for both residents and nonresident actors to follow to decrease water use. Both the executive directive and plan 2019 aim to source more local water and to decrease the purchase of imported potable water. According to LA100, Los Angeles can convert its grid to 100 percent renewable energy within 20 years.

Waste management

●●●●● High

In terms of waste management, Los Angeles has a special management policy. For waste sorting, residents' waste is divided into four categories, namely recyclables, green waste, residential waste, and animal excrement. Policies are strong when it comes to reducing plastic use. The policy covers a ban on single-use plastic bags, a mandatory commercial waste recycling system, a mandatory commercial organic recycling system, and nonessential nonuse of single-use plastic straws. Meanwhile, a joint government research institute is piloting a road repaving project using recycled plastic. By 2035, the policy expects to achieve 100 percent recycling of the city's wastewater.

Local government operations

●●●●● High

The city government is going to electrify the Los Angeles Department of Transportation and the Metro fleets, and it is moving to only procure zero-emissions goods. It also plans to complete an LED retrofit in all city buildings by 2028, maximize energy efficiency, reach carbon neutrality at all municipally owned buildings by 2030, and deliver zero-waste government buildings by 2025.

Green finance

●●●○○ Medium

In terms of green finance, Los Angeles City's green finance policy subsidies are basically a subsidy or incentive mechanism for communities or municipal units. For example, three underserved communities in Los Angeles have received subsidies provided by the State of California to develop local clean energy, urban greening, and related labor training. At this stage, the government strongly supports research institutions to study how to develop financial technology and mechanisms in Los Angeles.

Table C-9 | **Los Angeles policy list**

POLICY	LINK	AREA	ISSUANCE YEAR
pLAn2019 [b]	https://plan.lamayor.org/sites/default/files/pLAn_2019_final.pdf	Community-wide initiatives Transportation Waste management	2019
Executive Directive No. 25 [a]	https://lacity.gov/sites/g/files/wph2121/files/2021-04/20200210executivedirective25.pdf	Community-wide initiatives Green finance Local government operations	2020
Los Angeles Green Building Code [a]	https://up.codes/viewer/california/ca-green-code-2019	Buildings	2019
Los Angeles Building Code [a]	https://up.codes/viewer/los_angeles/ibc-2018/chapter/new_1/administration#new_91.108	Buildings	2018
Zero Emissions 2028 Roadmap 2.0 [b]	https://laincubator.org/wp-content/uploads/LA_Roadmap2.0_Final2.1.pdf	Transportation	2018
Mayor of Los Angeles: Sustainability [b]	https://plan.lamayor.org/	Waste management	2019
Solid Waste Integrated Resources Plan (SWIRP) [b]	https://www.lacitysan.org/san/faces/home?_adf.ctrl-state=yuv14mkxa_82&_afrLoop=3562185707395999#!	Waste management	2014
Executive Directive No. 5 [a]	https://d3n8a8pro7vhmx.cloudfront.net/mayorofla/pages/17070/attachments/original/1426620015/ED_5_-_Emergency_Drought___Response_-_Creating_a_Water_Wise_City.pdf?1426620015	Energy and water utilities	2014
LA100 Study [b]	https://maps.nrel.gov/la100/la100-study/report	Energy and water utilities	2021
Clean Air Action Plan [b]	https://plan.lamayor.org/	Local government operations	2019

Notes: [a] Laws and regulations
[b] Planning documents
[c] Other projects or third party evaluation

SHENZHEN

China, Asia

Shenzhen's policies are comprehensive but lack details. Especially in transportation and waste management, Shenzhen's policies are significant. In terms of transportation, Shenzhen's EV penetration rate and public transportation electrified rate are beyond other Chinese cities. For waste management, the policy covers quantitative targets, plastic ban, and waste reduction actions.

Community-wide initiatives

●●●●● High

Shenzhen's 14th Five-Year Plan on Ecological Environmental Protection proposes to follow national targets for carbon dioxide emissions per unit of gross domestic product (GDP) and the energy consumption reduction per unit of GDP. Policies have been introduced to support distributed energy stations and renewable energy, restricting key industrial projects with high emissions and energy intensity. Multiple low-carbon and zero-carbon pilot projects have been launched with clear targets for urban green space. However, there are no specific targets of renewable energy in the city.

Buildings

●●●●○ Relatively high

The *Shenzhen Special Economic Zone Green Building Regulations* is a green building regulation that incorporates industrial and residential buildings into the legal framework. Policies were introduced to encourage the use of renewable-based power and install EV charging facilities in buildings. There are also green building requirements related to energy consumption, energy-saving renovation, energy audits, green building identification, and so forth. The government provides technical and financial support for green buildings as well as implementation strategies and monitoring personnel. At present, Shenzhen lacks EV regulations, renewable energy incentives, and any capacity-building for energy conservation or energy efficiency.

Transportation

●●●●○ Relatively high

Shenzhen's 14th Five-Year Plan for Transportation Plan provides overall guidance and detailed regulations for sustainable transportation with quantitative targets for an urban green commute network. Policies were introduced to facilitate a green and integrated passenger transportation system, support the layout of EV charging facilities, incentivize the purchase of EVs in various ways, integrate ground public transportation and promote green freight. Shenzhen also explores "Green Logistic Zone" and accelerate the promotion of urban new energy logistic fleet.

Energy and water utilities

●●●●● High

Shenzhen built an intelligent platform to monitor building energy consumption by uploading monitoring data. At the same time, policies were introduced to build a low-carbon power grid with renewable energy. To conserve energy and water, Shenzhen compiled a list of recommended energy-saving equipment to encourage the adoption of innovative technologies for water and energy conservation. It also plans to continuously revise water-saving policies, regulations, indicators, and standards. On the whole, the policies cover a wide range of topics, but they need further refinement.

Waste management

●●●●● High

Shenzhen has issued the *Shenzhen's 14th Five-Year Plan for "Zero Waste" City Implementation Measures*, which puts forward the quantitative targets for reducing and recycling all kinds of waste, calls for a plastic ban, and advocates a "zero-waste city" through actions such as waste reduction campaigns, resource recycling, and classified collection. The policy covers eight categories of waste.

Local government operations

●●●●● High

Shenzhen prioritizes the purchase of recycling products and services, including green building materials, according to relevant regulations. Incentive policies were also introduced for LED lighting in urban energy-efficiency projects. Shenzhen has set statistics and reporting requirements for the green transition and energy consumption for public institutions.

Green finance

●●●●● High

Shenzhen has publicized the *Measures for the Administration of Carbon Emissions Trading in Shenzhen*. It continuously explores building a carbon-inclusive system and pilot projects for climate investment and financing. At the same time, the city has set up a promotion center for national climate investment and financing as well as a project inventory for the nationally determined contribution to support urban climate financing and investment.

Table C-10 | Shenzhen policy list

POLICY	LINK	AREA	ISSUANCE YEAR
Shenzhen's 14th Five-Year Plan for Ecological Environmental Protection [b]	http://meeb.sz.gov.cn/attachment/0/933/933241/9473357.pdf	Community-wide initiatives Green finance Waste management Energy and water utilities	2021
Shenzhen Green Building Promotion Measures [b]	http://www.sz.gov.cn/zfgb/2020/gb1144/content/post_7130799.html	Buildings	2020
Shenzhen Special Economic Zone Green Building Regulations [a]	https://flk.npc.gov.cn/detail2.html?ZmY4MDgxODE3ZmQ5ODM0MTAxODA0OWQ5MGUyZjMzZTA	Buildings	2022
The 14th Five-Year Plan for the high-quality development of Shenzhen's modern construction industry [b]	http://zjj.sz.gov.cn/attachment/0/969/969607/9772802.pdf	Buildings	2022
Action Plan for High-quality Development of Green Buildings in Shenzhen (2021-2025) [b]	http://zjj.sz.gov.cn/hdjlpt/yjzj/answer/16100	Buildings	2021
Measures for the Management of Special Funds for Green Innovation and Development in the Field of Engineering Construction in Shenzhen [b]	http://www.sz.gov.cn/zfgb/zcjd/content/post_8520610.html	Buildings	2021
Shenzhen's 14th Five-Year Plan for Transportation [b]	http://jtys.sz.gov.cn/attachment/1/1291/1291454/9585397.pdf	Transportation	2021
Shenzhen's 14th Five-Year Plan for "Zero Waste" City Implementation Measures [b]	https://www.mee.gov.cn/home/ztbd/2020/wfcsjssdgz/sdjz/ssfa/202208/P020220818585091038313.pdf	Waste management	2021
Measures on Ecological and Environmental Protection of the Shenzhen Special Economic Zone [a]	https://www.sz.gov.cn/cn/xxgk/zfxxgj/zcfg/content/post_8941834.html	Energy and water utilities	2021
Shenzhen Special Economic Zone Circular Economy Promotion Regulations [a]	http://www.sz.gov.cn/zfgb/2020/gb1164/content/post_8049319.html	Local government operations	2020
Shenzhen Public Administration Energy Saving Measures [b]	http://www.sz.gov.cn/zfgb/2011/gb765/content/post_4945538.html	Local government operations	2011
Measures for the Administration of Carbon Emission Trading in Shenzhen [a]	http://meeb.sz.gov.cn/xxgk/zcfg/zcfg/szhbfggz/content/post_9927705.html	Green finance	2022

Notes: [a] Laws and regulations
[b] Planning documents
[c] Other projects or third party evaluation

JOHANNESBURG

South Africa, Africa

Johannesburg has issued quite a range of policies, but it lacks EV-related policies. In urban planning, the Johannesburg focuses on mixed land use and the interconnectivity among districts.

Community-wide initiatives

●●●●○ Relatively high

Johannesburg is expected to achieve its zero-emissions targets by 2050, with a clearly defined target of a certain percentage of emissions reduction set for each decade. The city government has set various targets for renewable energy consumption by different kinds of buildings. As for solar energy, Johannesburg has launched specific plans and projects to help citizens upgrade their solar water heaters. Moreover, it plans to build more green spaces.

Buildings

●●●●● High

Johannesburg has a well-established EPC evaluation system. According to its Green Building Policy, Johannesburg will achieve the goal of zero-emissions buildings by 2050, and the specific numerical targets for zero-carbon/zero-water footprints were set to boost various types of buildings during the green transition. The policy also indicates that the city government will facilitate green buildings by providing incentives such as discounted interest on bank loans, fiscal subsidies, and tax reductions.

Transportation

●●●○○ Medium

Johannesburg has issued two documents, namely the *Joburg 2040 Growth and Development Strategy* and the *Spatial Development Framework 2040*, prioritizing mixed land use and transit-oriented development among urban planning and development in the coming decades. In public transport, Johannesburg first launched the "Corridors of Freedom" project to improve interregional traffic connectivity, followed by its Rea Vaya BRT project. The City of Johannesburg Climate Action Plan, jointly launched with C40 Cities, makes up for the lack of EV-related indicators for Johannesburg and aims to achieve the target of 100 percent EVs by 2050.

Energy and water utilites

●●●○○ Medium

Johannesburg mainly launches activities focused on water conservation. It expects to raise citizen awareness of water conservation through educational campaigns and to reduce wastewater through rainwater regulation projects.

Waste management

●●●●○ Relatively high

Johannesburg plans to achieve the goal of zero waste by 2050. The city government mainly reduces its waste by minimizing landfill amount. Johannesburg identified a total of 10 waste categories, including one for rubble waste.

Local government operations

●●●○○ Medium

According to the *Climate Action Plan*, the Johannesburg government will only purchase EVs starting from 2030. It also expects to improve the energy efficiency of municipal buildings through retrofitting.

Green finance

●●●●● High

Johannesburg directly obtains fiscal revenue for green development by issuing green bonds and interest-rate cuts. The city government encourages innovative green technology and the low-carbon economy.

Table C-11 | **Johannesburg policy list**

POLICY	LINK	AREA	ISSUANCE YEAR
Joburg 2040 GDS [b]	https://www.joburg.org.za/documents_/Documents/Joburg%20GDS%202040/Joburg%202040%20GDS_March%202019.pdf	Community-wide initiatives Transport Green finance Energy and water utilities Local government operations	2019
Johannesburg Climate Action Plan [b]	https://www.joburg.org.za/departments_/Documents/EISD/City%20of%20Johannesburg%20-%20Climate%20Action%20Plan%20%28CAP%29.pdf	Community-wide initiatives Waste management Local government operations	2021
Joburg Green Building Policy [b]	https://www.gpma.co.za/wp-content/uploads/2020/11/DRAFT-GREEN-BUILDING-POLICY-___FINAL-3April.pdf	Buildings	2020
Spatial Development Framework 2040 [b]	https://www.joburg.org.za/documents_/Pages/Key%20Documents/policies/Development%20Planning%20%EF%BC%86%20Urban%20Management/Citywide%20Spatial%20Policies/Spatial-Development-Framework-2040.aspx	Transport Green finance	2016
Waste Management Guidelines for Building Plans (BP) and Site Development Plans (SDP) Submission [c]	https://www.pikitup.co.za/wp-content/uploads/2022/12/REFUSEAREA-REVISED-11-June-2014.pdf	Waste management	2015

Notes: [a] Laws and regulations
[b] Planning documents
[c] Other projects or third party evaluation

NEW YORK

United States, North America

New York City's policy is well developed and exhibits the characteristics of cooperation with corporates and academic institutions. In terms of green finance, energy, water, and utilities , New York City has nongovernmental cooperative agencies to jointly develop policies. In its waste management policy, New York City emphasizes how the city's commercial food waste should be handled.

Community-wide initiatives

●●●○○ Medium

The New York City government has set clear, quantitative climate targets, including greenhouse gas emissions and the proportion of renewable energy, but energy-efficiency improvement is lacking. New York City supports community-based solar power, and it encourages the installation of integrated emissions-reduction technology such as distributed energy systems and microgrids covering the whole subway.

Buildings

●●●●○ Relatively high

New York City has good performance in buildings related policies. The *New York City Energy Conservation Code*, released in 2020, specifies the energy standards for commercial and residential buildings, including regulations on the use of renewable energy and EVs. Moreover, the city has issued strategies, allocated full-time staff, and provided government support to put such standards into operation. In addition, New York City also requires retrofitting and performance evaluations of energy efficiency for buildings as well as project-based energy audits with rewards for winners with higher efficiency. Finally, government agencies and educational institutions in New York City offer energy-related training programs to supply the market with high-quality labor.

Transportation

●●●●○ Relatively high

New York City has formulated a strategy for sustainable transportation and set quantitative targets for carbon emissions, the proportions of sustainable trips, and EVs in the transportation sector. In New York, specific zones are designated according to the efficiency of land planning, and there is a cap on indoor parking spaces. In addition, New York City has issued an integrated strategic plan for streets, has launched various projects to improve public transportation, and has invested heavily in EV charging facilities. However, the EV charging stations for public use are still inadequate at present, and no targets related to electric public transportation have been released. New York City also adopts a green supply chain strategy for freight. Now, the city is also exploring congestion charges, low-carbon/zero-carbon emissions zones, and a smart transportation system.

Energy and water utilities

●●●●● High

New York City has a well-designed policy portfolio with outstanding performance. Consolidated Edison, the city's main power supplier, is a public utility company owned by investors. Its software can sum up the power consumption of buildings and enable building owners to check the data on the company's online platform. The city government also provides the public with all kinds of energy use data on websites to support urban energy-efficiency assessment. When decarbonizing the urban power grid, New York City cooperated with Consolidated Edison to initiate various urban renewable energy projects. Finally, the power and water utility companies in New York City launched projects to facilitate the efficient and intensive use of urban energy and water resources, and local environmental authorities also issued a water resources management plan with clearly defined water-saving targets and measures.

Waste management

●●●●● High

New York City has incorporated waste management into its climate strategy—*New York City's Roadmap to 80 x 50*, which was released in 2016—and has also issued a separate waste management plan. As a member of C40 Cities, New York City has set a clear target for waste reduction. Therefore, it kicked off various waste reduction and recovery projects with many newly built public recovery facilities for better management of urban waste. Regulations on the treatment of urban commercial food waste have been formulated after the city realized the high carbon emissions of food waste.

Local government operations

●●●●● High

For government procurement and construction projects, the New York City government set the goal of fully upgrading its fleet into clean energy, and it issued policies in 2005 and 2013 on fuel use for vehicles purchased by the government. In addition, the government has hugely invested in energy-saving streetlight upgrades. For municipal buildings, New York City supports developers to provide energy-saving retrofitting while funding research and actual projects that improve the energy efficiency of buildings.

Green finance

●●●●● High

Together with external stakeholders, the New York City government invested in projects related to clean energy. At the same time, due to its policy of divesting pension funds from investments in fossil fuel companies, New York City is shifting its investment portfolio into clean energy.

Table C-12 | **New York policy list**

POLICY	LINK	AREA	ISSUANCE YEAR
The One City: Built to Last [c]	https://www.nyc.gov/assets/sustainability/downloads/pdf/publications/TWGreport_04212016.pdf	Community-wide initiatives	2014
The New York City Energy Conservation Code 2020 [a]	https://www.nyc.gov/assets/buildings/apps/pdf_viewer/viewer.html?file=2020ECC_CH1.pdf&section=energy_code_2020	Buildings	2020
Local Law No. 92 and Local Law No. 94 of 2019 [a]	https://www.nyc.gov/assets/buildings/pdf/green_roof_solar_ll92-n-94of2019_sn.pdf	Buildings	2019
Local Law No. 97 of 2019 [a]	https://www.nyc.gov/assets/buildings/local_laws/ll97of2019.pdf	Buildings	2019
Energy Audits and Retro commissioning Local Law 87 [a]	https://www.nyc.gov/html/gbee/downloads/pdf/121220_audits_and_rcx_summary_forwevsitev3.pdf	Buildings	2009
Local Law No. 88 [a]	https://www.nyc.gov/html/gbee/html/plan/ll88.shtml	Buildings	2009
Local Law No. 33 of 2018 [a]	https://www.nyc.gov/assets/buildings/local_laws/ll33of2018.pdf	Buildings	2018
1.5°C: Aligning NYC with Paris Agreement [c]	https://www.nyc.gov/assets/sustainability/downloads/pdf/1point5-AligningNYCwithParisAgrmtFORWEB.pdf	Transportation Green finance	2017
New York City's Roadmap to 80 x 50 [b]	https://www.nyc.gov/assets/sustainability/downloads/pdf/publications/New%20York%20City's%20Roadmap%20to%2080%20x%2050_Final.pdf	Transportation Green finance Waste management	2016
New York City Solid Waste Management Plan (SWMP) [b]	https://www.nyc.gov/assets/dsny/site/resources/reports/solid-waste-management-plan	Waste management	2006
NYC GHG Inventories [c]	https://climate.cityofnewyork.us/initiatives/nyc-greenhouse-gas-inventories/	Energy and water utilities	2008
Water Demand Management Plan 2019 [b]	https://www.nyc.gov/assets/dep/downloads/pdf/water/drinking-water/water-conservation-report2019.pdf	Energy and water utilities	2019
Our Plan: National Grid Net Zero by 2050 [b]	https://www.nationalgridus.com/media/pdfs/our-company/netzeroby2050plan.pdf	Local government operations	2020

Notes: [a] Laws and regulations
[b] Planning documents
[c] Other projects or third party evaluation

ENDNOTES

1. See the Policies Database here: https://www.iea.org/policies.

2. See the Climate Policy Database here: https://www.climatepolicydatabase.org.

3. See the Integrated National Climate and Energy Policies and Measures dataset here: https://www.eea.europa.eu/data-and-maps/data/climate-change-mitigation-policies-and-measures-1.

4. In 2013, ACEEE established the City Clean Energy Scorecard to evaluate clean energy strategies employed at the local level by city governments. It expanded the assessment to 100 cities in 2021. See the latest scorecard here: https://www.aceee.org/city-clean-energy-scorecard.

5. Mobility as a Service (MaaS) is a new concept of transport service, which refers to the integration of various forms of transport services into a single platform, accessible on demand (Song et al. 2022).

6. For comparability on a global scale, this paper adopts the internationally accepted Köppen climate classification, and the grid data come from Hylke E. Beck, Niklaus E. Zimmermann, Tim R. McVicar, Noemi Vergopolan, Alexis Berg, and Eric F. Wood, "Present and Future Köppen-Geiger Climate Classification Maps at 1-km Resolution," Scientific Data 5, no. 180214 (2018), https://www.nature.com/articles/sdata2018214.

7. The last mile or kilometer refers to the last leg of the user's trip comprising the movement of passengers from a transportation hub (such as bus stops or train stops) to a final destination. See Los Angeles County's First Last Mile Strategic Plan & Planning Guidelines here: https://libraryarchives.metro.net/dpgtl/scag/2014-first-last-mile-strategic-plan-final-march.pdf

8. Complete streets are a concept that provides safe, comfortable, and convenient access to all people of all ages, regardless of mobility and mode of transport used. Adapted from https://www.wri.org/research/complete-streets-brazil-promoting-paradigm-shift

9. The carbon neutrality target includes only carbon dioxide emissions, while the net-zero target includes all GHG emissions.

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ABOUT WRI

World Resources Institute is a global research organization that turns big ideas into action at the nexus of environment, economic opportunity, and human well-being.

Our Challenge
Natural resources are at the foundation of economic opportunity and human well-being. But today, we are depleting Earth's resources at rates that are not sustainable, endangering economies and people's lives. People depend on clean water, fertile land, healthy forests, and a stable climate. Livable cities and clean energy are essential for a sustainable planet. We must address these urgent, global challenges this decade.

Our Vision
We envision an equitable and prosperous planet driven by the wise management of natural resources. We aspire to create a world where the actions of government, business, and communities combine to eliminate poverty and sustain the natural environment for all people.

Our Approach
COUNT IT
We start with data. We conduct independent research and draw on the latest technology to develop new insights and recommendations. Our rigorous analysis identifies risks, unveils opportunities, and informs smart strategies. We focus our efforts on influential and emerging economies where the future of sustainability will be determined.

CHANGE IT
We use our research to influence government policies, business strategies, and civil society action. We test projects with communities, companies, and government agencies to build a strong evidence base. Then, we work with partners to deliver change on the ground that alleviates poverty and strengthens society. We hold ourselves accountable to ensure our outcomes will be bold and enduring.

SCALE IT
We don't think small. Once tested, we work with partners to adopt and expand our efforts regionally and globally. We engage with decision-makers to carry out our ideas and elevate our impact. We measure success through government and business actions that improve people's lives and sustain a healthy environment.