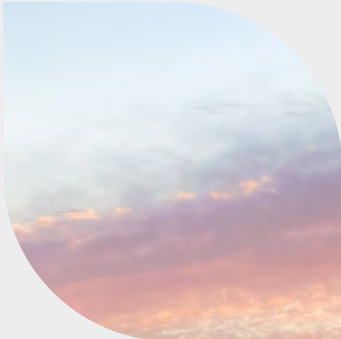
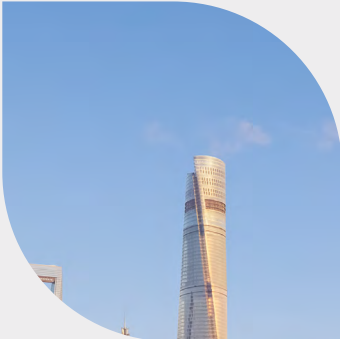
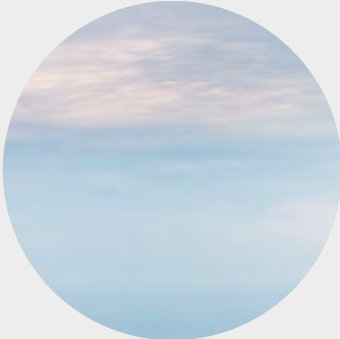


# Tracking and Assessing Cities' SDG Progress and Pathways to Greater Ambition

## The Cases of London, New York City, and Shanghai

June 2026

Center for Global Sustainability



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# List of Acronyms and Abbreviations

ALRI	Acute lower respiratory infection
BEV	Battery electric vehicle
CBDTP	Central Business District Tolling Program
COPD	Chronic Obstructive Pulmonary Disease
CRZ	Congestion Relief Zone
EREV	Extended-range electric vehicle
EV	Electric vehicle
GBL	Green Building Label
GDP	Gross domestic product
GHG	Greenhouse gas
HBV	Hepatitis B
HIV	Human Immunodeficiency Virus
IHD	Ischemic Heart Disease
LEED	Leadership in Energy and Environmental Design
LEZ	Low Emission Zone
London Plan	Spatial Development Strategy for Greater London
MJ	Megajoules
MTA	Metropolitan Transportation Authority
NEV	New energy vehicle
NO <sub>x</sub>	Nitrogen oxide
NYCEDC	New York City Economic Development Corporation
PHEV	Plug-in hybrid electric vehicle
PM	Particulate matter
ppb	Parts per billion
PPP	Purchasing Power Parity
SDG	Sustainable Development Goal
SI	Supplementary Information
SUD	Substance use disorder
TB	Tuberculosis
ULEZ	Ultra Low Emission Zone
UN	United Nations
WASH	Water, sanitation, and hygiene
WHO	World Health Organization

## Key Takeaways

- Through its 17 Sustainable Development Goals (SDGs), the United Nations established a set of overarching benchmarks and supporting indicators, with goals to be met by 2030. As the target year approaches, it is essential to take stock of progress on each indicator and to create an inventory of actions taken toward global sustainable development.
- This report adopts a city-centered perspective, recognizing that city actions across diverse dimensions of sustainability can generate direct and tangible improvements in people's lives while also contributing to broader sustainability outcomes. It also addresses the longstanding challenge of systematically assessing city impacts across the globe. By employing a robust and systematic research framework, the report overcomes barriers posed by diverse urban contexts and inconsistent data reporting, enabling more rigorous evaluations of city-level sustainability performance.
- This study assesses city-level progress toward four SDGs: SDG 3 (Good Health and Well-Being), SDG 7 (Affordable and Clean Energy), SDG 11 (Sustainable Cities and Communities), and SDG 13 (Climate Action). It examines 32 indicators across three cities—London (United Kingdom), New York City (United States), and Shanghai (China)—from 2015 to 2024. The study contains two objectives: (1) to assess city performance relative to 2030 SDG benchmarks and (2) to compare this progress against city- and national-level targets to determine whether cities are pursuing actions that are more ambitious than existing SDG and national commitments.
- As of the end of 2024, all three cities continue to make progress toward the UN's 2030 targets, although the pace varies substantially across SDGs. London advanced rapidly on SDGs 7 and 13, with slower progress on SDGs 3 and 11. New York City progressed rapidly on SDGs 7, 11, and 13, although progress remained slow for SDG 3. In Shanghai, improvements on SDGs 3, 7, and 11 outpaced growth on SDG 13.
- Across the three cities, all four SDGs showed notable improvements, particularly in reducing adolescent birth rates, air pollution mortality, water, sanitation, and hygiene (WASH)-related mortality, and PM2.5 concentrations. Full achievement of the indicator benchmark was consistently observed for maternal mortality, under-five mortality, neonatal mortality, electricity access, and green space. At the same time, all cities experienced declining performance in healthcare affordability and mortality from unintentional poisoning. Significant gains were also made in historically underperforming areas, especially renewable energy adoption and energy efficiency, with progress accelerating in 2023 and 2024.

- With regard to city-level targets, London and New York City show relatively lower levels of progress toward their own targets compared with UN benchmarks, while Shanghai shows higher levels of progress on its own benchmarks. City targets in London tend to focus on broad, sweeping goals, while local targets in New York City focus on populations with poor outcomes, and Shanghai's targets are most structurally aligned with SDG formatting.
- Comparing city- and national-level performance against national targets helps assess the role cities can play in contributing to broader sustainability goals. Overall, performance is mixed, with cities outperforming their home countries on most SDGs when considered in aggregate, although indicator-level results differ.
- To illustrate the policies driving SDG performance in each of the cities of analysis, the final section of this report includes case studies on flood resilience, congestion management, and green building.

# 1. Background

Cities are key players for achieving global sustainability. According to estimates by the European Commission, more than 40% of the global population lives in cities, and this share is expected to increase to 53% by the end of the century.<sup>1</sup> As cities continue to expand, demand for housing, transport, energy, and public services also grows. The future of sustainable development depends on cities' capacity to manage this growth and reduce environmental impacts through effective urban planning and policy. One such framework for understanding progress toward these aims is the United Nations' (UN) Sustainable Development Goals (SDGs). The analysis uses this global framework and its established 2030 benchmarks to assess city-level progress toward sustainable development, also considering city- and national-level targets to provide local context and insights into the role of cities in driving national sustainability.

The climate risks that cities and urban areas face are multiple and severe. Cities are disproportionately exposed to the impacts of flooding, heat stress, and sea level rise due to their high concentration of impervious surfaces and proximity to coasts and rivers. Additionally, interactions between climate hazards and other environmental degradation, such as poor air and water quality, compound system-wide impacts.<sup>2</sup> City infrastructure can thus amplify natural hazards, making it imperative for cities to address climate change and environmental risks. Urban areas are also major contributors to greenhouse gas (GHG) emissions, producing more than 70% of annual global emissions.<sup>3</sup> Due to their status as major emitters and economic hubs, cities are well positioned to drive rapid emissions reductions while simultaneously attending to the needs of their local population.

However, multiple factors constrain cities' capacity to enact sustainability policies, including limited fiscal resources, technical capacity, and governance capacity. The distribution of power among local, regional, and national levels of government determines the range of policy instruments available to cities to address sustainability challenges. This range may be expansive or restrictive depending on the national context and sector.<sup>4</sup> For example, national- or state-level control over electricity grids can limit the ability of city governments to decarbonize their power sector.<sup>5</sup> Cities must operate within these political structures, creating a complex policy environment that can either facilitate or constrain local ambition. Despite these limitations, cities have demonstrated a remarkable capacity for leadership in sustainability, with some acting as innovation hubs and policy laboratories where governments refine environmental regulations and social welfare policies before scaling them nationally.<sup>6</sup> This context places cities in a particularly favorable position to drive sustainable development and help achieve national and international goals.

In 2015, all UN Member States adopted the 2030 Agenda for Sustainable Development, establishing 17 goals as a comprehensive framework for development that addresses environmental, economic, and social needs. Although these goals are oriented toward national action, subnational actors such as provinces, cities, universities, and businesses have pledged to track, implement, and attain the targets.<sup>7,8</sup> This report analyzes city-level sustainability through the lens of SDGs, focusing on four goals:

- **Goal 3: Good Health and Well-Being** aims to ensure healthy lives and promote well-being for everyone at all ages.
- **Goal 7: Affordable and Clean Energy** aims to ensure access to affordable, reliable, sustainable, and modern energy.

- **Goal 11: Sustainable Cities and Communities** intends to make cities inclusive, safe, resilient, and sustainable.
- **Goal 13: Climate Action** focuses on taking urgent action to combat climate change and its impacts.

The four goals selected are highly relevant to climate change mitigation and adaptation, and have benchmarks that cities play key roles in implementing. This analysis omitted targets for which city governments largely lack jurisdiction (SDGs 16 and 17), have a limited ability to impact (SDGs 14 and 15), or have limited connection to environmental issues (SDG 4). Following this pilot study, later assessments will likely expand to include other relevant SDGs and their indicators.

Existing tools and reviews have attempted to score countries<sup>9</sup> and cities<sup>10,11,12</sup> on their progress toward SDGs. The Sustainable Solutions Development Network created an index to rank SDG progress in the 100 largest metropolitan areas, considering 54 indicators across 15 SDGs over a one year timestep.<sup>11</sup> Other assessment tools including the Organisation for Economic Co-operation and Development's local SDG explorer similarly consider progress within a one-year timestep, creating aggregate SDG scores through normalization across indicators.<sup>12</sup> Several cities, including Shanghai and New York City, produced Voluntary National Reviews over the past five years, relying on extensive case studies and reporting on longitudinal progress across a small set of indicators. These reports, pioneered by New York City, allow cities to track their progress toward SDGs.<sup>13</sup> Although use of these reports continues to grow, the scope of included SDGs is limited and they lack a methodological uniformity. Further, existing literature on city attainment of SDGs primarily relies on assessment of one-year timesteps and incomplete indicators, and lacks incorporation of local and national interests into the framework.

This study contributes to the existing literature by addressing the longstanding challenge of systematically assessing city-level sustainability performance across the globe. By employing a robust and consistent analytical framework based on the UN SDGs, it overcomes barriers arising from the diversity of urban contexts and inconsistencies in data reporting, enabling more rigorous and comparable evaluations of city progress. The analysis focuses on three major global cities—London, New York City, and Shanghai—and examines progress toward SDGs 3, 7, 11, and 13. Using data from 2015 to 2024, this study assesses city performance across 32 indicators and evaluates the extent to which the three cities are increasing ambition to meet sustainability goals. Specifically, the study has two objectives: (1) to assess city performance relative to 2030 SDG benchmarks and (2) to compare this progress against city- and national-level targets to determine whether cities are pursuing actions that are more ambitious than existing SDG and national commitments.

The rest of the report is structured as follows: Chapter 2 lays out the data and methodology, while Chapter 3 reports city progress toward the UN's 2030 SDG targets. Chapters 4 and 5 further explore this topic by assessing city progress toward their own city-defined goals and toward their respective 2030 national benchmarks. Chapter 6 compares city and national performance on national targets that align with UN SDGs. Chapter 7 provides in-depth case studies that explore real policy solutions cities are implementing to achieve SDG indicator benchmarks. Finally, Chapter 8 concludes with key findings, policy recommendations, and directions for future research and action.

## 2. Methods

### 2.1. Data Collection

**Inclusion and exclusion criteria.** Across the four SDGs, we collected all relevant sub-targets under each SDG goal for inclusion in the analysis. In total, 32 indicators were retained while 27 were excluded (see Tables 1-4). Due to data availability constraints and the limited scope of city-level governance, several indicators were either removed or modified. Specifically, 10 indicators for SDG 3, three for SDG 7, eight for SDG 11, and six for SDG 13 were excluded. Many omissions involve indicators that fall largely outside city jurisdiction, such as SDG 3.c on health worker density and distribution in developing countries. Others omitted include 3.6.1 on reduction of traffic deaths, which had targets ending in 2020, and 3.3.5 on tropical disease deaths, a metric irrelevant to these cities. Additionally, the analysis simplified the definition of four indicators, adjusting indicator 11.1.1 on housing to focus on homelessness, narrowing 11.2.1 on transportation accessibility to the share of trips taken by public transportation, modifying 11.7.1 on public spaces to account for only open green spaces, and changing 13.1.1 to focus on city climate action plans instead of Nationally Determined Contributions.

**Data for each indicator.** We collected annual panel data for each city from 2015 through 2024, covering the majority of the SDG framework implementation period. The analysis uses data from secondary sources including government reports, national statistics agencies, censuses, and city-run open data repositories including London Datastore,<sup>14</sup> New York City Open Data,<sup>15</sup> and Shanghai Statistical Yearbooks. We selected data sources based on credibility, completeness, and recency, collecting data between April and May 2026. The Supplementary Data Files contain more details on sources and indicator-level annual data. For unbalanced panel data where complete datasets could not be obtained or had missing entries, we gathered data from alternative credible sources to fill the gaps. Where isolated missing values could not be found from other sources, we forward filled data, replacing missing years with data from the most recent preceding year, while for multi-year block gaps in the data, we estimated intermediate years using linear interpolation. For detailed data and supporting materials, please visit our GitHub repository [here](#).

**UN SDG Benchmarks.** To assess city progress toward UN SDGs, we compiled relevant 2030 benchmark targets for each indicator (the last column in Tables 1-4). The UN clearly defines the majority of these benchmarks. However, the benchmarks for a few indicators are more ambiguous, with the UN calling for “significant [reductions]” or improvements against 2015 performance. For these cases, we established benchmark tiers based on percentage improvement from the 2015 baseline: 0–49% reduction = reasonable, 50–79% = great, and  $\geq 80\%$  = substantial/significant.

**Table 1: SDG 3 on Good Health & Well-Being, indicators, metrics, and 2030 UN benchmark.**

Number	Indicator	Definition	2030 UN Benchmark
3.1.1	Maternal mortality ratio	Number of deaths attributed to childbirth per 100,000 live births	Reduce the death rate to 70 per 100,000 live births
3.2.1	Under-five mortality rate	Child deaths between birth and five years per 1,000 live births	Reduce the death rate to 25 per 100,000 live births

Number	Indicator	Definition	2030 UN Benchmark
3.2.2	Neonatal mortality rate	Deaths within the first 28 days of life per 1,000 live births	Reduce the death rate to 12 per 100,000 live births
3.3.1	New HIV infections	Number of new HIV infections per 1,000 uninfected population	Reduce new infection incidence to zero
3.3.2	Tuberculosis (TB) incidence	Number of new TB cases per 100,000 population	Reduce disease incidence by 80% compared with 2015
3.3.3	Malaria incidence	Number of new malaria cases per 1,000 population	Reduce disease incidence to zero
3.3.4	Hepatitis B (HBV) incidence	Number of new HBV infections per 100,000 population	Reduce disease incidence to zero
3.4.1	Non-communicable disease mortality	Number of deaths from cancer, cardiovascular disease, diabetes, and chronic respiratory disease	Reduce number of deaths 33% compared with 2015
3.4.2	Suicide mortality rate	Number of deaths by suicide	Reduce number of deaths 33% compared with 2015
3.5.1	Coverage of treatment for substance use disorders (SUDs)	Number of people receiving treatment annually per the total number of people with SUDs	Treat 100% of population with SUDs
3.5.2	Alcohol per capita consumption	Total alcohol consumption, in liters of pure alcohol	Reduce consumption 20% compared with 2010
3.7.1	Women using modern family planning methods	Women using modern methods (sterilization, intrauterine device, implant, injectable, condom, or oral contraceptive) as a share of women of reproductive age	100% of needs met through modern methods
3.7.2	Adolescent birth rate	Adolescent birth rate (aged 10-19 years) per 1,000 girls aged 10-19	Substantially reduce
3.8.1	Coverage of essential health services	Percentage of population with health insurance coverage	100% of population insured

Number	Indicator	Definition	2030 UN Benchmark
3.8.2	Household expenditures on healthcare	Out-of-pocket healthcare spending as a share of average discretionary spending	Substantially reduce
3.9.1	Air pollution mortality	Deaths from lung cancer, ALRI, stroke, COPD, and IHD attributed to air pollution, under a given particulate matter (PM) concentration, per 100,000 population	Substantially reduce
3.9.2	Mortality rate attributed to unsafe water, unsafe sanitation and lack of hygiene (WASH)	Deaths from diarrhea, acute respiratory infections, and protein-energy malnutrition attributed to unsafe WASH, per 100,000 population	Substantially reduce
3.9.3	Unintentional poisoning mortality	Number of deaths from unintentional poisonings	Substantially reduce

**Table 2: SDG 7 on Affordable and Clean Energy, indicators, metrics, and 2030 UN benchmark.**

Number	Indicator	Definition	2030 UN Benchmark
7.1.1	Electricity access	Proportion of population with access to electricity	100% access
7.2.1	Renewable energy	Share of final energy consumption from renewable sources	Triple renewable energy share compared with 2022
7.3.1	Energy efficiency	Primary energy use per city GDP (MJ/\$ constant 2021 PPP)	Double energy efficiency compared with 2022

**Table 3: SDG 11 on Sustainable Cities and Communities, indicators, metrics, and 2030 UN benchmark.**

Number	Indicator	Definition	2030 UN Benchmark
11.1.1	Housing	Proportion of urban population that is homeless	No reported homelessness
11.2.1	Public transport access	Proportion of the population that uses public transportation	Substantially reduce

Number	Indicator	Definition	2030 UN Benchmark
11.5.1	Natural disaster mortality and impacts	Number of people who died, went missing, or were directly affected per 100,000 population	Substantially reduce
11.5.2	Natural disaster economic loss	Direct economic losses, including damage to physical assets, infrastructure, and productive capacity, as a proportion of GDP	Substantially reduce
11.6.1	Solid waste management	Share of solid waste that is recycled, composted, or diverted from landfills	Collect and manage 100% of urban solid waste
11.6.2	Air quality	Average annual PM2.5 concentration (ug/m <sup>3</sup> )	Reduce PM2.5 to ≤5 µg/m <sup>3</sup> annual mean
11.7.1	Green space	Average share of the built-up area of cities that is open space, green space, or a public facility	Open spaces, green spaces, and public facilities make up 15% of total city area
11.7.2	Street harassment	Share of residents that have experienced unwanted sexual comments, been followed, shouted at, or threatened by a stranger in public	No reported harassment

**Table 4: SDG 13 on Climate Action, indicators, metrics, and 2030 UN benchmark.**

Number	Indicator	Definition	2030 UN Benchmark
13.1.1	Natural disaster mortality and impacts	Number of people who died, went missing, or were directly affected per 100,000 population	Substantially reduce
13.2.1	City climate action	Presence of a city climate action plan, and its 2030 emissions target	Present target
13.2.2	Emissions	GHG emissions	Emissions fall 7.5% annually

**City and national 2030 targets.** To assess city progress toward their own targets and national targets, and to evaluate whether cities are pursuing ambitious actions beyond UN SDG or national goals, we compiled 2030 benchmark data at the city and national level across the selected indicators, finding mixed coverage and availability (Supplementary Information (SI) Tables 1-3). Many of these

benchmarks differ subtly from UN SDG benchmark definitions. For example, some targets are expressed in terms of total deaths instead of deaths per 100,000 population, while others focus specifically on populations with acute disparities, as in the case of Black maternal mortality in New York City. To accurately assess progress toward city and national goals, we compiled annual data on progress toward benchmarks using the indicator definitions that apply to each city. For more details on sources and indicator-level annual data, see Supplementary Data Files 1-5.

**Benchmark definitions.** The following definitions apply in this report:

- UN benchmarks: 2030 sustainability targets established by the United Nations, encompassing dozens of specific indicators categorized under 17 overarching Sustainable Development Goals.
- City benchmarks: 2030 sustainability targets set by city governments that align with UN SDG indicators.
- National benchmarks: 2030 sustainability targets set by national governments that align with UN SDG indicators.

## 2.2. Methodology

### 2.2.1 Progress score at indicator and SDG levels

This analysis uses a benchmark-based scoring approach to measure each city's progress from its 2015 baseline toward the 2030 SDG benchmark targets.

**Indicator-level progress score.** For each city, indicator, and year, we calculated an indicator-level progress score.  $B_i$  denotes the 2015 baseline value for indicator  $i$ ,  $T_i$  denotes the 2030 benchmark target, and  $A_{it}$  denotes the observed value of indicator  $i$  in year  $t$ . The total distance from the baseline to the benchmark target is defined as:

$$D_i = |T_i - B_i|$$

Each indicator was classified according to its direction of improvement. For positive indicators, where a higher value represents better performance, the target is considered achieved when  $A_{it} \geq T_i$ . For negative indicators, where a lower value represents better performance, the target is considered achieved when  $A_{it} \leq T_i$ .

The indicator score was then calculated as the share of the baseline-to-target distance achieved in each year. For positive indicators, the score is:

$$IndicatorScore_{it} = \frac{A_{it} - B_i}{|T_i - B_i|}$$

For negative indicators, the score is:

$$IndicatorScore_{it} = \frac{B_i - A_{it}}{|T_i - B_i|}$$

The final score was capped within the range [-1,1]. A score of 0 indicates that the indicator remains at its 2015 baseline level. A score of 1 indicates that the 2030 benchmark target has been met or exceeded. Negative values indicate movement away from the target relative to the 2015 baseline, with -1 representing deterioration equivalent to one full baseline-to-target distance.

The same scoring procedure was applied under each benchmark definition. For city-level benchmarks,  $T_i$  represents the city-specific benchmark target. For national benchmarks,  $T_i$  represents the corresponding national target. For UN-level benchmarks,  $T_i$  represents the corresponding UN target. Therefore, differences across benchmark results reflect differences in the benchmark target values and in the set of indicators for which valid benchmarks are available.

**SDG-level progress score.** After calculating indicator-level scores, SDG-level scores were computed as the arithmetic mean of all available indicator scores mapped to the same SDG. For city  $c$ , SDG  $g$ , and year  $t$ , the SDG score is given by:

$$SDGScore_{cgt} = \frac{1}{N_{cgt}} \sum_{i=1}^{N_{cgt}} IndicatorScore_{icgt}$$

where  $N_{cgt}$  is the number of available indicators mapped to SDG  $g$  for city  $c$  in year  $t$ . Since 2015 is used as the baseline year, the 2015 score is equal to zero by construction and is omitted from the progress figures.

Additionally, for SDG 13, the UN-level benchmark defines the emissions reduction pathway as a 7.6% annual decline from 2020 to 2030. To keep the baseline year consistent with the other SDG benchmarks, we extended the same 7.6% annual reduction pathway backward from 2020 to 2015. The resulting 2015 value was then used as the baseline for calculating SDG 13 progress, while preserving the original UN benchmark trajectory.

### 2.2.2. Progress score at indicator and city levels

To assess progress toward city targets, we applied the scoring procedure described in Section 2.2.1 to each city's indicator data, using city-level benchmark targets as the reference point. For each indicator, the baseline value was the city's observed 2015 value and the target value was the corresponding city-specific 2030 benchmark. The resulting indicator-level score measures the share of the city's baseline-to-target distance achieved in each year.

We calculated these scores for all indicators with available city-level benchmarks, then aggregated within each SDG to obtain city-level SDG progress scores. The scores therefore show how far each city has progressed toward its own city-level targets.

### 2.2.3. Progress score at indicator and national levels

To enable a direct comparison between city and national progress, we applied the benchmark-based scoring framework described in Section 2.2.1 to both city and national data, using national benchmark targets as the reference point for both geographies.

Specifically, for each city-nation pair (New York City / United States, London / United Kingdom, Shanghai / China), we calculated indicator-level and SDG-level progress scores for both the city and nation using the same national target  $T_i$  and the same scoring formula. However, the baseline value

$B_i$  differs between the two: for the city score,  $B_i$  reflects the city's own 2015 value; for the national score,  $B_i$  reflects the nation's own 2015 value.

This approach ensures that both scores are expressed on the same scale and measured against the same goal, making city-nation comparisons interpretable. A higher city score relative to the national score indicates that the city is progressing faster toward the national target than the nation as a whole.

#### 2.2.4. Indicator decomposition

To examine which indicators drive each aggregate SDG score, we further decomposed the SDG score into indicator-level contributions. Because each SDG score is calculated as the arithmetic mean of its constituent indicator scores, the contribution of each indicator is defined as the normalized indicator score divided by the number of available indicators within the same city, SDG, and year:

$$Contribution_{icgt} = \frac{IndicatorScore_{icgt}}{N_{cgt}}$$

The sum of all indicator contributions within each city, SDG, and year therefore equals the corresponding aggregate SDG score:

$$\sum_i Contribution_{icgt} = SDGScore_{cgt}$$

This decomposition allows the analysis to identify key drivers contributing to overall SDG performance, while also highlighting factors that are negatively affecting the scores and may represent areas for further improvement.

# 3. City Performance Against UN SDG Benchmarks

## Overall performance

- All three cities progressed toward the UN’s 2030 targets, although the pace of progress varied substantially across SDGs. London advanced more rapidly on SDGs 7 and 13, while progress on SDGs 3 and 11 was comparatively slower, partly because the city already started from relatively high baseline levels in 2015. New York City showed faster progress on SDGs 7, 11, and 13, but progress on SDG 3 remained relatively slow. In particular, following the COVID-19 pandemic, improvements on SDG 3 indicators slowed compared with the pre-pandemic period. Shanghai progressed more rapidly on SDGs 3, 7, and 11, but showed relatively limited progress on SDG 13, largely driven by slower reductions in GHG emissions.
- Although none of the three cities have achieved any of the UN 2030 targets, four years remain until the target year. While it is difficult to predict whether the targets will ultimately be achieved, the cities demonstrate varying rates of progress toward these goals.
- Across the three cities, all four SDGs benefited from continued significant improvements in several key performance areas, such as reducing the adolescent birth rate (3.7.2), reducing air pollution mortality (3.9.1), reducing the WASH mortality rate (3.9.2), and improving air quality by reducing annual PM2.5 concentration (11.6.2). All the cities had declining performance in other areas, such as the share of household expenditures on healthcare (3.8.2) and mortality attributed to unintentional poisoning (3.9.3). In addition, 100% progress toward SDG subtargets was observed across all years and for all cities for the following five indicators: maternal mortality ratio (3.1.1), under-five mortality rate (3.2.1), neonatal mortality rate (3.2.2), electricity access (7.1.1), and green space (11.7.1).
- All three cities showed progress over the study period—particularly during the past two years—in several historically underperforming areas, including the share of renewable energy in total final energy consumption (7.2.1) and energy efficiency measured in terms of primary energy use relative to GDP (7.3.1).
- Although no common pattern of consistently poor performance was observed across all cities, each city possesses important opportunities for further progress toward achieving the SDGs, including solid waste management (11.6.1) in London, GHG emissions reduction (13.2.2) in New York City, and public transport (11.2.1) in Shanghai.
- Just as importantly, cities can learn from one another by examining areas in which others have performed well over time. For example, Shanghai showed continued improvement in reducing alcohol per capita consumption (3.5.2) and lowering the homelessness rate (11.1.1). Both Shanghai and London also performed relatively well in reducing suicide rates (3.4.2). In addition, Shanghai and New York City demonstrated strong progress in improving solid waste management (11.6.1), an area that remains a persistent challenge for London. Meanwhile, London maintained steady and sustained progress in GHG emissions reductions (13.2.2), whereas New York City’s progress has been moderate and Shanghai’s progress has been comparatively slower.

## 3.1. London

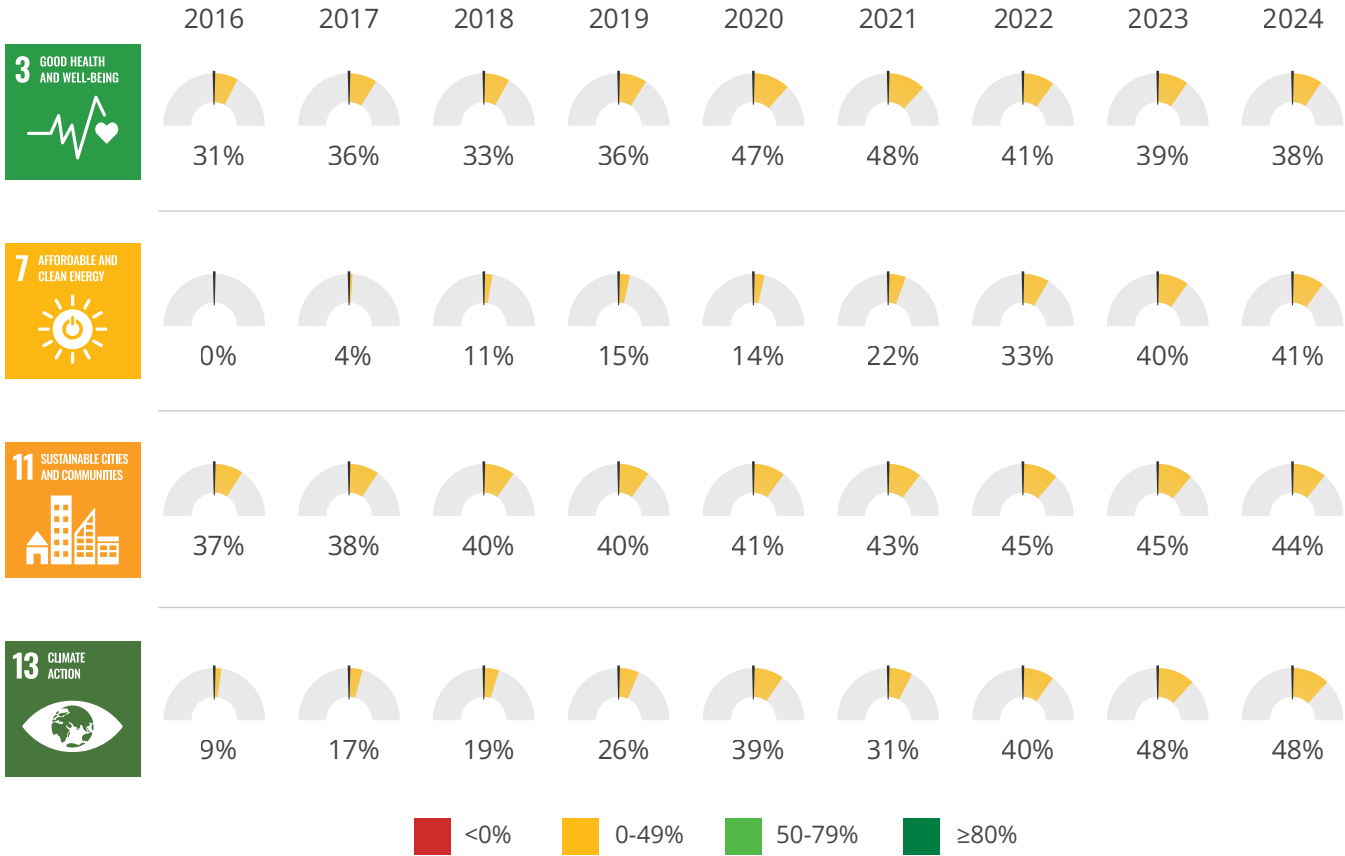
London demonstrated progress across all four SDGs between 2015 and 2024, relative to UN 2030 benchmarks, with scores increasing from 31-38% on SDG 3 (an average increase of 0.78% points per year), 0-41% on SDG 7 (4.56% points per year), 37-44% on SDG 11 (0.78% points per year), and 9-48% on SDG 13 (4.33% points per year) over the 10-year study period. Although the city has not yet achieved any of the UN 2030 targets, four years remain until the target year. While it is difficult to predict whether the targets will ultimately be achieved, some SDGs (7 and 13) may continue to progress more rapidly than others (3 and 11) given their current rates of improvement (see Figure 1).

From the 2015 baseline, London's SDG 3 performance improved steadily, ranging from 31-38% progress toward the benchmark across the study period. This progress was supported by positive trends from a majority of the SDG 3 indicators (13 out of 18 indicators), with 5 of the 18 indicators achieving 100% of their corresponding SDG subtargets. Several indicators also demonstrated particularly substantial improvements over time (see SI Figures 1-4). These include reductions in HBV incidence (3.3.4), adolescent birth rate (3.7.2), air pollution mortality (3.9.1), and WASH mortality (3.9.2). In addition, London benefited from consistently strong and stable performance on several indicators that achieved or maintained 100% progress toward their benchmarks throughout the study period, including maternal mortality ratio (3.1.1), under-five mortality rate (3.2.1), neonatal mortality rate (3.2.2), and health insurance coverage (3.8.1). See SI Table 4 for more details. Despite steady overall improvement, the city experienced consistent regression in SUDs treatment coverage (3.5.1), alcohol consumption (3.5.2), family planning coverage (3.7.1), health expenditures (3.8.2), and unintentional poisoning mortality (3.9.3).

London also showed consistent progress toward SDG 7 benchmarks, primarily driven by sustained contributions from the electricity access indicator (7.1.1). All Londoners had access to electricity across the study period, meaning this indicator consistently achieved 100% of the corresponding SDG subtarget. The renewable energy (7.2.1) and energy efficiency (7.3.1) indicators regressed until 2022, after which both improved, resulting in positive near-term movement toward UN benchmarks, particularly on the energy efficiency indicator. SDG 11 displayed a similar trajectory to SDG 3, increasing from 37% to 45% (2016–2022) before slightly declining to 44% by 2024. Progress was supported by relatively even contributions from the natural disaster mortality and impacts (11.5.1), natural disaster economic loss (11.5.2), and green space (11.7.1) indicators throughout the study period, all of which achieved 100% progress toward SDG subtargets across all years. Growth from 2020 onward is attributable in part to improvements in the public transport access (11.2.1), air quality (11.6.2), and street harassment (11.7.2) indicators, with the most notable progress toward SDG subtargets occurring in air quality (-6% in 2016 to 49% in 2024). However, London's housing (11.1.1) regressed from 2019–2020 and 2023–2024, and solid waste management (11.6.1) remained ≤0% over the study period, underscoring areas where further progress is needed. SDG 13 exhibited a steady upward trend, with particularly strong growth from 2019 onwards, reaching 48% of the UN benchmark by 2023. As this SDG relies upon the GHG emissions (13.2.2) indicator, the results indicate London is making progress in reducing local emissions relative to the UN 2030 benchmark.

London's improvement on indicators such as air pollution mortality (3.9.1) and air quality (11.6.2) can be attributed in part to flagship policies such as the Central London Ultra Low Emission Zone and the Non-Road Mobile Machinery Low Emission Zone, which were the first of their kind globally and provide evidence of London's commitment to leading on climate action.<sup>16</sup> Local policymakers can continue to adopt ambitious policies to build on this success. Solid waste management (11.6.1) represents one

indicator-level area where improvement remains possible. Between 2019 and 2020, London reported the lowest rates of household waste recycling (33.5%), the lowest rate of local waste collection for recycling (30.0%), and the highest waste-to-incineration rate (63.3%) of all English regions.<sup>17</sup> While borough-level variations persist, landfill diversion rates have remained largely stagnant through 2024, suggesting that the city can more rigorously enforce recycling policies, increase collection frequency, and improve related communication with residents.<sup>18</sup>



**Figure 1: London’s progress toward 2030 UN targets between 2015–2024.** Since 2015 is treated as the baseline year, it is excluded from the graph. Each gauge shows the SDG progress score for that year. Shading to the right of the black zero line indicates progress toward the target; shading to the left indicates movement away from the target. A larger shaded area means a larger change from the 2015 baseline. Colors indicate score ranges: red for <0%, yellow for 0–49%, light green for 50–79%, and dark green for ≥80%. Note: For SDG 13, the baseline year was adjusted to 2015 for consistency across the analysis, even though the original base year was set for 2020.

### 3.2. New York City

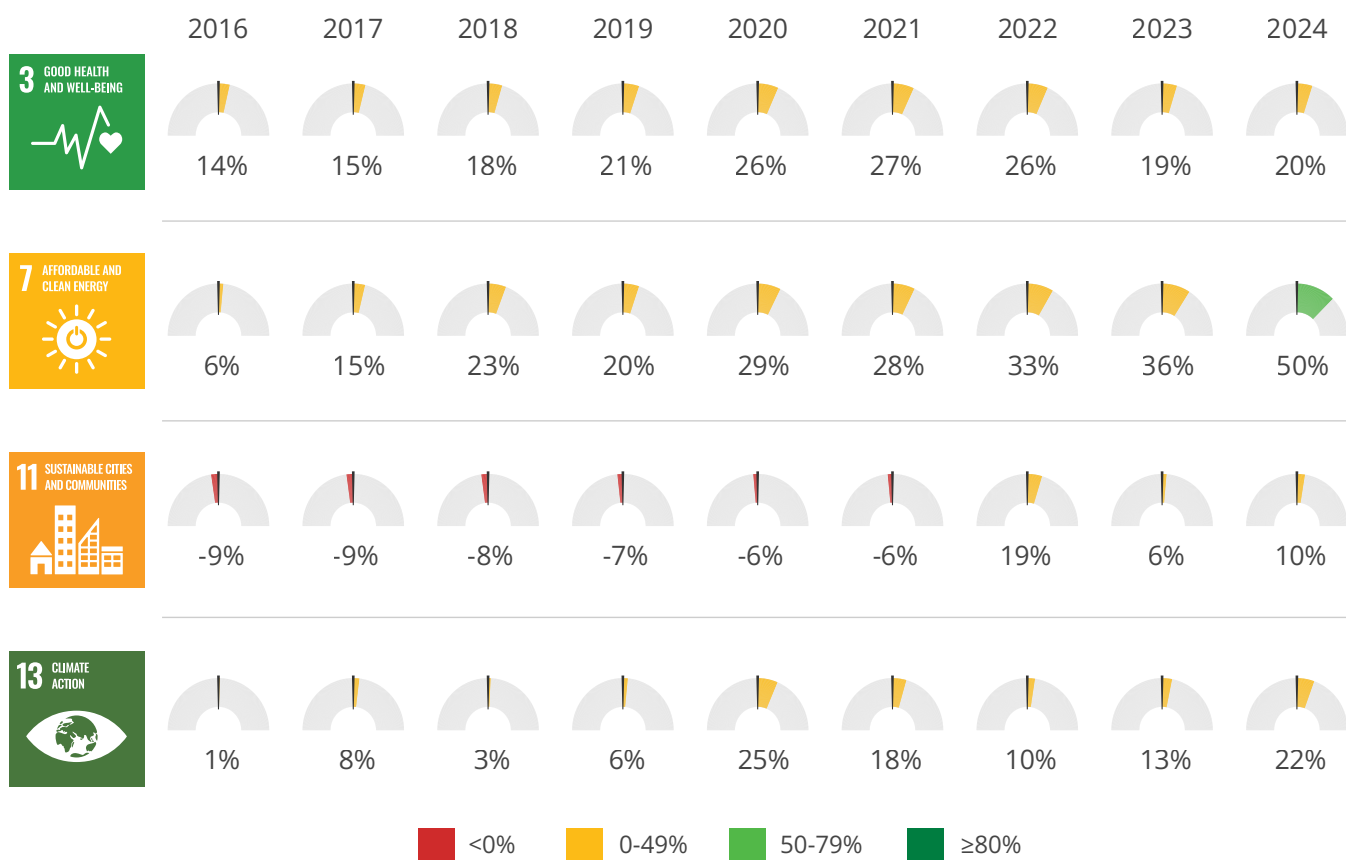
New York City made progress across all four SDGs between 2015 and 2024, relative to 2030 UN benchmarks, with scores increasing from 14-20% on SDG 3 (an average increase of 0.67% points per year), 6-50% on SDG 7 (4.89% points per year), -9-10% on SDG 11 (2.11% points per year), and 1-22% on SDG 13 (2.33% points per year) over the study period. Although the city has not yet achieved any of the UN 2030 targets, four years remain until the target year. While it is difficult to predict whether

the targets will ultimately be achieved, some SDGs (7, 11 and 13) may continue to progress more rapidly than others (3) given their current rates of improvement (see Figure 2).

From the 2015 baseline, New York City's SDG 3 performance improved slightly over the study period (14-20%), with the highest scores occurring between 2020 and 2022. This progress was supported by positive trends across more than half of the SDG 3 indicators (10 out of 18 indicators), with 4 of the 18 indicators achieving 100% of their corresponding SDG subtargets (see SI Figures 5-8). Several indicators showed particularly substantial improvements, most notably, reductions in the adolescent birth rate (3.7.2), air pollution mortality (3.9.1), and WASH mortality (3.9.2). In addition, New York City benefited from consistently strong and stable performance in several indicators that achieved or maintained 100% progress toward their benchmarks throughout the study period, including maternal mortality ratio (3.1.1), under-five mortality rate (3.2.1), and neonatal mortality rate (3.2.2). See SI Table 5 for more details. Despite modest gains overall, the city experienced persistent regression of -100% in the unintentional poisoning mortality (3.9.3) indicator, with smaller declines in malaria incidence (3.3.3), suicide mortality rate (3.4.2), SUDs treatment coverage (3.5.2), and alcohol consumption (3.5.2).

New York City showed strong and consistent growth toward SDG 7 benchmarks (3 out of 3 indicators), with progress rising from 6% in 2016 to 50% by 2024, driven by consistently high performance of 100% on the electricity access indicator (7.1.1), along with modest gains in the renewable energy indicator (7.2.1) from 2019 to 2021 and in 2024. From 2015 to 2021, New York City scored poorly on the energy efficiency indicator (7.3.1), but from 2023 to 2024, the city changed course (13% to 37%), underscoring the potential of strong near-term progress. SDG 11 scores remained low until 2022, reflecting consistently weak performance in the housing (11.1.1), public transport (11.2.1), natural disaster mortality and impacts (11.5.1), and natural disaster economic loss (11.5.2) indicators. However, improvement from -100% to 100% in the natural disaster economic loss indicator (11.5.2) beginning in 2022, combined with consistently strong performance on the air quality (11.6.2) and green space (11.7.1) indicators and moderate performance on the solid waste management (11.6.1) indicator, led to gains in SDG 11 scores from 2022 to 2024 (although still small relative to progress on SDGs 7 and 13). New York City showed progress on SDG 13 as well, rising from 1% in 2016 to a peak of 25% in 2020, before declining slightly to 22% in 2024. Because this indicator reflects GHG emissions reductions (13.2.2), the results suggest that the city has made progress in reducing local emissions relative to the UN benchmark, but that additional sustained action will be needed to accelerate progress.

City policies such as the Clean Fuel Bus Program, Clean Air Taxi legislation, Clean Heat Program, and Congestion Relief Zone are continuing to support positive outcomes in indicators such as air pollution mortality (3.9.1) and air quality (11.6.2),<sup>19</sup> and the myriad of other ambitious policies and programs New York City has enacted in the past few decades provide a foundation for achieving the city's long-term target of 80% emissions reduction by 2050 (from a 2005 baseline).<sup>20</sup> Continued economy-wide emissions reductions are necessary in order for New York City to make progress toward SDG 13 targets and broader climate action goals.



**Figure 2: New York City's progress toward 2030 UN targets between 2015-2024.** Since 2015 is treated as the baseline, it is excluded from the graph. Each gauge shows the SDG progress score for that year. Shading to the right of the black zero line indicates progress toward the target; shading to the left indicates movement away from the target. A larger shaded area means a larger change from the 2015 baseline. Colors indicate score ranges: red for <0%, yellow for 0-49%, light green for 50-79%, and dark green for ≥80%. Note: For SDG 13, the baseline year was adjusted to 2015 for consistency across the analysis, even though the original base year was set for 2020.

### 3.3. Shanghai

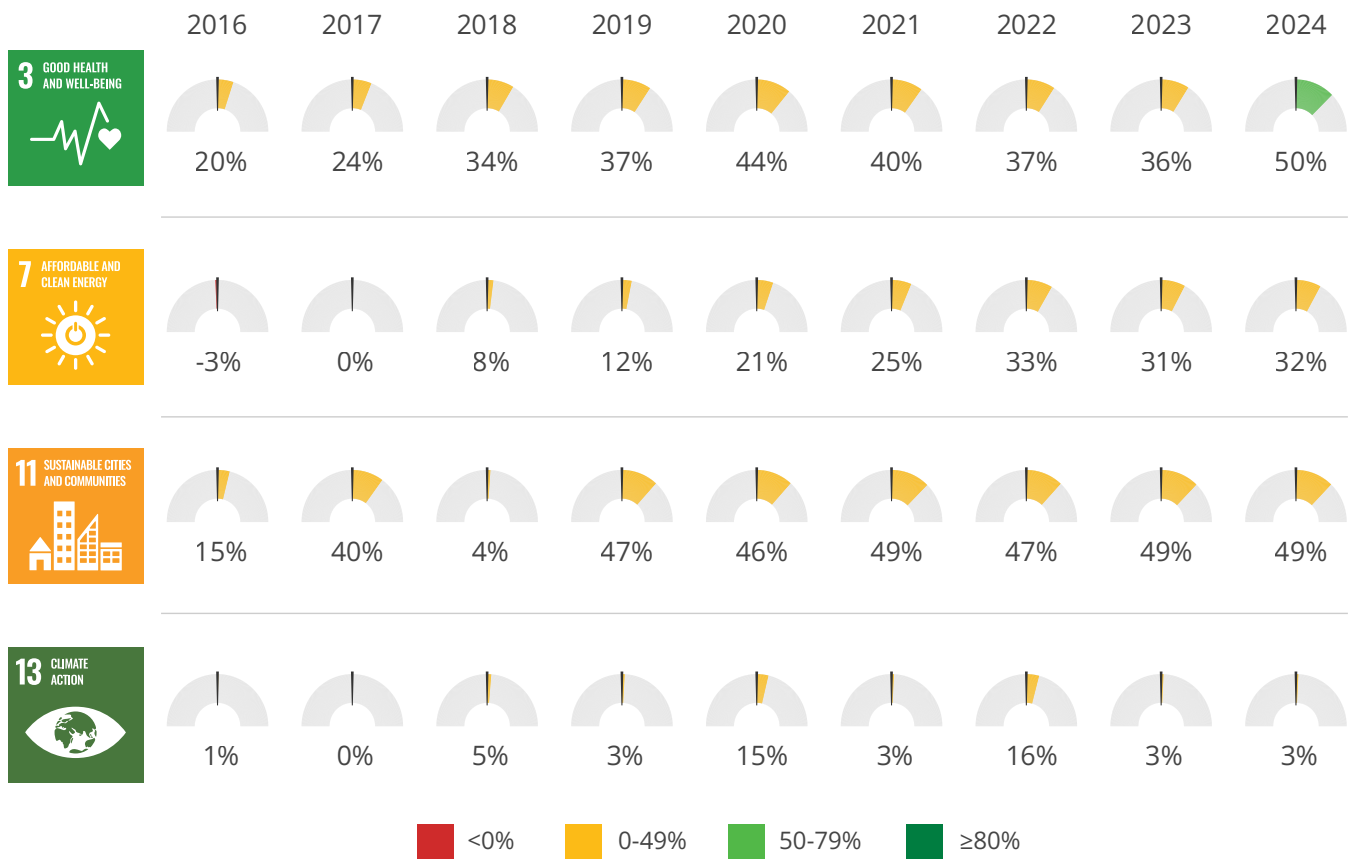
Shanghai made progress across all four SDGs between 2015 and 2024, relative to UN benchmarks, with scores increasing from 20-50% on SDG 3 (an average increase of 3.33% points per year), -3-32% on SDG 7 (3.89% points per year), 15-49% on SDG 11 (3.78% points per year), and 1-3% on SDG 13 (0.22% points per year) over the study period. Although the city has not yet achieved any of the UN 2030 targets, four years remain until the target year. While it is difficult to predict whether the targets will ultimately be achieved, some SDGs (3, 7 and 11) may continue to progress more rapidly than others (13) given their current rates of improvement (see Figure 3).

From the 2015 baseline, Shanghai's SDG 3 performance improved steadily over the study period (20-50%). This progress was supported by positive trends across a vast majority of SDG 3 indicators (15 out of 18 indicators), with 6 of the 18 indicators achieving 100% of their corresponding SDG subtargets (see SI Figures 9-12). Several indicators also showed particularly substantial improvements: reductions in the suicide mortality rate (3.4.2), alcohol consumption (3.5.2), adolescent birth rate

(3.7.2), air pollution mortality (3.9.1), and WASH mortality (3.9.2). In addition, Shanghai benefited from consistently strong and stable performance in several indicators that achieved or maintained 100% progress toward their benchmarks throughout the study period, including maternal mortality ratio (3.1.1), under-five mortality rate (3.2.1), and neonatal mortality rate (3.2.2). See SI Table 6 for more details. However, small regressions in the non-communicable disease mortality (3.4.1), household expenditures on healthcare (3.8.2), and unintentional poisoning mortality (3.9.3) indicators point to areas where further improvements are needed.

Shanghai demonstrated moderate growth toward SDG 7 benchmarks (1 out of 3 indicators), with progress driven by sustained contributions of 100% from the electricity access indicator (7.1.1). Smaller contributions from the renewable energy indicator (7.2.1) and the energy efficiency indicator (7.3.1) also drove advancement, with the latter improving from 11% achievement of the SDG subtarget in 2016 to 59% by 2024. Similar to SDGs 3 and 7, Shanghai showed strong progress toward SDG 11 benchmarks, supported by consistent contributions of 100% from the natural disaster mortality and impacts (11.5.1; excluding 2018) and green space (11.7.1) indicators, along with 100% progress from the natural disaster economic loss (11.5.2) indicator from 2019 onwards. Progress was further supported by modest near-term contributions from the housing (11.1.1), solid waste management (11.6.1), and air quality (11.6.2) indicators. Shanghai's score consistently declined on the public transport indicator (11.2.1) from 2020 onwards, underscoring an area with room for growth. Shanghai's progress on SDG 13 was slow, with minor peaks in GHG emissions reduction (13.2.2) in 2020 (15%) and 2022 (16%), indicating that substantial advancements can be made in reducing city-wide emissions at a pace that will meet the UN's 2030 benchmark.

Shanghai's strong performance on the air quality (11.6.2) and green space (11.7.1) indicators is supported by citywide investments into related initiatives.<sup>21</sup> However, although Shanghai benefits from a strong EV market and substantial government investment in transportation infrastructure, regression of the public transport indicator (11.2.1) from 2020 onwards points to room for improvement. The city's multimodal connections remain limited, and its public transport stops are more spread out than in comparable Asian cities,<sup>22</sup> indicating that increasing stop density and further developing multimodality could improve local public transport access.



**Figure 3. Shanghai's progress toward 2030 UN targets between 2015-2024.** Since 2015 is treated as the baseline, it is excluded from the graph. Each gauge shows the SDG progress score for that year. Shading to the right of the black zero line indicates progress toward the target; shading to the left indicates movement away from the target. A larger shaded area means a larger change from the 2015 baseline. Colors indicate score ranges: red for < 0%, yellow for 0-49%, light green for 50-79%, and dark green for ≥80%. Note: For SDG 13, the baseline year was adjusted to 2015 for consistency across the analysis, even though the original base year was set for 2020.

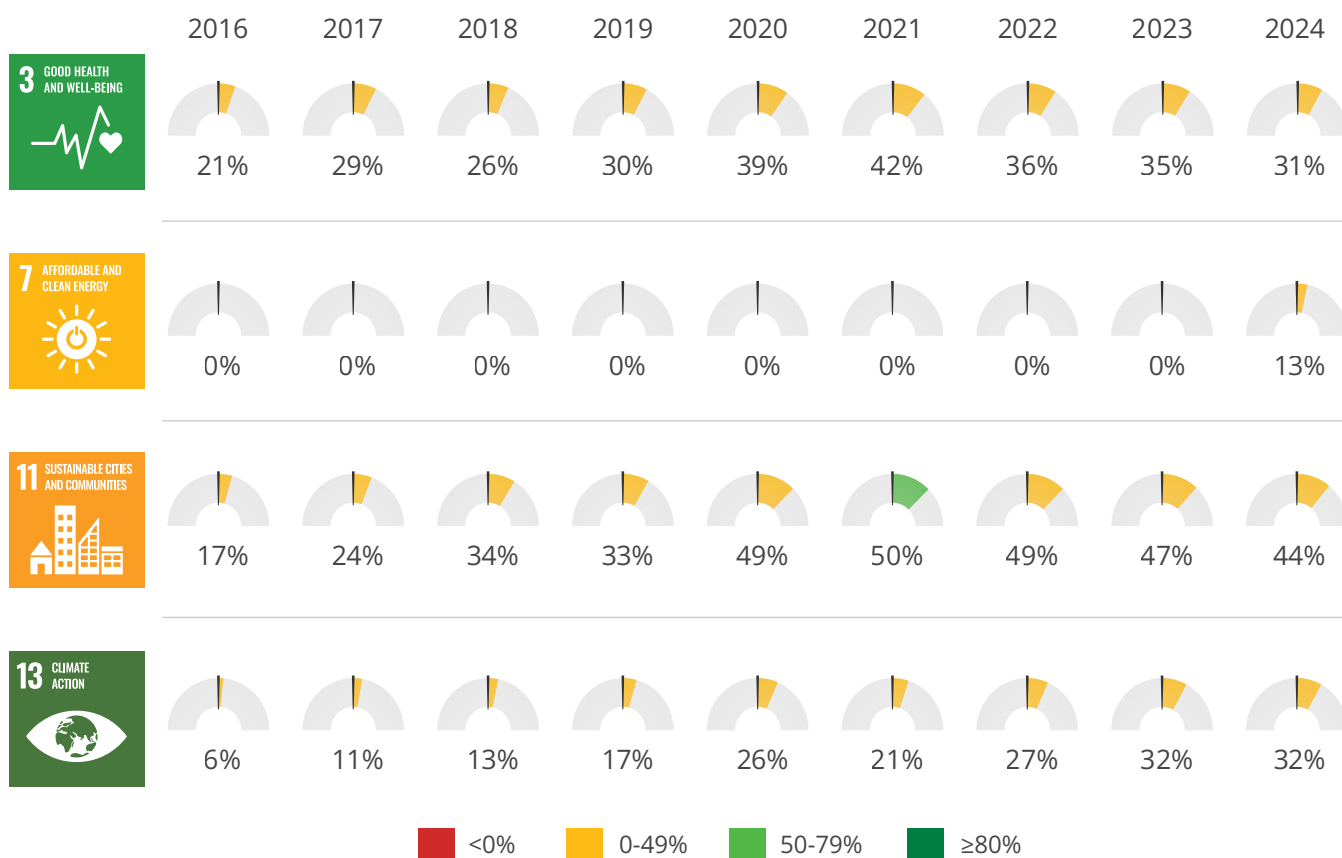
## 4. City Performance Against City Benchmarks

### Overall performance

- In addition to international benchmark attainment, this study assesses city progress on their own targets to understand city priorities through the lens of the internationally consistent framework of SDGs.
- Defining city targets as those matching SDG indicators, or covering topic areas that differed only subtly—for example, including recycling targets within SDG indicator 11.6.1, on overall landfill diversion—the cities of analysis had variable numbers of 2030 benchmarks: London has only nine targets, while New York City and Shanghai have 13 and 14, respectively.
- City targets in London tend to focus on broad, sweeping goals (e.g., ending rough sleeping by 2030), while local targets in New York City focus on populations with poor outcomes (e.g., reducing HVB rates among Asian residents), and Shanghai’s targets are most structurally aligned with SDG goal formatting.
- London and New York City show relatively lower levels of progress toward their own targets compared with UN benchmarks, while Shanghai shows higher levels of progress on its own benchmarks. Both New York City and Shanghai demonstrate continued progress on their SDG 13 goals; Shanghai achieves its 2030 emissions reduction goals before 2030.

### 4.1. London

Across all four SDGs, London improved its scores between 2016 and 2024, relative to its own benchmarks. Scores increased from 21-31% on SDG 3 (an average increase of 1.11% points per year), 0-13% on SDG 7 (1.44% points per year), 17-44% on SDG 11 (3% points per year), and 6-32% on SDG 13 (2.89% points per year) over the study period. Although the city has not yet achieved any of the city 2030 targets, four years remain until the target year. While it is difficult to predict whether the targets will ultimately be achieved, some SDGs (11 and 13) may continue to progress more rapidly than others (3 and 7) given their current rates of improvement (see Figure 4).



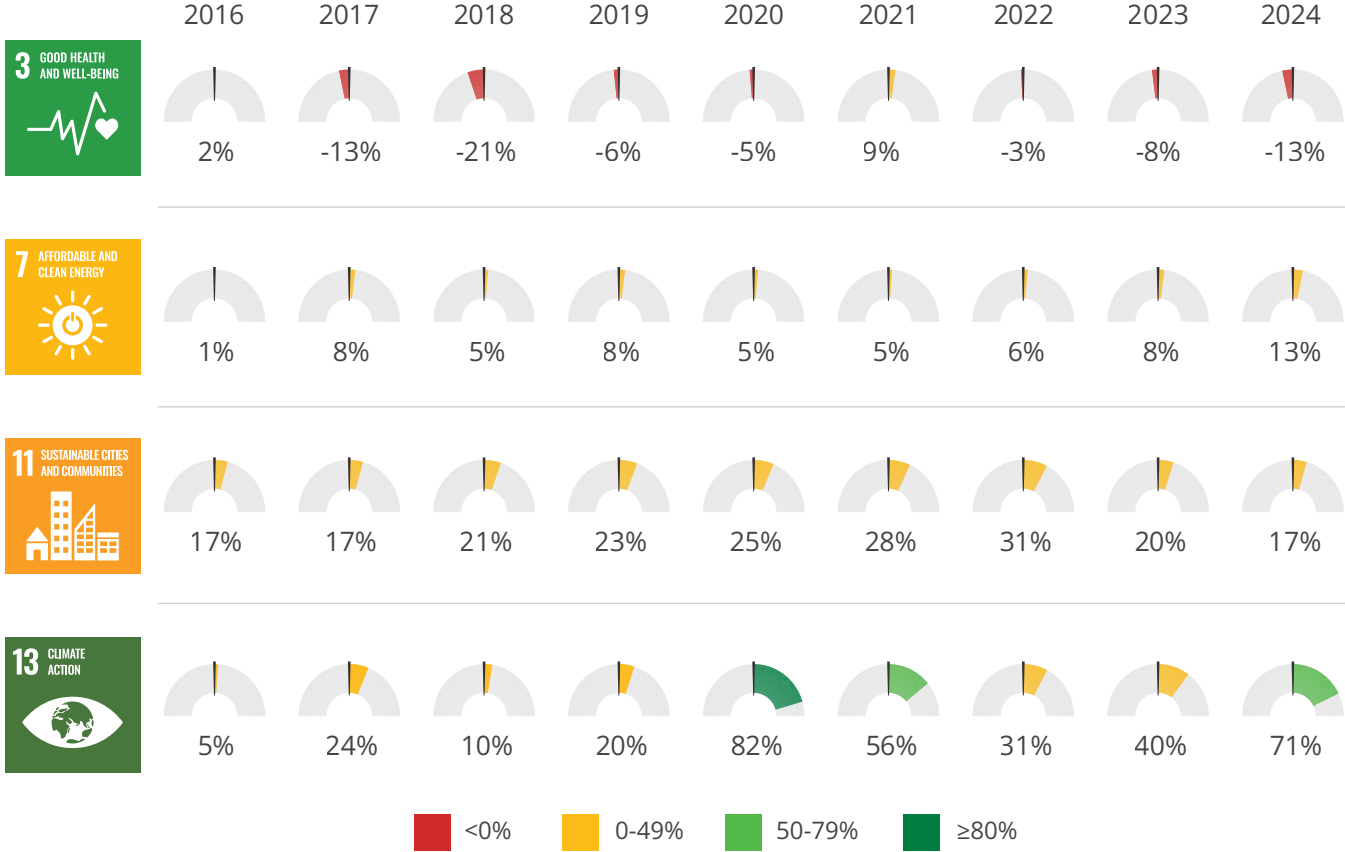
**Figure 4: London’s progress toward its own 2030 targets between 2015–2024.** Since 2015 is treated as the baseline, it is excluded from the graph. Each gauge shows the SDG progress score for that year. Shading to the right of the black zero line indicates progress toward the target; shading to the left indicates movement away from the target. A larger shaded area means a larger change from the 2015 baseline. Colors indicate score ranges: red for < 0%, yellow for 0–49%, light green for 50–79%, and dark green for ≥ 80%.

London has the fewest city-level targets of any of the cities in this analysis with city benchmarks available for nine indicators, making performance on each crucial. The city’s comparatively lower progress toward some benchmarks partly reflects the ambitious nature of its locally defined targets. Out of nine indicators, three are more ambitious than the corresponding UN benchmarks, while one is less ambitious, two are the same, and three are non-comparable with the UN benchmark levels. In particular, London’s benchmark for suicide mortality (3.4.2) aims to achieve zero suicides by 2030, whereas the corresponding UN benchmark calls for a one-third reduction in deaths relative to 2015 levels. Similarly, London aims to achieve net-zero emissions by 2030 (13.2.2), while the UN benchmark requires emissions reductions of 7.6% annually between 2020 and 2030. The one indicator with a lower level of ambition is average annual PM2.5 concentration (11.6.2), with London targeting the WHO’s guideline of 10 µg/m<sup>3</sup> while the UN benchmark is 5 µg/m<sup>3</sup>. See SI Table 7 and SI Figures 13-16 for more details.

## 4.2. New York City

In contrast with its performance against UN targets, New York City exhibits mixed results on its own benchmarks, revealing their stringency. Though scores increased from 1-13% on SDG 7 (an average

increase of 1.33% points per year), and 5-71% on SDG 13 (7.33% points per year) over the study period, scores decreased from 2 to -13% on SDG 3 (-1.67% points per year), and both started and ended at 17% for SDG 11, though performance improved in the middle of the study period. Although the city has not yet achieved any of its 2030 targets, four years remain until the target year. While it is difficult to predict whether the targets will ultimately be achieved, some SDGs (7 and 13) may continue to progress more rapidly than others (3 and 11) given their current rates of improvement (see Figure 5).



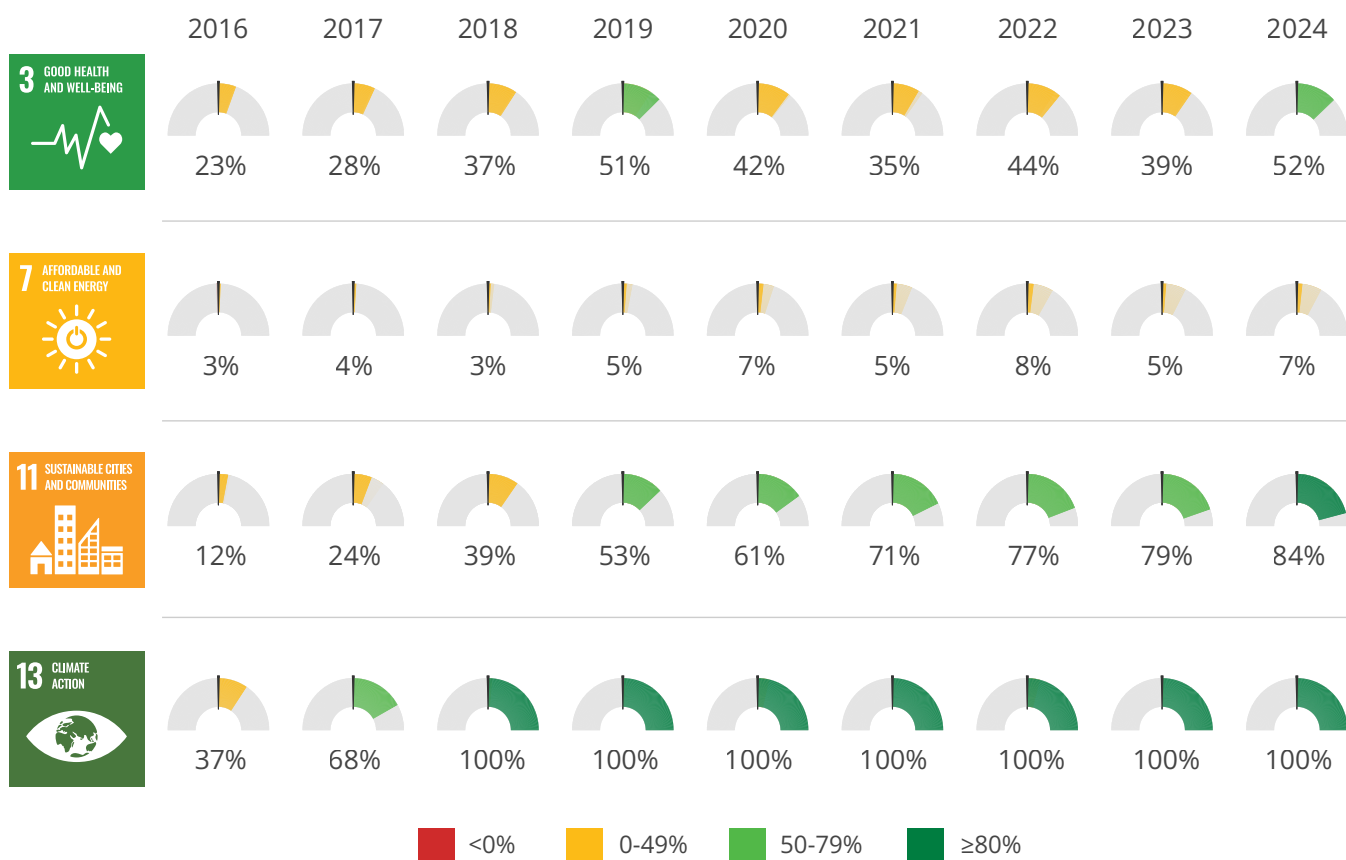
**Figure 5: New York City's progress toward its own 2030 targets between 2015–2024.** Since 2015 is treated as the baseline, it is excluded from the graph. Shading to the right of the black zero line indicates progress toward the target; shading to the left indicates movement away from the target. A larger shaded area means a larger change from the 2015 baseline. Colors indicate score ranges: red for < 0%, yellow for 0–49%, light green for 50–79%, and dark green for ≥ 80%.

New York City showed lower levels of progress toward its own targets than it did against UN benchmarks. This is despite the fact that out of 13 indicators included for New York City, two are more ambitious than the corresponding UN benchmarks, while eight are less ambitious, and three are non-comparable with the UN benchmark levels. New York City established more ambitious targets than the UN for two indicators, targeting zero new TB cases (3.3.2) (the UN targets an 80% reduction compared with 2015 levels) and aiming to end homelessness (11.1.1) by 2026, four years before the UN's benchmark. Indicators for maternal mortality (3.1.1), new HIV diagnoses (3.3.1), new HBV cases (3.3.4), non-communicable disease (3.4.1), suicide mortality (3.4.2), air quality (11.6.2), climate action plan (13.2.1), and GHG emissions (13.2.2) have less aggressive 2030 benchmarks. However, for some of these indicators, such as heart disease mortality and diabetes mortality, though New York

City's targets are technically less ambitious than corresponding UN benchmarks, the city's baseline performance is already high above the global average. Over the study period, New York City's health performance declined, driven primarily by its high and worsening maternal mortality rate among Black women (3.1.1). Though New York City's maternal mortality rate across all races meets UN targets, the city's maternal mortality rate among Black women in 2024 was more than double the benchmark. Given that New York City's health targets exist in response to existing disparities, their outcomes are worse than those set more broadly, as in the case of UN benchmarks. See Section 6 for more details. New York City continues to make slow progress on SDG 7, but has lower performance by 2024 as the city does not have targets for either the electricity access (7.1.1) or energy efficiency (7.3.1) indicators, both of which perform strongly. For SDG 13, New York City's uneven results display the emissions dip and recovery associated with COVID-19 shutdowns, as GHG emissions (13.2.2) are the only indicator analyzed. See SI Table 8 for more details.

### 4.3. Shanghai

Across all four SDGs, Shanghai improved its scores between 2015 and 2024, relative to its own benchmarks. Scores increased from 23-52% on SDG 3 (an average increase of 3.22% points per year), 3-7% on SDG 7 (.44% points per year), 12-84% on SDG 11 (8% points per year), and 37-100% on SDG 13 (7% points per year) over the study period. Shanghai attained its climate action target in 2018, and is on track to meet its SDG 11 target by 2030, though significant improvement is needed among SDG 7 indicators in anticipation of 2030 (see Figure 6).



**Figure 6: Shanghai's progress toward its own 2030 targets between 2015–2024.** Since 2015 is treated as the baseline, it is excluded from the graph. Shading to the right of the black zero line indicates progress toward the target; shading to the left indicates movement away from the target. A larger shaded area means a larger change from the 2015 baseline. Colors indicate score ranges: red for < 0%, yellow for 0–49%, light green for 50–79%, and dark green for ≥ 80%.

Shanghai performed better against its own benchmarks than UN benchmarks on all SDGs, with the exception of SDG 7. Out of 14 indicators, four are more ambitious than the corresponding UN benchmarks, while six are less ambitious, one is the same, and three are non-comparable with the UN benchmark levels. Shanghai established more ambitious targets than the UN for four indicators, including maternal mortality (3.1.1), under-five mortality (3.2.1), and neonatal mortality (3.2.2), as well as renewable energy share of final energy consumption (7.2.1). Indicators for new HIV diagnoses (3.3.1), new TB cases (3.3.2), out-of-pocket healthcare expenditures (3.8.2), air quality (11.6.2), climate action plan (13.2.1), and GHG emissions (13.2.2) have less aggressive 2030 benchmarks. However, for some of these indicators, such as new TB cases (3.3.2), Shanghai is well below the global average; though Shanghai's target of 18 new cases per 100,000 is less ambitious than the UN goal of total elimination, Shanghai's baseline rate of 27.26 per 100,000 is already low.

As Shanghai has long had universal electricity access (7.1.1), and given its lack of an energy efficiency target (7.3.1), this score is based solely on its renewable energy share of final energy (7.2.1); city performance on SDG 7 is calculated using only one indicator, and does not include two high-performing indicators for which the city has no target, resulting in a lower aggregate score. However, overall, when considering sustainability through the lens of Shanghai's priorities, it achieved considerable

progress toward its goals over the past ten years. The city increased green space per capita (11.7.1) and household recycling (11.6.1) while lowering average PM2.5 concentrations (11.6.2) from 53 ug/m<sup>3</sup> to 28 ug/m<sup>3</sup>, resulting in strong SDG 11 performance. See SI Table 9 for more details. Shanghai also successfully met its goal of reducing carbon emissions per unit of GDP (13.2.2) by 70% compared with 2005 levels, thus meeting its 2030 SDG 13 benchmark. However, the discrepancy between UN and city-defined goals is evident within this indicator, given the difference in 2024 attainment, which reaches 3% and 100%, respectively.

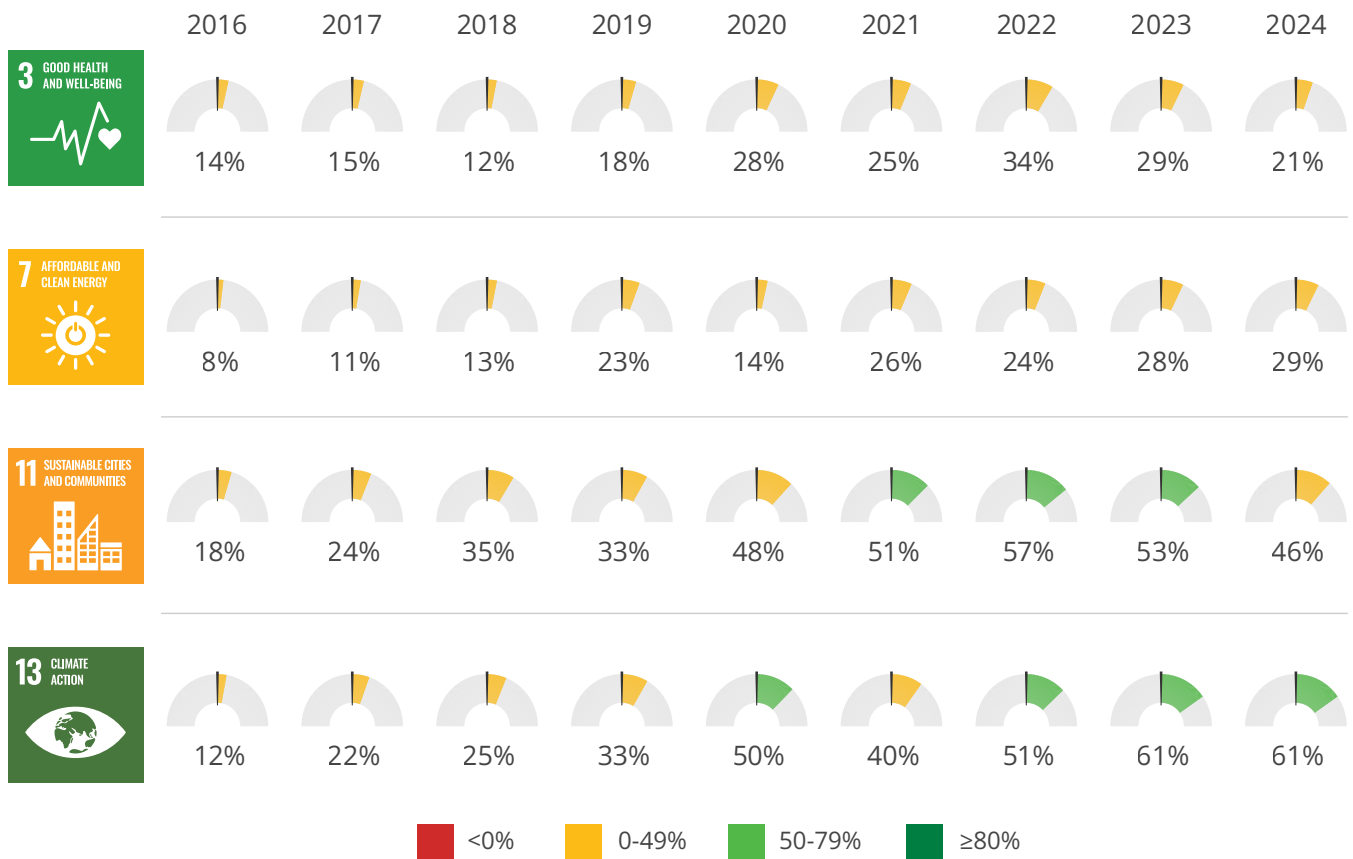
## 5. City Performance Against National Benchmarks

### Overall performance

- In addition to the prior two benchmarks, this study considers city performance compared with national-level benchmarks to better understand how cities can contribute to national sustainability through the lens of SDGs.
- Countries are more uniform than cities in their target coverage—the United Kingdom has 15 targets, the United States has 16 targets, and China has 17 targets that overlap with UN SDG indicators.
- Over the study period, cities generally improved upon their performance against national benchmarks, with London and Shanghai performing well on SDG 7 and 13, driven by indicator 7.2.1 on renewable energy share. In contrast, New York City improved on SDG 11 but declined on other SDGs.
- Compared with UN and city-level benchmarks, London and Shanghai perform well against national targets, while New York City exhibits mixed results. In many cases, cities perform well toward national targets, given their relative wealth and resource access compared with other parts of their country.

### 5.1. London

Across all four SDGs, London improved its scores between 2015 and 2024, relative to the UK's benchmarks. Scores increased from 14-21% on SDG 3 (an average increase of .78% points per year), 18-73% on SDG 7 (6.11% points per year), 18-46% on SDG 11 (3.11% points per year), and 12-61% on SDG 13 (5.44% points per year) over the study period. Although the city has not yet achieved any of its national 2030 targets, four years remain until the target year. While it is difficult to predict whether the targets will ultimately be achieved, some SDGs (7, 11, and 13) may continue to progress more rapidly than others (3) given their current rates of improvement (see Figure 7).



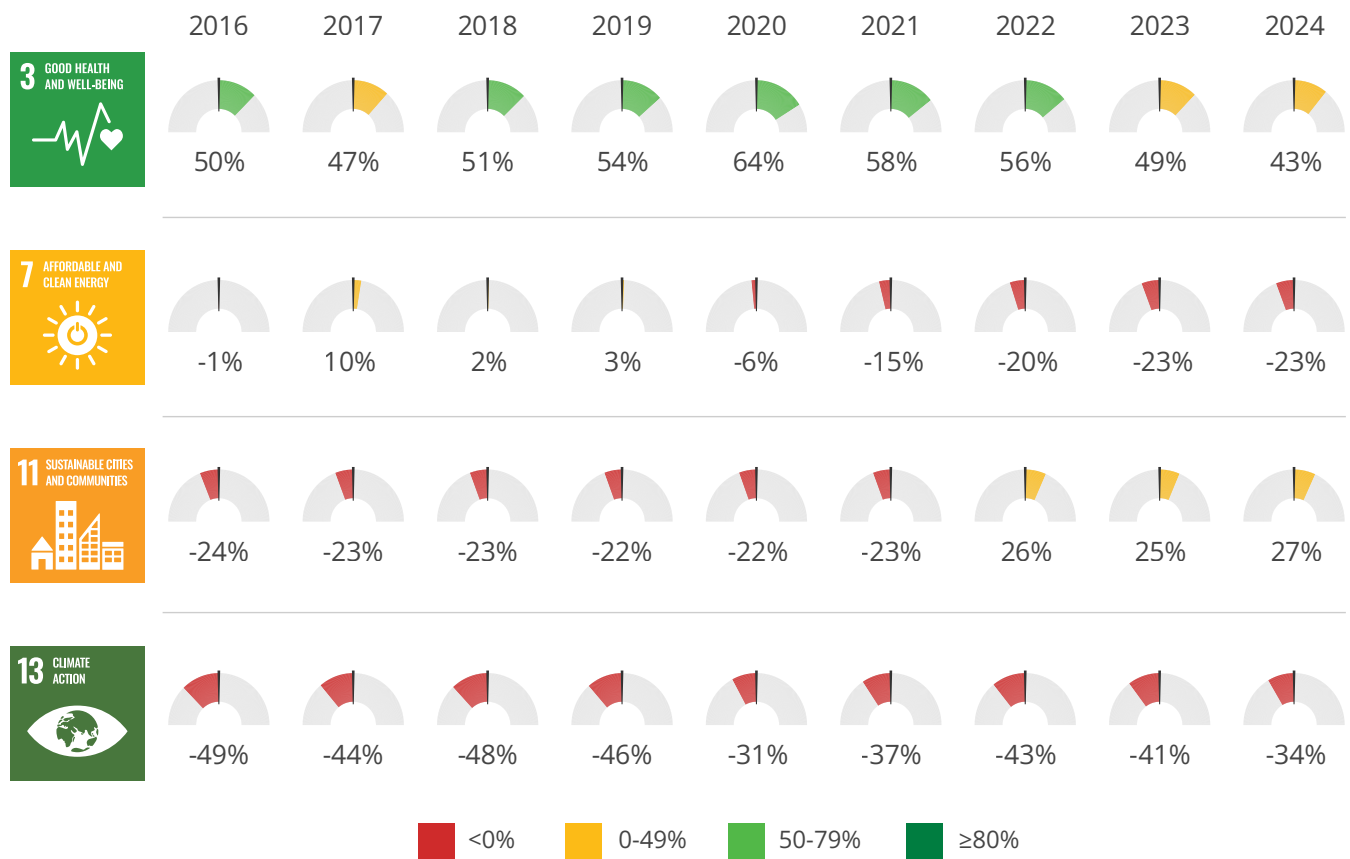
**Figure 7: London's progress toward the United Kingdom's 2030 targets between 2015–2024.** Since 2015 is treated as the baseline, it is excluded from the graph. Shading to the right of the black zero line indicates progress toward the target; shading to the left indicates movement away from the target. A larger shaded area means a larger change from the 2015 baseline. Colors indicate score ranges: red for < 0%, yellow for 0–49%, light green for 50–79%, and dark green for ≥ 80%.

In general, London performs better against UK benchmarks than its own targets or UN targets. One exception is SDG 3, as the UK has set very ambitious health targets, such as the initiative to end new transmission of HIV by 2030 (3.3.1). Within SDG 3, alcohol consumption (3.5.2) in particular drags down London's performance; the city has the highest per capita alcohol consumption rate of the three cities of analysis, a consumption rate that is still rising following COVID-19. London performs well on SDGs 7 and 13, signs of commitment to climate mitigation—improvements within SDG 7 are driven by indicator 7.2.1 on renewable energy consumption, where London's high performance helps to support the national goal of 100% clean electricity by 2030. The UK's increased share of renewables, especially offshore wind, is complemented by coal plant retirements during the study period, including the total phaseout of coal in the UK in 2024. Improvements across the energy sector helped reduce emissions (13.2.2) during the study period in support of SDG 13, which showed consistent progress toward national goals. See SI Table 10 for more details.

## 5.2. New York City

Using national benchmarks that were set during the Biden Administration, SDG scores between 2015–2024 in New York City were mixed. Scores increased from -24-27% on SDG 11 (an average

increase of 5.67% points per year), and -49 to -34% on SDG 13 (1.67% points per year) over the study period. Further, scores decreased from 38-31% on SDG 3 (-0.78% points per year) and from -1 to -23% on SDG 7 (-2.44% points per year). Although the city has not yet achieved any of its national 2030 targets, four years remain until the target year. While it is difficult to predict whether the targets will ultimately be achieved, some SDGs (11) may continue to progress more rapidly than others (3, 7, and 13) given their current rates of improvement (see Figure 8).



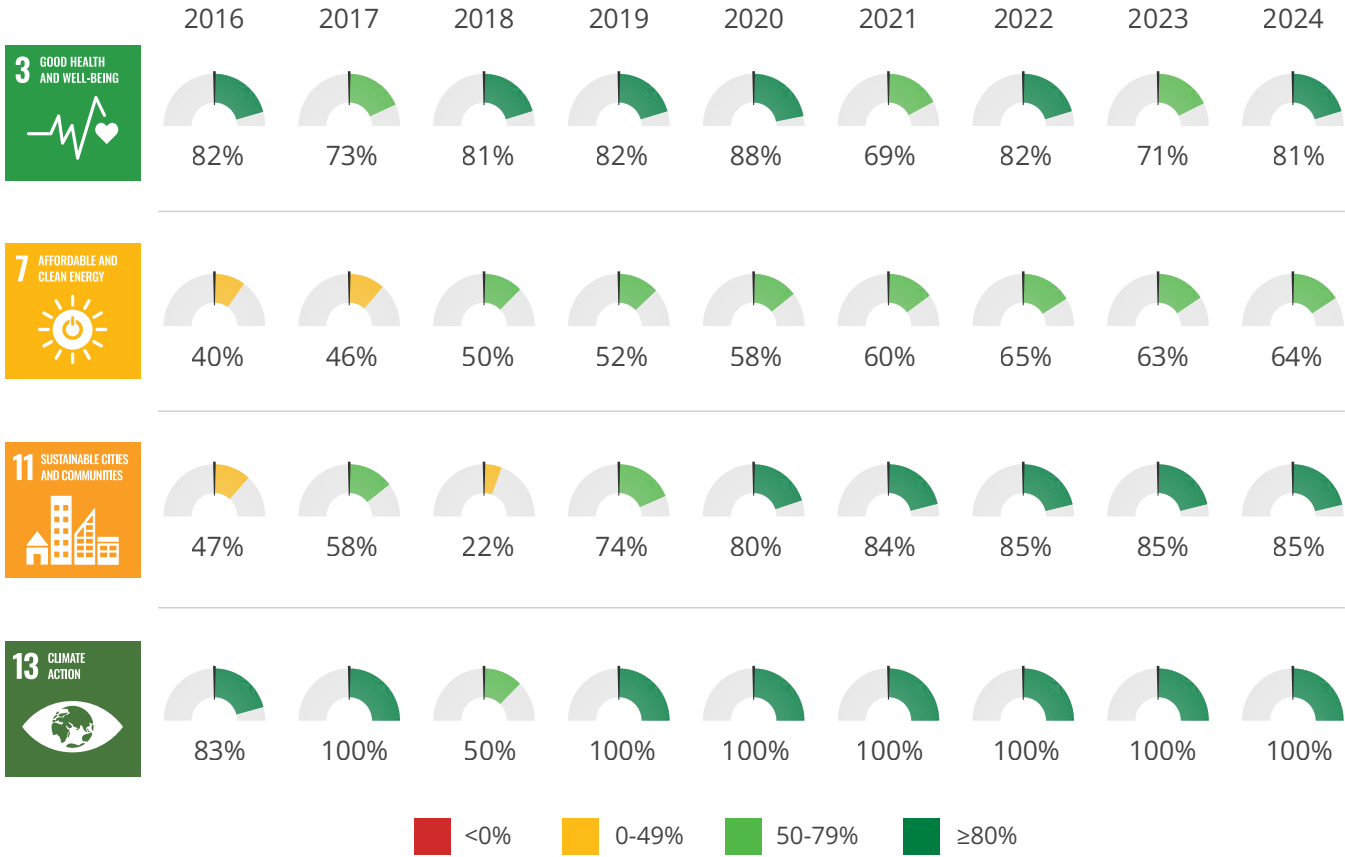
**Figure 8: New York City's progress toward the United States' 2030 targets between 2015–2024.** Since 2015 is treated as the baseline, it is excluded from the graph. Shading to the right of the black zero line indicates progress toward the target; shading to the left indicates movement away from the target. A larger shaded area means a larger change from the 2015 baseline. Colors indicate score ranges: red for < 0%, yellow for 0–49%, light green for 50–79%, and dark green for ≥ 80%.

Overall, New York City made negligible progress toward U.S. 2030 benchmarks. See SI Table 11 and SI Figures 17-20 for more details. New York City performs better on U.S. targets than their own targets for health, given the city's consistently low under-five mortality rate (3.2.1) and lower suicide mortality (3.4.2) than the United States nationally. However, New York City performed worse on SDG 13 under U.S. targets, given the stronger GHG reduction target (13.2.2) at the federal level. New York City's progress was further hindered by the nationally defined target for indicator 7.2.1 under SDG 7, which includes not only renewables, but all clean technology, as the United States set the goal of reaching 100% clean electricity by 2030 under the Biden Administration. However, though the city increased overall renewable capacity, New York City's clean electricity share dropped over the study period due to nuclear retirements and expanded gas generation.<sup>23</sup> Compared with UN benchmarks,

New York City performs worse on U.S. targets—with the exception of SDG 11—due to generally more ambitious national targets.

### 5.3. Shanghai

Across most of the SDGs, Shanghai improved its scores between 2015 and 2024 relative to national benchmarks, attaining China’s SDG 13 target. Scores increased from 40-64% on SDG 7 (an average increase of 2.67% points per year), 47-85% on SDG 11 (4.22% points per year), and 83-100% on SDG 13 (1.88% points per year) over the study period (see Figure 9). Shanghai’s SDG 3 score declined subtly, from 82-81% (-0.11% points per year). Although the city has not yet achieved any of the national 2030 targets, four years remain until the target year. While it is difficult to predict whether the targets will ultimately be achieved, some SDGs (7 and 11) may continue to progress more rapidly than others (3 and 13) given their current rates of improvement.



**Figure 9: Shanghai’s progress toward China’s 2030 targets between 2015–2024.** Since 2015 is treated as the baseline, it is excluded from the graph. Shading to the right of the black zero line indicates progress toward the target; shading to the left indicates movement away from the target. A larger shaded area means a larger change from the 2015 baseline. Colors indicate score ranges: red for < 0%, yellow for 0–49%, light green for 50–79%, and dark green for ≥ 80%.

Shanghai performs better against China’s goals than its own goals, particularly for SDGs 3 and 7, given relative benchmark stringency. SDG 7 is also boosted by the inclusion of a national electricity access goal (7.1.1), which Shanghai meets across the study period. See SI Table 12. Additionally, when

considering national goals, Shanghai outperformed itself on all UN benchmarks, particularly for SDG 13 on climate action. However, the emissions reduction target (13.2.2) articulated by China is weaker than that set by the UN: China's goal only covers carbon dioxide emissions as a percent of GDP, while the UN target calls for steep annual emissions reductions across all gases from 2020–2030.

## 6. Comparing Performance and Targets Across Levels of Governance

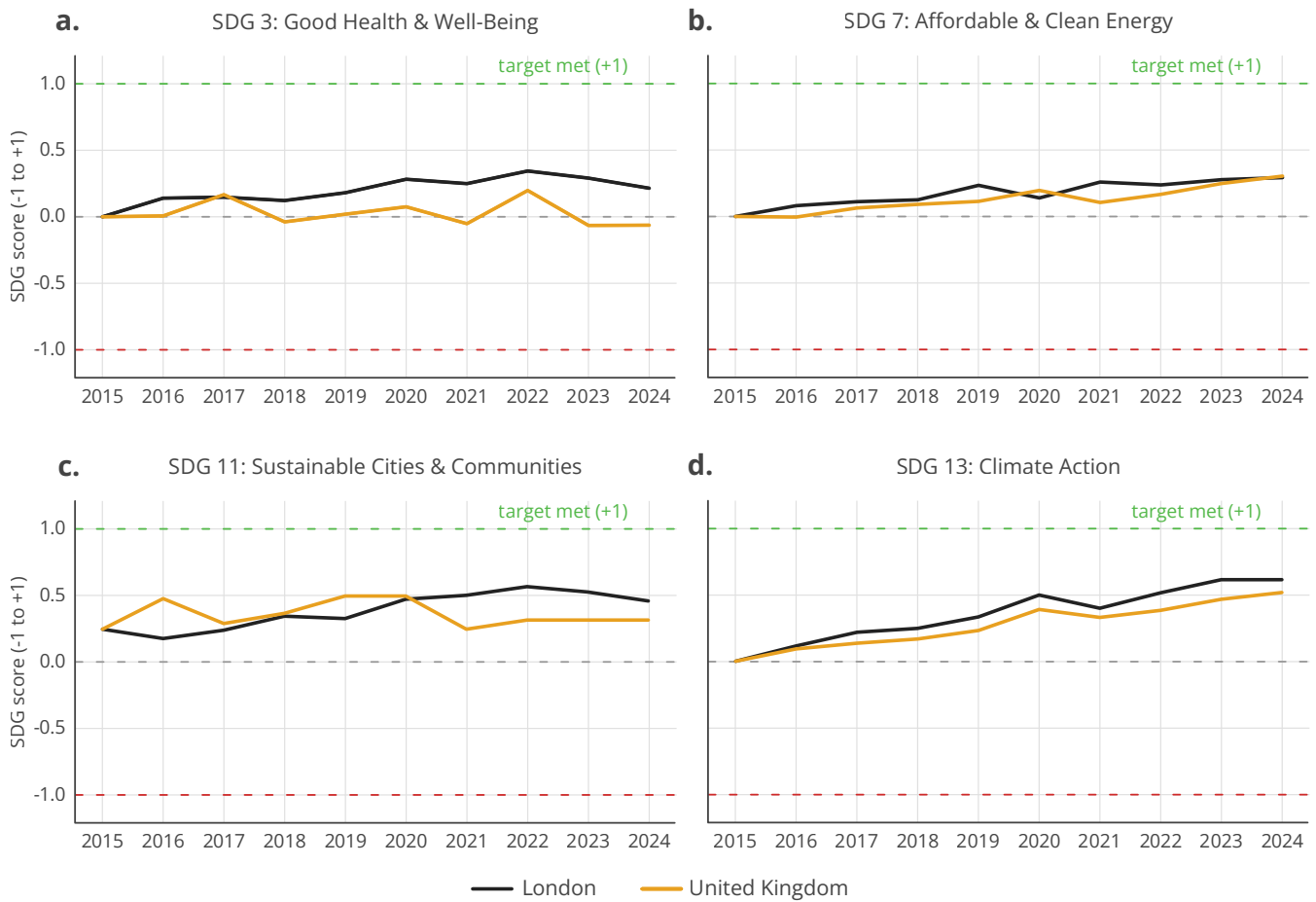
### 6.1. Comparing City and National Performance on National Targets

Overall, cities outperform their national counterparts on national goals when considering aggregate SDG scores. By 2024, London's SDG attainment across all benchmarks surpasses that of the United Kingdom. Across the study period, New York City outperforms the United States on SDG 3, and also surpasses U.S. outcomes on SDGs 11 and 13 by 2024. However, New York City's declining SDG 7 score stands in contrast to the U.S.'s stable score, neither of which are near 2030 benchmark attainment. In Shanghai, the trend of cities leading in SDG attainment is most apparent: Shanghai leads China on SDG performance for SDGs 3, 7, and 11, and meets China's full benchmark attainment of SDG 13 by 2019.

#### 6.1.1. Comparing London and United Kingdom Performance on National Targets

London and the United Kingdom perform similarly across most SDG 3 indicators, though city-level outcomes are on aggregate better than national outcomes (see Figure 10a). Metrics on neonatal mortality (3.2.2), under-five mortality (3.2.1), new HIV diagnoses (3.3.1), new TB cases (3.3.2), and new HBV rates (3.3.4) hover between 0.0-0.5, largely improving over the study period. However, both London and the United Kingdom face increasingly high rates of alcohol consumption (3.5.2) and non-communicable disease mortality (3.4.1), and the United Kingdom faces a dramatic rise in suicide rates (3.4.2) even as London has reduced suicides. On SDG 7, both London and the United Kingdom show progress toward their nationally established clean energy targets (7.2.1). Since SDG 7 is represented by a single indicator, the aggregate SDG score mirrors the indicator-level trend exactly (Figure 10b). London and the UK's increasing scores reflect coal retirements and increasing shares of offshore wind, aiding in citywide and national clean energy transitions.

London and the United Kingdom have mixed results on SDG 11, both with regards to overall performance and city versus national success (see Figure 10c). The national and city-level overall SDG scores hovered around .5 for the study period, with London outperforming the United Kingdom by 2024. Both the United Kingdom and London exceeded the waste management goal (11.6.1) throughout the study period, and improved air quality performance (11.6.2) to meet air quality targets by 2019 and 2020, respectively. However, both the city and the nation struggled with increased homelessness (11.1.1) following COVID-19; the UK's score dropped and never recovered. On SDG 13, London slightly outperforms the United Kingdom through the whole study period (Figure 10d). The United Kingdom established a target for only one indicator, 13.2.2 on GHG reductions, on which London reaches a score of 0.61 by 2024, while the United Kingdom lags slightly, reaching 0.52 on the target of net-zero by 2050. See SI Figure 21 for indicator-level details.



**Figure 10: London and UK performance comparison on national targets. a.** SDG 3: Health & Well-being. **b.** SDG 7: Affordable & Clean Energy **c.** SDG 11: Sustainable Cities & Communities **d.** SDG 13: Climate Action

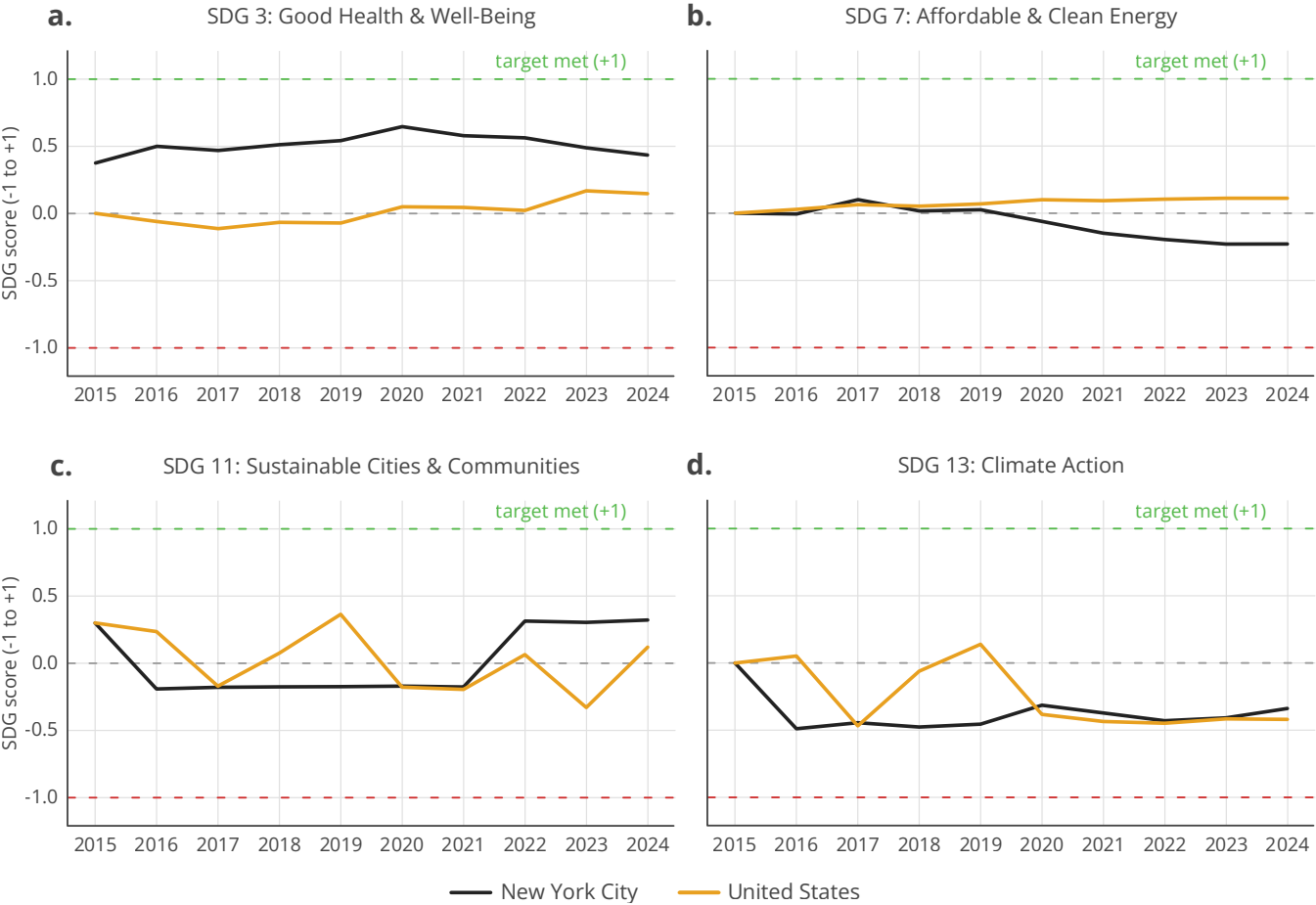
### 6.1.2. Comparing New York City and United States Performance on National Targets

New York City outperforms the United States on SDG 3 across most indicators (see Figure 11a). New York City’s aggregate score (0.4–0.6) is consistently well above the U.S. national score (~0.0–0.15). By 2024, New York City attained the national benchmarks for under-five mortality (3.2.1), suicide mortality (3.4.2), and health insurance coverage (3.8.1), while the U.S. national scores on these indicators remain volatile and well-below target. The U.S.’s maternal mortality (3.1.1) score also declined between 2018–2022. The only exceptions to this trend exist among the indicators for new TB cases (3.3.2) and HBV incidence (3.3.4), where national-level progress has outpaced New York City’s progress.

On SDG 7, the United States outperforms New York City throughout the study period (Figure 11b). The U.S. national score shows modest but consistent improvement, reaching approximately 0.15 by 2024, while New York City’s score declines steadily from 2017 onward, reaching approximately –0.25 by 2024. Since SDG 7 is represented by a single indicator, clean electricity share (7.2.1), the aggregate SDG score mirrors the indicator-level trend exactly. New York City’s declining score reflects a structural shift in its electricity grid mix: the phased closure of nuclear generating stations removed a major source of zero-carbon baseload power. This source was largely replaced by natural gas rather than renewables, causing the city’s clean electricity share to fall further behind the national target over the study period.

New York City and the United States exhibit mixed results on SDG 11 (Figure 11c). While the U.S. national score generally outpaced New York City for the majority of the study period, the city converged with the national average by 2024. Both geographies faced substantial challenges regarding natural disaster mortality (11.5.1) and economic loss indicators (11.5.2), with performance frequently regressing to the maximum level of -1. Notably, New York City demonstrated superior performance in air quality (11.6.2), consistently meeting PM2.5 benchmarks, whereas national performance remained highly volatile. Progress on solid waste management (11.6.1) was marginal for both, with New York City maintaining a slight lead.

On SDG 13, New York City marginally outperforms the United States by the end of the study period, driven primarily by stronger progress on GHG emissions reduction (13.2.2), where the city's score reaches approximately 0.3 by 2024 compared to the U.S. national score of 0.2. Both geographies remain far from their climate targets, and disaster mortality (13.1.1) remains volatile and largely at maximum regression for both (Figure 11d). See SI Figure 22 for indicator-level details.



**Figure 11: New York City and United States performance comparison on national targets. a.** SDG 3: Health & Well-being. **b.** SDG 7: Affordable & Clean Energy **c.** SDG 11: Sustainable Cities & Communities **d.** SDG 13: Climate Action

**6.1.3 Comparing Shanghai and China Performance on National Targets**

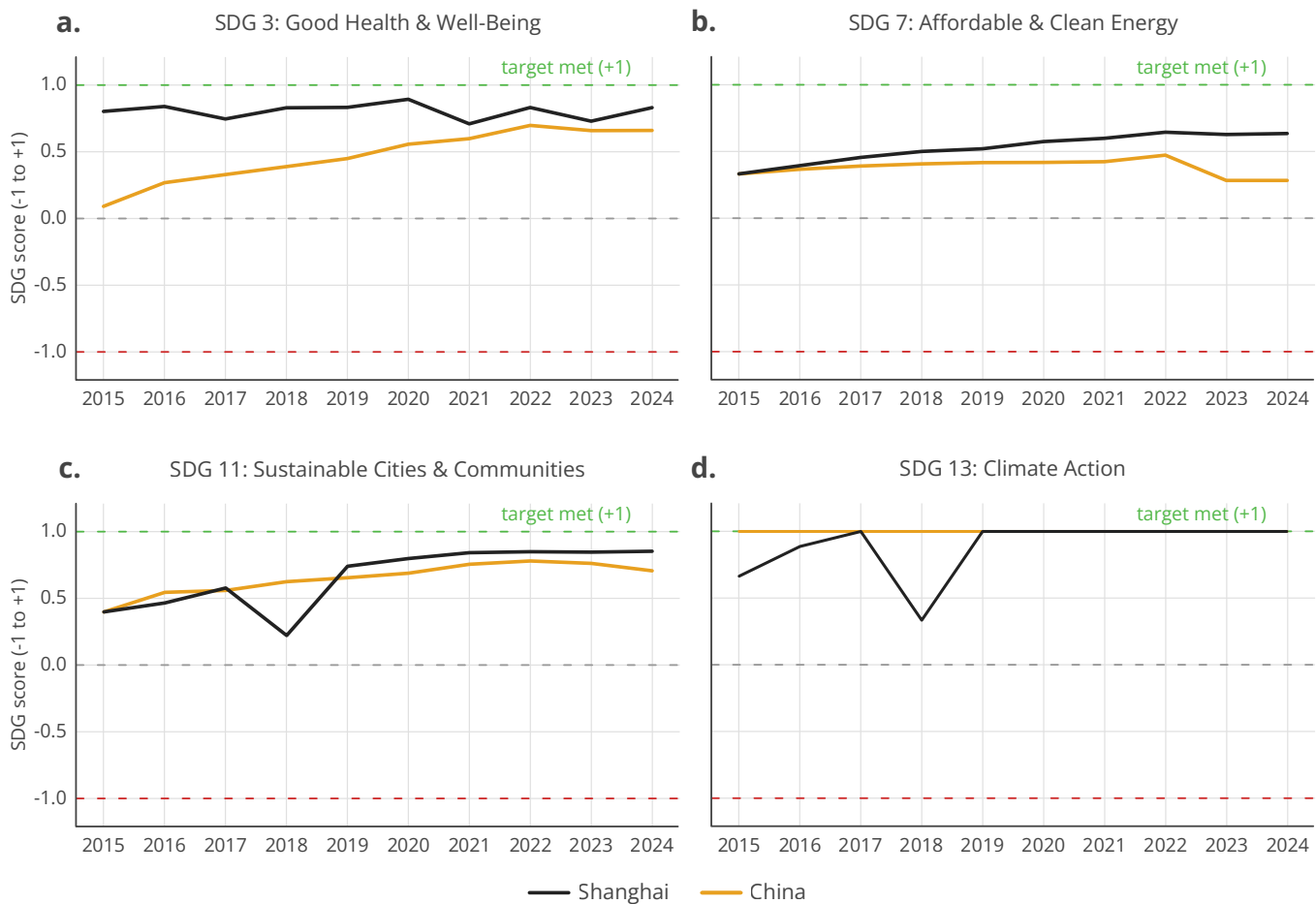
Shanghai outperforms China on SDG 3 across most indicators (see Figure 12a). Shanghai’s aggregate score (0.79–0.81) is consistently well above the Chinese national score (0.07–0.64), though China

begins to catch up after 2020. Notably, throughout the whole study period, Shanghai has fully met targets for maternal mortality (3.1.1), neonatal mortality (3.2.2), under-five mortality (3.2.1), new TB cases (3.3.2), and out-of-pocket healthcare costs (3.8.2). Nearly all national indicators improve over the study period, meeting targets in the case of neonatal mortality (3.2.2) and under-five mortality (3.2.1).

Shanghai and China exhibit mixed results on SDG 7 (Figure 12b). The Chinese national score remains consistent throughout the study period, hovering around 0.5 before dropping in 2023, while the local score in Shanghai grows steadily between 2015–2024, reaching 0.64. China's declines are driven by its poor energy efficiency score (7.3.1), an indicator on which Shanghai outperforms them by 1.15. In contrast, China has a slightly higher score on the share of final energy derived from renewables (7.2.1). Both at the country and city-level, the electricity access target (7.1.1) is met across the study period.

On SDG 11, Shanghai outperforms China throughout most of the study period, excluding a one-year dip in 2018 following tropical storms Ampil and Rumbia. With the exception of national disaster mortality and impacts (11.5.1), Shanghai demonstrated superior performance on all other indicators, including waste management (11.6.1), air quality (11.6.2), and green space (11.7.1), reaching all of these indicators' 2030 benchmarks by the end of the study period. Though performing below Shanghai, China improves across all of these indicators, rising from a 2015 score of 0 to reach an aggregate SDG score of 0.51 by 2024 (Figure 12c).

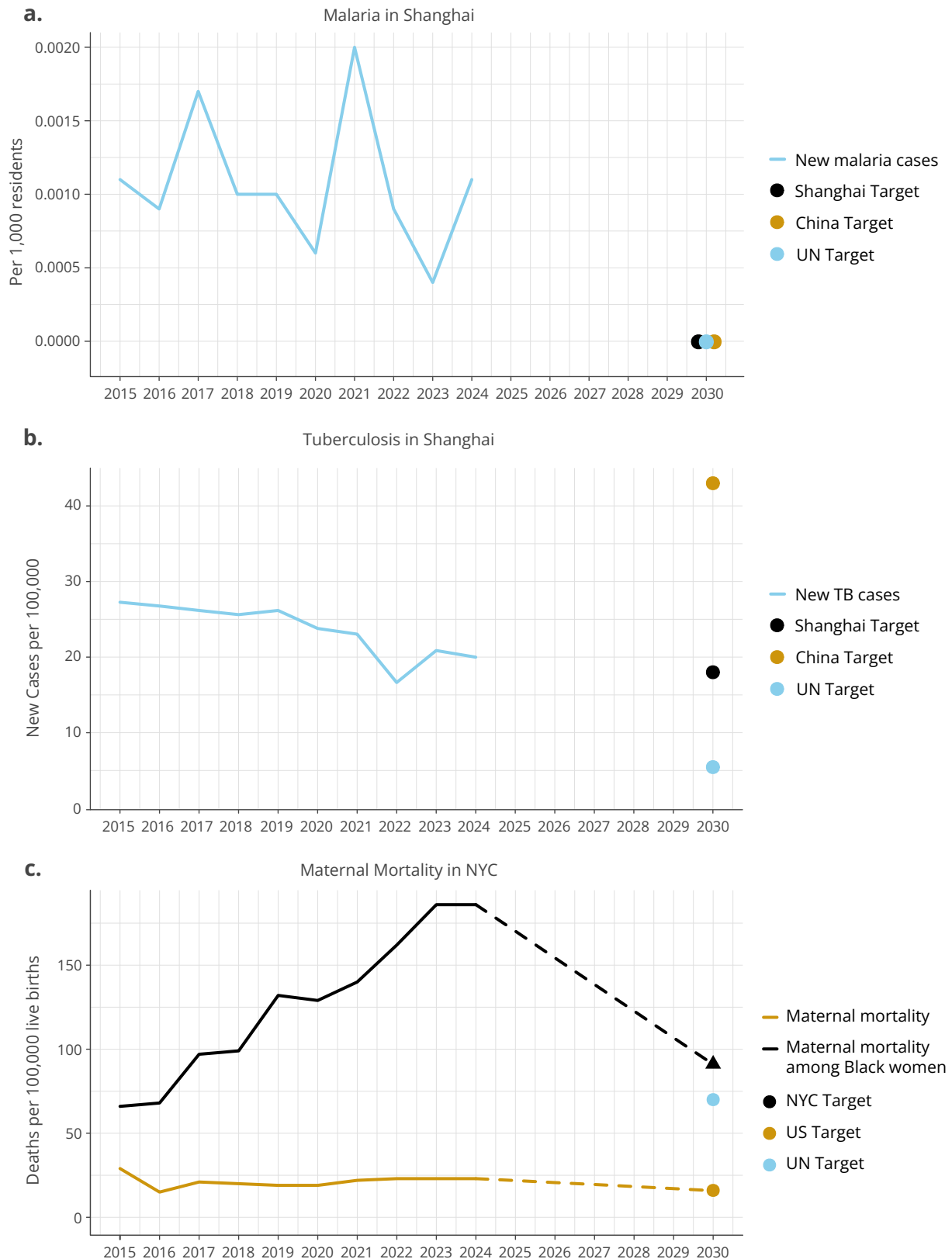
On SDG 13, China outperforms Shanghai, as the country has already reached the SDG target in 2015 (Figure 12d). Shanghai catches up in 2017, falling for one year before consistently meeting the target in 2019. Only two indicators are used in SDG calculation: natural disaster death and impacts (13.1.1) and carbon dioxide emissions per GDP (13.2.2). Shanghai's outcomes for natural disaster deaths and impacts have improved following intense tropical cyclones in 2018, and its growing GDP has helped reduce its carbon intensity. See SI Figure 23 for indicator-level details.



**Figure 12: Shanghai and China performance comparison on national targets. a.** SDG 3: Health & Well-being. **b.** SDG 7: Affordable & Clean Energy **c.** SDG 11: Sustainable Cities & Communities **d.** SDG 13: Climate Action

## 6.2. Target Stringency Across Levels of Governance

City performance varies by level of governance—international, national, or city-level— due to the sometimes differing nature of benchmarks and indicator definitions. Only two indicators have the same indicator definition and 2030 targets across levels of analysis: indicator 3.3.3 on malaria incidence in Shanghai and indicator 3.3.1 on new HIV diagnoses in London (see Figure 13a). For the former indicator, the city, country, and the United Nations each define the indicators in terms of new malaria cases per 1,000 people, while targeting zero new cases by 2030. In other cases, the indicator definition is the same across all levels of governance, but the 2030 benchmarks differ; though the city, country, and United Nations all have the same indicator definition of new tuberculosis cases per 100,000, for example, each level of governance has a different target, at 18, 43, and zero cases per 100,000, respectively (Figure 13b). Across cities and levels of governance, this type of target discrepancy is most common, encompassing 17 indicators, including suicide mortality (3.4.2) in New York City, air quality (11.6.2) in London, and neonatal mortality (3.2.2) in Shanghai. A total of 11 indicators have city, national, and UN targets, but the indicator definitions and 2030 benchmarks differ in each context (Figure 13c). Benchmark stringency varies greatly by level of governance, and cities often have stronger goals than their national counterparts, impacting aggregate SDG scores. See SI Figures 24-27 for benchmark comparisons across all relevant indicators.



**Figure 13: Differences in benchmark stringency and indicator definitions.** **a.** Same 2030 benchmark goal and same indicator definition, seen for indicator 3.3.3 on malaria in Shanghai **b.** Different 2030 benchmark goal and same indicator definition, seen for indicator 3.3.2 on tuberculosis in Shanghai **c.** Different 2030 benchmark goal and different indicator definition, seen for indicator 3.1.1 on maternal mortality in New York City

## 7. Case Studies

As cities work toward achieving the SDGs, translating global targets into localized, actionable strategies remains a critical implementation step. The following case studies illustrate how London, New York City, and Shanghai are operationalizing progress across three areas: flood resilience, congestion management, and green building initiatives.

By strengthening their flood resilience, cities can mitigate mortalities and economic losses due to natural disasters (Indicators 11.5.1 and 11.5.2), while also improving public health outcomes through better disaster-related disease prevention and response (SDG 3). Meanwhile, congestion management can reduce GHG emissions and mitigate particulate matter and other air quality concerns coming from the transportation sector (Indicators 13.2.2 and 11.6.2). Finally, the transition to green buildings can advance adequate and sustainable housing, circular waste management, and renewable energy integration (Indicators 11.1.1, 11.6.1, and 7.2.1), along with reducing GHG emissions from the buildings sector (Indicator 13.2.2). Together, these case studies demonstrate that cities are driving sustainable development forward within their urban contexts, helping to further national and international goals.

### 7.1. Flood Resilience

As climate change causes sea levels to rise while increasing the frequency and intensity of storms, urbanization has often exacerbated inefficient land use practices and increased construction of impermeable infrastructure, leading to surface water flooding. These elements of climate change and urbanization intersect within urban areas, amplifying flood risks for many city populations. Floods have become a frequent and expensive challenge for cities, causing significant economic and social losses.<sup>24</sup> Flood resilience is, therefore, a critical concept for cities to integrate into their urban planning and hazard mitigation efforts. Flood resilience in the urban context encompasses the ability of a city to cope with disturbances and hazards related to flooding, as well as its ability to recover and adapt in a timely and efficient manner.<sup>25</sup>

Developing proactive approaches to bolster urban flood resilience is critical as many cities face increased risks of flooding. Traditional flood solutions can include dikes, levees, and seawalls, typically known as grey infrastructure. Flood management practices can also incorporate natural elements, like wetland restoration, reef and mangrove restoration, and green urban retention areas, or implement low-impact development to provide co-benefits. These approaches contribute directly to a city's sustainability because they can limit the negative impacts of flooding on jobs, livelihoods, and infrastructure while delivering co-benefits such as better air and water quality and reduced emissions.

#### 7.1.1. London

The city of London, England, is located on the Thames River, a tidal river that has posed the greatest flood risk to the city. London has faced flood risks from the Thames throughout its history,<sup>26</sup> and the need for defenses against the river's highest tide levels is well understood. However, as the impacts of climate change become more apparent, London faces increased flood risk not only from rising sea levels but also from increasing frequency and intensity of rainfall. During the summer of 2021, London experienced two flash floods from extreme heavy rain—twice the average July rainfall—within a span of two hours. The heavy rains caused damage to infrastructure and displaced residents as homes and businesses flooded. Flood risk due to rainfall is exacerbated by London's impermeable surfaces and older drainage system, which is still largely based on the original Victorian network.<sup>27</sup> With limits

to drainage capacity, there is increased health and safety risk from combined sewer overflows with a system that manages both stormwater runoff and wastewater. Currently, over 319,000 properties in London are at high risk of flooding from heavy rainfall and around 27,800 properties are at high risk of tidal flooding,<sup>28</sup> making flood resilience an important aspect to incorporate into London's decision making and planning.

## Action & Approaches

The Thames Barrier, which began operating in 1982, is one of the largest mobile flood barriers in the world. The barrier closes to protect London from flooding whenever there is potential for tidal surges, or when water levels are expected to overcome other tidal defenses upstream of the barrier.<sup>29</sup> Other tidal flood defenses include walls, embankments, flood gates, and pumping stations.<sup>30</sup> Since the early 2000s, London has had to close the Thames Barrier with increasing frequency to address rising sea levels, though the Environment Agency warns that the Barrier should not be closed more than 50 times a year.<sup>31</sup> London's Thames Estuary 2100 Plan guides the city around upgrades for these tidal defenses, like raising statutory heights, that are needed as seawater levels increase.<sup>32</sup>

While London has historically dealt with tidal flooding and is relatively well-prepared to manage that type of flood risk, the city has also had to manage more extreme rainfall and flooding due to stormwater runoff. The city developed its London Surface Water Strategy in 2025, spurred by the aftermath of significant surface water flooding that happened in 2021.<sup>33</sup> The Strategy's principles align well with the concept of flood resilience, prioritizing flood solutions that are nature- and evidence-based, protecting the most vulnerable populations, making cross-government structures easier to navigate, and creating networks to respond more efficiently and effectively. One key policy solution that London is implementing is integrating is more sustainable drainage to combat its large extent of impermeable surfaces.<sup>34,35</sup>

## Impact & Lessons Learned

Overall, London is aware of its compounding flood risks, and it has implemented assessments, plans, policies, and procedures to address and mitigate those risks while protecting its citizens and cultural and economic assets. It has experience managing tidal flooding, as evidenced by the success of the Thames Barrier and other tidal flood defenses, the former of which has saved London an estimated £1.5 billion annually in avoided flood-related property damages.<sup>165</sup> However, the city must plan for potential sea level rise that may overcome those defenses while adapting to new flood risks, particularly intense rainfall that can overburden London's current stormwater management system.

### 7.1.2. New York City

Many intersecting features increase New York City's flood vulnerability: a densely concentrated population, 520 miles of coastline, an aging sewer system, and an extensive network of concrete and impermeable surfaces that cover 72% of the city.<sup>36,37,38</sup> As the likelihood of extreme weather increases, the city faces flood risks from heavy rainfall that can induce surface water flooding, as well as risks from coastal storms that can cause storm surges. Low-lying neighborhoods in New York City are also vulnerable to groundwater and tidal flooding as seawater levels rise and coastlines erode. These diverse flood risks intertwine in New York City, as many storms the city faces are tropical cyclones that bring heavy rains and storm surges. Flooding has caused detrimental impacts on human health, safety, transportation systems, and economic growth in New York City.<sup>39</sup>

## Action & Approaches

New York City is mitigating flood risks and increasing its flood resilience using several strategies, including protecting shorelines, implementing nature-based solutions, retrofitting buildings and infrastructure with flood-resistant systems, and building plans that reflect the priorities of residents across the boroughs. These approaches allow the city to ensure that its coastal waterfront and position as the U.S.'s largest urban area continue to serve as beneficial economic, social and environmental assets, rather than existential threats.

New York City's location on the coastline has historically been an economic advantage, but over the last few decades, it has needed to reconcile its coastal position with the growing threat of sea level rise and an eroding coast. Much of the city's land around its coast has continued to be economically valuable as recreational parks and residential housing.

However, New York City's vulnerability to flooding was made most apparent during 2012's Hurricane Sandy, which caused over \$19 billion in damages, mainly attributable to storm surge flooding.<sup>39</sup> About 17% of New York City was under water during peak flooding, impacting a span of about 51 miles.<sup>40</sup> Flooding impacted several types of city infrastructure: utility impacts caused many customers to lose electricity for several days and transportation system damages halted subway services in all East River tunnels. Moreover, the storm eroded three million cubic yards of sand from New York City's beaches.<sup>41</sup>

After the devastation wrought by the hurricane, the city was determined to bolster its coastal resilience. Following a design competition, a vision called the Big U emerged with the goal of fortifying 10 miles of shoreline along the East River, wrapping around the tip of Manhattan and extending up into the Hudson River. The project emphasized the social and environmental assets along the coast through the construction of community green spaces that serve as functional solutions to flooding. Now, as implementation has started, the Big U is composed of several different projects. These include the East Side Coastal Resiliency Project and the Lower Manhattan Coastal Resiliency Project, which will deploy raised parks, berms, floodwalls, adjustable floodgates and barriers, salt tolerant trees, permeable pavers, and expanded green space.<sup>42</sup> These projects demonstrate New York City's integrated approach, showing that coastal infrastructure can protect residents, manage stormwater, provide public space, and be integrated into a complex urban landscape.

Another project that exemplifies this approach is Living Breakwaters on south Staten Island, which reduces the impact of waves and erosion while promoting social and ecological assets through provision of educational programs and new habitat for oysters and fish.<sup>43</sup> New York City's Build It Back program also helped homeowners impacted by Hurricane Sandy pay for rebuilding, relocation, and making their homes more resilient—important factors to help increase the adaptive capacity of residents. Furthermore, an area on Staten Island where homes were bought out due to their location in a high risk flood zone has been redeveloped with a seawall and natural wetlands to decrease the risk of a devastating storm surge.<sup>44</sup>

In addition to coastal flooding, New York City faces flood risks from stormwater runoff. About 60% of the city's drainage system is made of combined sewer systems, which manage both wastewater and stormwater. These systems can be more easily overwhelmed during heavy rains when stormwater exceeds the design capacity of the system. New York City also has a high percentage of impervious surfaces, where stormwater cannot infiltrate into the ground.

In early September 2021, remnants of Hurricane Ida overwhelmed New York City's sewer system and soils, which had already been impacted by two tropical storms just weeks earlier. This caused major surface water flooding that impacted the subway, low-lying areas, and basements.<sup>45</sup> The rainfall intensity surpassed the city's drainage systems' capacity, resulting in the National Weather Service declaring the first-ever flash flood emergency in the city.<sup>46</sup> This incident damaged about 35,000 buildings, 3.3% of all structures in New York City.<sup>44</sup>

Before Hurricane Ida, the city already had several approaches to managing the risk of stormwater flooding in place. During the event, the city's Emergency Management department activated its Flash Flood Emergency Plan, which mobilized special emergency assets and rapid response teams. Additionally, NotifyNYC helped inform and alert residents about flooding. In the same year, New York City developed its 2021 Stormwater Resiliency Plan, which outlined the city's approach to managing and mitigating extreme rainfall risks by mapping flood vulnerability. New York City also continues efforts to implement cloudburst management,<sup>47</sup> bluebelts,<sup>48</sup> green infrastructure,<sup>49</sup> and high-level storm sewers, among other solutions, to address stormwater flood risks.<sup>50</sup> The city has continued these efforts and has a suite of tools and plans to help manage stormwater floods and other flood risks the city faces.<sup>51</sup>

## Impact & Lessons Learned

New York City continues to build its flood resiliency with a multipronged approach. Not only has the city implemented hard infrastructure solutions, it is also incorporating natural solutions to maximize infiltration while educating residents about flood risks. While New York City has experienced flooding that exposed vulnerable points within its flood response system, such as Hurricanes Sandy and Ida, it has used those pivotal moments to learn and adapt its processes. The city continues to invest in flood resiliency, but will need to reconcile these efforts with the effects of unintended gentrification in some neighborhoods that occur due to buyouts or residents being priced out after neighborhoods are rebuilt.<sup>52,53,54</sup>

### 7.1.3. Shanghai

Shanghai's economic and historic identities are inseparable from the city's relationship with the major bodies of water surrounding it: the Yangtze River Delta, the Huangpu River, and the East China Sea.<sup>55,56</sup> Historically China's largest foreign capital export base and now its primary financial center, Shanghai is the busiest container port in the world.<sup>57</sup> While the city's coastal location is key to its economic strength, it also introduces several flood risks like land subsidence, sea level rise, and severe weather-related flooding.<sup>57,58</sup> These risks only grow as the climate continues to warm. A 2020 estimate found that sea levels around Shanghai are rising 3.4 millimeters annually, and are expected to continue to rise.<sup>59</sup> Further, as the city continues to expand, rapid construction has overwhelmed drainage systems, worsening floods and the risk of land subsidence.<sup>57</sup> Shanghai also faces recurrent typhoons, and has experienced several that have caused considerable damage. Even with substantial investments in flood management efforts, these storm events continue to cause billions of dollars in damages.<sup>59,60</sup>

## Action & Approaches

Shanghai has taken various measures over the last few decades to minimize flood risks, including constructing the Huangpu River levee system, building seawalls, updating urban drainage systems, and installing advanced flood information systems.<sup>57</sup> Shanghai has continued to reinforce and heighten

its levees and seawalls since their original construction in the 1950s and the 1990s, respectively, to protect against stronger storms and flooding. More recently, Shanghai invested in an expansion of its urban drainage system to allow it to handle a higher capacity of stormwater. The Shanghai Flood Control Information Center also monitors and collects information about tide- and sea-levels, meteorological forecasts, and urban drainage, in order to alert authorities and the public in a timely manner about flood risks.

While Shanghai implemented green infrastructure and other ecological flood control methods, like green roofs and wetland maintenance, China launched its national Sponge City Initiative in 2015. The “sponge city” urban design uses sustainable low-impact development to manage urban runoff and stormwater, upgrade outdated infrastructure, and integrate functional ecosystem services. China’s initiative directed 20% of urban areas to capture, absorb, or reuse 70% of stormwater runoff by 2020, and 80% of urban areas to do so by 2030.<sup>61</sup> In 2017, China directed all cities to prepare a sponge city master plan, selecting Shanghai as one of 30 pilot cities to receive national funding to support its projects. Shanghai set an intermediate goal of achieving 40% sponge city status by 2025, and was the second city in China to begin implementation.<sup>62,63</sup> Shanghai has since opened a sponge park in Lingang,<sup>64</sup> a coastal area in the city with low elevation and widespread development across tidal flats, making the area vulnerable to recurrent pluvial flooding.<sup>161</sup> The park manages floods through low-impact development, ecological conservation, and rehabilitation, also incorporating recreational experiences.<sup>64,65</sup> Changning District in Shanghai has also launched its Sponge City Construction Plan, which focuses on ecological restoration and integration, establishes priority construction zones, and sets targets for achieving a district-wide runoff control rate.<sup>66</sup>

Following these district-level projects, Shanghai launched its first city-wide comprehensive plan for sponge city implementation in 2024. The plan reflects lessons learned from the city’s pilot projects and incorporates aspects of their technical standards, ecological restoration projects, infrastructure systems, and financial mechanisms. Key levers include developing sophisticated hydrological models to guide infrastructure, expanding ecological corridors for absorption and filtration, restoring wetlands, expanding water conservancy projects, upgrading drainage systems, increasing construction and permit approval standards, and creating dedicated funding mechanisms.<sup>63</sup>

## Impact & Lessons Learned

Shanghai has not reported updates on the 2025 goal of 40% coverage of sponge city infrastructure. However, as of September 2025, Changning District completed approximately 15.37 km<sup>2</sup> of sponge city construction, covering 41% of the district’s built area.<sup>67</sup> A study based in Lingang found that sponge city development significantly enhanced runoff retention, particularly during heavy and torrential rainfall scenarios.<sup>58</sup>

As Shanghai moves toward low-impact urban development to manage rainfall and combat flood risks, small-scale pilots have proven valuable in determining best practices and effectiveness of different implementation techniques. Shanghai plans to implement strategies, including the use of ecological corridors, across the city.

## 7.2. Congestion Management

As urban cores grow, they face increasing vehicle traffic congestion and need for revenue sources. To address these dual challenges, congestion management schemes emerged as a legislative strategy.

Different types of congestion management practices exist, but most aim to reduce vehicle miles traveled while promoting mode shift. Congestion pricing, for example, is a market-based strategy that requires vehicles to pay a fee to enter certain zones, usually high-traffic areas, during peak hours. This policy creates a financial disincentive that pushes drivers to shift travel habits, either by changing driving times or switching to alternative transportation modes like public transit, cycling, and walking. License plate quotas are another congestion management practice, one which puts a cap on the number of new license plates available for cars registered in the city. By reducing the volume of vehicles on the road, congestion management aims to not only alleviate car traffic but also lower concentrations of harmful air pollutants like PM<sub>2.5</sub> or NO<sub>x</sub>, as well as CO<sub>2</sub> emissions.

### 7.2.1. London

In the late 1990s, London faced significant automobile traffic in its historic center, with average vehicle speeds falling to less than 12 km/hr. This traffic cost the city £2-4 million/week in lost time, and resulting air pollution regularly breached health limits.<sup>68</sup> As Europe's most congested city in 2025,<sup>69</sup> London continues to struggle with automobile traffic, which has been a detriment to air quality. In 2016, a committee of Parliament members declared air pollution in the United Kingdom a "public health emergency".<sup>70</sup>

#### Action & Approaches

London has studied the impacts of congestion charging since the 1970s, implementing a series of road pricing schemes designed to reduce congestion and improve air quality. The first, called the Congestion Charge, was introduced in 2003 as a way to reduce traffic and generate revenue for public transit.<sup>71</sup> The policy charged drivers £5/day to enter a designated zone, with some exceptions for local residents and those with disabilities. Over the last two decades, this has increased to reach £15/day in order to maintain its effectiveness and continue to generate revenue.<sup>72</sup>

Over time, the city has put more emphasis on improving air quality and public health along with reducing traffic congestion. In 2008, London introduced the Low Emission Zone (LEZ), focused on reducing PM<sub>10</sub> across Greater London by setting emission standards for heavier duty commercial vehicles such as lorries, buses, and coaches, and charging those vehicles when they are noncompliant.<sup>73</sup> Then, in 2019, London implemented its Ultra Low Emission Zone (ULEZ) in the same area as the LEZ, setting standards for all types of vehicles. The program boosted bus travel in central London by 33%, and contributed to a 10% overall mode shift toward public transport, cycling, or walking.<sup>74,75</sup> Administrators continuously increased the stringency of the LEZ standard, expanding the ULEZ to include Greater London and Inner London, the latter of which raised cost concerns among low-income outer London residents with noncompliant vehicles. In response, the city launched a £110 million scrappage program and made improvements to the Outer London bus network.<sup>76</sup> Many of these standards were implemented to bring London into compliance with UK limits for certain air pollutants, like PM<sub>10</sub> and NO<sub>2</sub>.<sup>77</sup>

#### Impact & Lessons Learned

London initially introduced congestion pricing to solve the issue of traffic congestion and raise revenue for public transit. The Congestion Charge was effective at its conception, leading to a 15% reduction in traffic in 2003 and continuing to reduce traffic despite growth in the city's population.<sup>72</sup> The program boosted bus travel in central London by 33%, and contributed to a 10% overall mode shift toward public transport, cycling, or walking.<sup>74</sup> However, even as automobile traffic volume has

decreased, London remains one of the most congested cities in Europe, and traffic speeds in the city center are still low, as road space has been reallocated to other sustainable transportation modes, like bus lanes, bicycles lanes, and sidewalks.<sup>72</sup>

London has also seen reduction in air pollutants as it has shifted its road pricing schemes to focus on improving air quality and public health. After LEZ implementation, Greater London saw an 18.5% reduction in sick leave compared to pre-LEZ levels.<sup>78</sup> Following ULEZ implementation, concentrations of NO<sub>2</sub> in Greater London decreased by 23%, while concentrations of CO<sub>2</sub> and PM2.5 fell by 4% and 19%, respectively.<sup>79</sup> By 2025, 97% of vehicles in central London were ULEZ-compliant (meeting European emissions standards),<sup>80</sup> with a 58% reduction in noncompliant vehicle entrances from 2019 levels.

Revenues from the Congestion Charge reached £307 million from 2021–2022, with the ULEZ and LEZ generating a net income of £111 million and £34 million in 2021–2022, respectively.<sup>81</sup> However, as compliance with the charge rose, revenues declined, prompting ULEZ expansion. It is projected that ULEZ net revenues will decline over time, reaching zero by 2027 as compliance improves and fewer drivers pay.<sup>82</sup> London's congestion pricing schemes serve as an example of the trade-offs within policy tools. As drivers become more compliant—the ultimate implicit goal of the LEZ and ULEZ—revenues will continue to decrease. Additionally, though London's congestion pricing initially aimed to reduce automobile traffic, that has ultimately not improved within the city's core. Nevertheless, these measures have still allowed for mode shifting to more sustainable transportation, as well as improvements in air quality and reduced health impacts.

## 7.2.2. New York City

More than 700,000 vehicles pass through the Manhattan Central Business District in New York City every day, and average travel speeds can be as low as 8 km/hr.<sup>83</sup> This traffic costs the regional economy around \$20 billion annually in delays, travel uncertainties, and slower movement of goods and services.<sup>84</sup> Congestion pricing in New York City was first introduced in the early 2000s as a program to reduce traffic and pollution in Manhattan's Central Business District. Early proposals failed in the state legislature due to concerns about affordability, equity, and ramifications for neighboring boroughs,<sup>85</sup> but the plan resurfaced in 2017. Framed as a strategy for funding the financially strained Metropolitan Transportation Authority (MTA) while addressing crippling gridlock, the program finally achieved all the needed state and federal approvals by 2024, and was launched in January 2025, making New York City the first city in the nation to implement a large-scale congestion toll.<sup>86</sup>

### Action & Approaches

The MTA administers New York City's congestion pricing program, known as the Central Business District Tolling Program (CBDTP), which it applies to all vehicles entering Manhattan south of 60th Street, known as the Congestion Relief Zone (CRZ).<sup>87</sup> The tolling system relies on a network of gantries with cameras and E-ZPass readers that automatically enforce the toll through license plate recognition.

Tolls charge drivers a \$9 fee for passenger vehicles during peak daytime hours, lower than the \$15 originally proposed, with higher rates for larger vehicles like trucks and tour buses.<sup>87</sup> The policy includes special exemptions for emergency vehicles, people with disabilities, and other categories. Additionally, private vehicles and motorcycles are only charged once per day, while trucks and charter and tour buses are charged for each entry. Additionally, the city provides a Low-Income Discount Plan and tax credit to those who qualify to address affordability concerns.

Revenues from the program are explicitly earmarked for transit infrastructure upgrades, particularly for the subway, accessibility improvements, and bus modernization. According to the New York State Governor's office, congestion pricing generated over \$550 million in revenue in its first year of operation.<sup>88</sup> The CBDTP is designed to finance long-term bonds worth \$15 billion to fund public transportation improvements: increased subway cars, dual-mode locomotives, train control signal upgrades, accessibility improvements for subway platforms and elevators, additional electric buses, and power substation upgrades.<sup>89</sup>

## Impact & Lessons Learned

In its first year, New York City's congestion pricing program generated significant benefits. From January through October 2025, 21.6 million fewer vehicles entered the CRZ, which reduced traffic by 11% compared to the baseline period. Additionally, traffic delays in Manhattan were nearly a quarter lower than expected, with average trip times decreasing by 17% and 51% at the Queensboro Bridge and Holland Tunnels, respectively.<sup>90</sup> The benefits of the CBDTP extend beyond the CRZ; traffic delays in the neighboring regions outside Manhattan were 9% lower than the baseline.<sup>91</sup>

Air quality monitoring, while ongoing, indicates early success in reducing concentrations of pollutants of concern. Inside the CRZ, the seasonal average concentrations of PM<sub>2.5</sub> dropped .4 µg/m<sup>3</sup>, NO<sub>2</sub> dropped .8 parts per billion (ppb), NO dropped 1.8 ppb, and black carbon concentrations dropped .12 µg/m<sup>3</sup>. One study estimates that PM<sub>2.5</sub> fell by 22% within the first six months of implementation, which is comparatively larger than the PM<sub>2.5</sub> reductions estimated for the first few years of implementation of London and Stockholm's congestion pricing programs.<sup>92</sup>

Implementing congestion pricing in New York City required coordinated multi-level governance. Given state authority over tolling, the city could not independently enact the congestion pricing, and thus required state-level support and federal approval. Any attempt to adopt congestion pricing in other U.S. cities could come under the same scrutiny and would require similar multi-level coordination.

### 7.2.3. Shanghai

Shanghai does not have a congestion pricing scheme; rather, it uses monthly license auctions to limit the number of vehicle licenses issued in the city, thus restricting vehicle fuel consumption. China lifted its prohibition of private vehicle ownership in 1986, paving the way for increased motorization.<sup>93</sup> Shanghai began its license plate auction policy in 1994, when private vehicle ownership in China was still low. As its private vehicle ownership has grown, Shanghai faces increased congestion and worsened air quality, like many other high density cities.<sup>94</sup> Shanghai's mobility demand is 21.8 km per person per day, consistent with other cities of its size,<sup>95</sup> and in 2023, the city reported more than 5.68 million registered vehicles.<sup>96</sup> Transportation currently accounts for nearly 30% of the city's emissions, 60% of which come from private vehicles.<sup>97,95</sup> In response to these needs, Shanghai set a series of transportation targets, including a 90-minute commute to the city center, shifting 65% of external passenger transportation to railways, and servicing half of all city center travel through public transport.<sup>98</sup> While Shanghai has other supporting transportation policies aimed at reducing traffic and encouraging mode shifting, the city primarily relies on its license plate auction program to regulate and reduce road congestion.

## Action & Approaches

Shanghai's license plate auction program limits private car plate sales to a fixed monthly quota. Auction prices started at ¥20,000 per plate in 1998 and have climbed to over ¥92,000 per plate in 2025.<sup>99,100</sup> The auctioned price represents a large portion of the vehicle capital costs. During the first years of operation, the city offered lower starting auction prices on plates for locally produced automobiles, with higher starting prices on plates for imported vehicles. In 2002, Shanghai reserved 3,000 plates for domestic vehicles and only 30 plates for imported vehicles.

In 2016, Shanghai began incentivizing new energy vehicles (NEVs), which includes battery electric vehicles (BEVs), plug-in hybrid electric vehicles (PHEVs), extended-range electric vehicles (EREVs), and hydrogen fuel-cell electric vehicles, by exempting them from plate auctions.<sup>101,102</sup> However, in 2023, given increased NEV uptake, the city decided to begin excluding PHEVs and EREVs from the free plate policy, though Shanghai will continue to offer free plates to BEVs until 2026.<sup>103</sup>

## Impact & Lessons Learned

In 2023, Shanghai's license plate auction policy brought in over ¥20 billion in revenue,<sup>104</sup> with the program generating a cumulative revenue of over ¥170 billion from 1994–2023.<sup>105</sup> The city reinvested auction revenues into major public transit network expansions and maintenance projects, including ring roads and rail network construction.<sup>106,107</sup> The program, however, has faced leakage as some Shanghai residents choose to register their vehicles in other cities to avoid the license plate auction and fee, opting to navigate road restrictions rather than the auction process.<sup>108</sup> This leakage can weaken the effectiveness of the policy by increasing the number of non-local vehicles in Shanghai, causing problems in traffic management.<sup>109</sup> The program has mainly impacted the share of passenger vehicles in Shanghai, as opposed to buses and trucks, because the majority of privately owned vehicles are passenger vehicles while the auction only regulates private vehicles.<sup>110</sup>

The exemption of NEVs from plate auctions in 2016 led to a significant increase in NEV uptake. Between 2015 and 2019, the total number of privately owned NEVs grew from 35,000 to 240,000 vehicles. By 2022, average NEV sales share reached 51%.<sup>101,111</sup> Despite tightened requirements for plate exemptions, the city registered 278,000 new NEVs in 2024, a 2% increase from the previous year's registration rates. By 2024, Shanghai had a total of 1.51 million NEVs on the road, 70% of which were fully electric.<sup>112</sup>

While Shanghai's license plate auction program has been effective in limiting car ownership, its structure benefits those with higher incomes and can be a barrier to lower income residents. While most residents support further government intervention to address the issue of road congestion, surveys demonstrate that some residents view the auction policies as unaffordable and inequitable, even with public recognition of the program's effectiveness.<sup>113</sup> Some residents have turned to the black market for licenses and reduced registrations, with total auction participation dipping in recent years.<sup>114</sup> Continued reductions in program participation may result in a lack of funding for public transit maintenance and expansion, highlighting the need for other public transit system funding approaches.

Shanghai and many other cities in China may not be as well suited for congestion pricing as London or New York City. Congestion pricing works best when the majority of destinations are within the cordon and most of the travelers live outside that cordon, the best example being employees commuting into a city for work. Public vehicles make up a large portion of vehicle stock in many Chinese cities due to

the country's strong public sector, while congestion pricing is not well attuned to public vehicles, as they may be exempted or insensitive to costs. In 2008, 55% of the 1.32 million registered vehicles in Shanghai were privately owned.<sup>108</sup> While congestion pricing schemes may be a popular congestion management policy, Shanghai has found an effective policy through its license plate auction program. By 2022, Shanghai had a diverse mobility system, with public transport accounting for 40% of all travel, followed by cars (36%), walking (21%), and other modes like cycling (3%).<sup>95</sup>

Shanghai's 30-year experience in implementing its license plate auction program provides valuable insights. The city's demand-management approach to reducing road congestion, implemented through monthly license plate auctions, allowed the city to generate significant public revenue for further re-investment into public transit maintenance and expansion. An exemption of NEVs from the auction system incentivized accelerated NEV uptake in the city while also attracting NEV manufacturers into the region as a result of a local demand surge.

## 7.3. Green Building Initiatives

As populations increasingly urbanize, the way buildings are designed, constructed, and renovated has become a central focus for emissions reductions. Buildings and their supply chains are responsible for a large share of GHG emissions, as well as energy, water, and materials consumption. To work toward reductions in emissions and energy usage, green building practices aim to create structures that are environmentally low-impact and resource-efficient throughout their life cycle. Many green building approaches involve renewable energy and technologies alongside techniques that improve resource efficiency, maximizing energy, water, and materials performance. Today, prioritizing sustainable practices for buildings is particularly vital for cities, which consume the vast majority of global energy and produce massive carbon footprints due to their built environment. By improving both new construction and existing buildings, cities can drastically reduce resource consumption while bettering the livelihoods of their residents.

### 7.3.1. London

As the hub for the UK's Industrial Revolution, London has been referred to as "The Big Smoke" due to the dense smog and coal smoke that plagued the city.<sup>115</sup> After years of expansion and rapid industrialization, London faced what is now known as the Great London Smog of 1952, a pollution-based fog that caused an estimated 4,000 deaths.<sup>116</sup> Due to the event's severity, the United Kingdom promulgated the Clean Air Act of 1956, which required households in "smoke control areas" to move toward smokeless fuels such as electricity and gas, and allowed localities to require more stringent standards for chimneys.<sup>117</sup> While the United Kingdom has continued to update and modify these regulations through more recent Clean Air Acts, the first act in 1956 was a significant milestone for the development of legal frameworks that regulated buildings in order to protect human health and the environment.

### Action & Approaches

In 2021, buildings accounted for 78% of London's GHG emissions.<sup>34</sup> London has several policies that aim to reduce emissions coming from buildings, focusing on energy efficiency, greening, and embodied carbon targets. London is targeting a goal of net-zero carbon by 2030.<sup>118</sup>

At the forefront of London's green building policies is the comprehensive Spatial Development Strategy for Greater London ("London Plan"), which articulates the mayor's policies for land use and

development across Greater London.<sup>119</sup> The 2021 London Plan set strategic goals to reduce building GHG emissions through greater energy efficiency and electrification. For example, it set forth building performance standards for major developments, requiring that they reduce on-site emissions an additional 35% beyond the UK's 2013 Building Regulations.<sup>120</sup> Additionally, the plan stipulates that residential developments achieve 10% emissions reductions, while non-residential buildings must reduce emissions by 15%. If developers cannot meet these standards, they must settle the difference through financial contributions to the borough's carbon offset fund or through off-site mitigation efforts.<sup>34</sup> Each London Plan is implemented through a combination of mayoral policies and borough-level Local Plans,<sup>121</sup> which become legally binding after Greater London Authority approval.<sup>122</sup>

London's Accelerated Green Pathway aligns with the London Plan by setting out a roadmap to reduce total heat demand from buildings, install 2.2 million heat pumps, and connect buildings to district heating networks, all by 2030.<sup>123</sup> These goals align London with the Paris Agreement's trajectory of keeping global warming below 1.50 C.

To ensure implementation of these policies and goals, London created the Energy for Londoners initiative, which aims to heat homes, make workplaces more energy efficient, and supply increasing shares of local clean energy. This umbrella initiative is made up of various grants and programs. Multiple green building initiatives operate under this program, including the Retrofit Accelerator, which provides residential and commercial energy efficiency upgrades; Cleaner Heat Cashback, which provides cashback to small businesses for boiler replacements; and Warmer Homes, which provides grants to low-income households for energy efficiency improvements.<sup>124</sup>

## Impact & Lessons Learned

By 2024, London achieved 57% higher carbon reduction in proposed new buildings than required by national-level building regulations, which mainly came from energy efficiency and electrification measures. Many proposed developments will also include solar panels and be connected to communal or district heat networks. Programs associated with Energy for Londoners delivered millions of pounds worth of investment projects in workplaces and homes across London. For example, the retrofit accelerator for workplaces delivered £260 million in investment projects.<sup>125</sup>

Robust policies, including grant programs, mandates, and incentives all contribute to the advancement of green buildings in London. Though improved in the past few years, many households still live in fuel poverty. Across Europe, pushback against net-zero development primarily stems from affordability concerns. Therefore, cost-of-living should be considered when evaluating building standards, with support put in place to enact green building standards and initiatives without burdening households.

### 7.3.2. New York City

New York City has struggled with managing its emissions from buildings and industry, and has a history of smog.<sup>126</sup> In 2022, 66% of New York City's emissions came from buildings and the majority of these emissions come from buildings larger than 25,000 square feet, which make up only 5% of New York City's building stock.<sup>127</sup> Much of the energy used in buildings comes from fossil fuel combustion, which can contribute to adverse health impacts and premature deaths.<sup>128</sup> Modeling using the U.S. Environmental Protection Agency's emissions datasets estimates that commercial and residential building fuel combustion resulted in approximately 1,700 to 3,400 deaths in New York City in 2017.<sup>129</sup> To combat these health and air quality impacts, New York City has implemented ambitious policies to reduce emissions from its buildings.

## Action & Approaches

New York City has a suite of local laws that aim to reduce emissions from its buildings sector, complemented by community-focused programs to help residents and business owners overcome hurdles. These local laws and programs target on-site emissions reductions, greening and renovation, energy efficiency, and electrification.

In 2009, New York City was one of the first U.S. cities to implement a benchmarking law to collect data about energy and water usage in large buildings, the first step in reducing energy consumption and emissions from buildings.<sup>130</sup> Since then, the city has continued to target buildings through other local laws: setting annual carbon emissions standards,<sup>131</sup> requiring the installation of rooftop solar<sup>132</sup> or LEED certification,<sup>133</sup> setting energy efficiency requirements,<sup>134</sup> and eliminating the use of carbon intensive fuels in buildings to promote electrification.<sup>135</sup> Many of these policies are part of New York City's Climate Mobilization Act of 2019,<sup>136</sup> a package of laws aimed at reducing emissions from buildings 40% by 2030 and 80% by 2050, and its Capital Green Building Program, which helps implement the provisions in the city's Green Building Standard, aiming to ensure that buildings owned or funded by the city are built to higher performance standards than the industry average.<sup>137</sup> While this suite of laws puts in place stringent requirements, New York City has implemented programs to help building owners and businesses comply. The NYC Accelerator is a technical assistance program for Local Law 97, which set annual carbon emissions caps for large buildings. The accelerator offers support around compliance, upgrades, incentives, and financing, and is estimated to have helped over 20,000 buildings with energy upgrades.<sup>138</sup>

In addition to these laws, the New York City Economic Development Corporation (NYCEDC), a nonprofit that serves as the official economic development entity for the city, published the Circular Design & Construction Guidelines, requiring waste from demolitions to be diverted, usage of low-carbon building materials, and the reuse and recycling of concrete and soil for NYCEDC capital projects.<sup>139</sup>

## Impact & Lessons Learned

From 2005 to 2024, New York City's commercial, manufacturing, and construction buildings have reduced their overall energy consumption.<sup>140</sup> Additionally, in 2024, an analysis found that site energy use from covered buildings under Local Law 97 fell 15% from 2010 levels and emissions fell 26% among regularly benchmarked properties during that same time period. These findings demonstrate that New York City's building laws are succeeding in reducing emissions from buildings and combating adverse health and air quality impacts. However, the city will still need to address smaller, uncovered buildings where gas is the dominant fuel and further pursue grid decarbonization to realize the full benefits of decarbonized buildings,<sup>129</sup> as residential gas energy usage was the only building energy usage that increased significantly from 2005 to 2024.<sup>141</sup>

Sweeping, multi-pronged strategies can be highly effective tools for targeting building emissions and energy usage. New York City demonstrates how a city can implement different levels of policies and assistance programs to promote the decarbonization and greening of buildings, reduce GHG emissions, and promote the health of its residents. While the majority of buildings have been in compliance, New York City will have to grapple with how to assist buildings to remain in compliance as emission standards continue to become more stringent, and determine ways to strategically and affordably decarbonize residential buildings, which have the highest natural gas usage in the city.

### 7.3.3. Shanghai

The building sector accounts for approximately a quarter of all emissions in Shanghai.<sup>142</sup> While comprehensive city-published data on building emissions is limited, the Shanghai Municipal Commission of Housing and Urban-Rural Development has disclosed that since the 12th Five-Year Plan (2011–2015), Shanghai's total residential building floorspace has grown substantially, along with its associated emissions.<sup>143</sup> The Commission reports that since 2015, emissions have increased by 18% and 20% in public and residential buildings, respectively.<sup>143</sup> As incomes continue to rise, accompanied by increased standards of living and household energy consumption, building sector emissions are projected to account for an increasingly higher share of Shanghai's total emissions.<sup>142</sup> Though analysis of the city's building emissions found that under business-as-usual policies, emissions would peak around 2035, the Commission set a target of peak emissions in 2030 under a suite of new policies.<sup>143</sup>

#### Action & Approaches

To achieve its targets, Shanghai set up measures to pursue green building policies, including technology demonstrations, strengthened green standards, online energy monitoring platforms, and energy-saving retrofits for buildings falling behind on emissions standards.

The Changning District of Shanghai has served as a strong model for ambitious building policies. Changning has a populous residential and commercial area with almost no industry presence, and buildings account for approximately 90% of final energy consumption in the district.<sup>144</sup> Changning's innovations and projects have served as key pilots for city-wide policies, including both the online energy monitoring and green retrofit programs. Changning piloted their online monitoring system in 2007, serving as China's first online building energy performance monitoring system.<sup>145</sup> The District continued to build upon this system in a project with the World Bank, which improved the online platform to better monitor and assess energy performance opportunities.<sup>144</sup> The project took the next step by using the data collected to select buildings to retrofit to meet higher green standards.

Shanghai's emissions monitoring platform is based on the model used in Changning.<sup>145</sup> In 2009, Shanghai began to monitor energy utilization in large public buildings.<sup>142</sup> The city then issued its Shanghai Green Building Regulations, which implemented green standards, and the online Smart Carbon Emission Monitoring Platform, which tracks the emissions of public buildings.<sup>143</sup> One standard in the regulations requires that all new non-industrial buildings meet Shanghai's Green Building Label (GBL), and further requires that large public buildings, government investment projects, and certain super high-rise buildings meet a minimum of two- or three-star rating under the GBL.<sup>146</sup> Through the monitoring platform, the city is able to evaluate which buildings achieve performance standards and conduct energy audits, renovations, and other measures based on the proportion of excess emissions.<sup>143</sup> Based on this, Shanghai can determine which public buildings exceed their annual energy consumption limit and implement measures, such as green retrofits, at these sites.<sup>143</sup>

To support green building retrofits, Shanghai has established several funding mechanisms. Promulgated in 2020, the Special Support Measures for Demonstration Projects of Building Energy Conservation and Green Building in Shanghai Program provides financial support for energy-saving renovations of existing public buildings and demonstration projects. The program evaluates the level of need for assistance by district and provides differentiated levels of support.<sup>143</sup> For example, the Pudong District of Shanghai receives a 20% subsidy for the installation of renewable energy in new and renovated buildings, the highest subsidy of its kind in China.<sup>146</sup>

## Impact & Lessons Learned

The Changning online building energy platform now monitors 187 public buildings, comprising over 90% of all major public buildings in the district.<sup>144</sup> The platform helps public building managers and operators identify opportunities for optimizing operational efficiency in their buildings. The system also provides regulators and policymakers with up-to-date and verified information about building energy performance.<sup>144</sup> Due to its success, this platform was replicated across Shanghai, and now serves as the nationwide model for energy monitoring.<sup>144</sup> Using this platform, Shanghai identified 67 buildings for upgrades, including government buildings, shopping centers, hospitals, and office buildings, with subsequent retrofits resulting in emissions reductions of 19 ktCO<sub>2</sub>e/year.<sup>144</sup>

Shanghai has been able to ensure that all non-industrial buildings built after 2019 implement green building standards.<sup>146</sup> Beyond meeting GBL requirements, since 2022, Shanghai has led China in total LEED certified projects constructed.<sup>146</sup> Further, through its financial support mechanisms, Shanghai has been able to complete 16.5 million m<sup>2</sup> of green renovations, aiming to complete 20 million m<sup>2</sup> of renovations by the end of 2025.<sup>143</sup> As of 2024, Shanghai has achieved over 400 million m<sup>2</sup> of green buildings.<sup>147</sup>

As cities pursue increasingly large-scale energy monitoring and green building projects, including standards for new buildings and retrofits, Shanghai's approach can serve as a model of efficiency and rapid implementation. By focusing initial efforts in a district with high building emissions and partnering with non-governmental entities, the city was able to pilot and test a monitoring system and series of retrofits prior to large-scale use.

## 8. Conclusion

### 8.1. Progress Toward 2030 Benchmarks

London, New York City, and Shanghai each perform well across the four SDGs, generally displaying positive progress toward 2030 targets. The pace of progress varies by city, SDG, and indicator, though each city improves rapidly on SDG 7. While London and New York City performed slower on their own targets than UN benchmarks, Shanghai continued to progress rapidly at the city-level. Cities also improved against national-level benchmarks, particularly on SDGs 7 and 13 in London and Shanghai, reflecting their rapid renewable energy deployment. Overall, cities outperform their national counterparts on national goals when considered through the lens of SDGs, though performance varies greatly by indicator. This finding indicates that cities may be able to aid their countries in achieving broader sustainability goals if their strengths and local contexts are taken into consideration.

### 8.2. Lessons Learned

This study occupies a novel space in city-level SDG analysis. This report builds upon existing literature to build a comprehensive, longitudinal methodology designed to assess and compare city performance across four UN SDGs. While this iteration enables assessment of urban sustainable development through the lens of international, national, and local goals, expanding the methodology to a larger set of cities and beyond four SDGs will require further methodological refinement.

Good target setting lies at the intersection of ambition and achievability. A few targets rely heavily on the former, resulting in benchmarks that even these three wealthy, high-achieving cities struggle to meet. For example, benchmarks on new HIV infections, new malaria cases, and new HBV infections target zero cases by 2030. These health targets, while desirable, are difficult to achieve even in cities with relatively low cases. Further, gathering data for a few targets proved difficult due to vague language and data complexity. Indicator 11.2.1 on public transportation is one such example, as it calls for “safe, affordable, accessible, and sustainable transport systems for all.” Though later clarifying that this is defined as the share of the population living within a certain distance from certain types of transport, the required level of spatial analysis is difficult due to lack of data availability. Finally, undefined benchmarks for a few indicators make standardized analysis difficult: targets for reductions in the adolescent birth rate, air pollution mortality (3.9.1), WASH mortality (3.9.2), unintentional poisoning mortality (3.9.3), natural disaster mortality and impacts (11.5.1), and natural disaster economic loss (11.5.2) all lack quantitative targets, instead calling for “substantial” or “significant” reductions. Establishing quantitative targets, though potentially controversial, would benefit future analysis.

Though data is available across cities for most indicators, particularly for London and New York City, future studies would benefit from expanded data collection and accessibility for some indicators. Due to a lack of local alcohol consumption data for London and Shanghai, this analysis relied upon national-level UN data. Some indicators had only a few years of data, including green space (11.7.1) in London, and SUDs treatment coverage (3.5.1), homelessness rate (11.1.1), and family planning coverage (3.7.1) in Shanghai. Notably, across cities, street harassment data remains scant. For the rare years it is available—two years for London, one year for New York City, one year for Shanghai—data indicates the issue is pervasive, with  $\geq 50\%$  of residents experiencing harassment. In 2022, New York City established a Street Harassment Prevention Advisory Board, and plans to study its occurrence and those most at risk,<sup>148</sup> a first step toward improving understanding of this under-studied indicator.

Finally, increased consistency across intergovernmental bodies could improve future data collection. For indicators such as alcohol consumption (3.5.2), this study uses a target from the WHO, given the lack of a defined UN benchmark. Future iterations of city sustainability benchmarking could benefit from standardization of data collection and targets among both cities and international bodies.

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