



City net zero profile

UK

November 2022



Foreword

In light of build back greener, a strategy set out by government for decarbonising all sectors in the UK to meet our net zero target by 2050, how does local government play a role in ensuring this applies to our cities? The COVID-19 pandemic shed a strong light on inequalities at the city level. The investment in economic recovery is an opportune moment for UK cities and for local authorities to put climate action, sustainable development, and equity at the core of policies and initiatives.

An intersectional approach to net zero is critical. The just transition must not be only about the energy transition but must aim to ensure that cities are positioned to provide the requisite social safety nets and a thriving economy that leaves no-one behind through concerted climate action towards net zero. Both local authorities and the government have a key role to play in this.

The 63 largest towns and cities in the UK generate about 45 percent of all UK carbon emissions. This will likely put pressure on and increase demand for energy infrastructure. The climate change crisis extends beyond city boundaries and national borders and requires the collective power of a global coalition.

A low carbon future

Cities and local authorities have greater capacity than they realise to move towards a low carbon future and arrive at net zero while helping to ensure prosperity and equity. They should leverage technology, budgets, green policies, capital programs, partnerships, and new governance models to influence emissions reductions. Some of the policies which local authorities in the UK can use are Clean Air Zones, Workplace Parking Levies, improve Electric Vehicle charging point access, and ensuring usage of the Green Homes Grants.

Over 300 local authorities in the UK have declared a climate emergency and many cities have made significant and ambitious net-zero commitments. Nottingham plans to become a carbon-neutral city by 2028 – the earliest date of any UK city; Bristol has committed to achieving the same by 2030. This commitment coupled with bold action is a step closer to meeting the Paris Climate Goals to keep UK and global temperature rises below two 1.5 degrees Celsius compared with pre-industrial levels.

For the UK the 10 point plan for a green industrial revolution lays the foundations for a green economic recovery. Therefore, forcing cities to understand both current and future source of emissions, to put requisite actions and efforts in place to combat carbon intensity. For example, towns and cities with dense populations tends to have a lower transport carbon footprint than less densely planned towns, as public transport and shorter distances between areas people need to access encourage use of buses, trains, walking or cycling. The lack of standardisation in the carbon accounting of cities and the lack of consensus on how to measure urban carbon emissions has an adverse effect on decarbonisation. Striving to ensure data integration and interoperability can strengthen city initiatives and impacts towards net zero. KPMG in collaboration with United Cities has evaluated cities' readiness and progress towards net zero and provided insights into the opportunities and challenges. The results highlight the importance of balancing climate action to help ensure mitigation and adaptation for equitable and inclusive impact for the UK.

Emission reductions

Research shows that cities cannot achieve net zero by focusing on emissions reductions within their administrative boundaries alone. Cities must decarbonise key transboundary supply chains and use urban and regional landscapes to sequester carbon from the atmosphere. Equally, national government has a significant role to play in this. Reform of planning policy to make it easier to build new energy efficient homes and reintroduce the Green Homes Scheme to retrofit existing homes to decrease heating use. The Net zero readiness spotlight: Cities report considers the complex interplay between city infrastructure, behaviour and sequencing of mitigation and adaptation action for cities to achieve net zero. It also considers the necessary transitions required in six interconnected systems of energy, mobility, built environment, industry, waste and sanitation and green infrastructure by leveraging on transition drivers.

A central finding of this report is the importance of developing city net zero policies and initiatives that can attract sustainable finance. Cities are conducive to innovation that can drive transformation through new ways of engagement, innovative business models and regulations to attract investment and get access to so



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City net zero profile – London



London, United Kingdom

London aims to transition to net zero by 2030.⁸⁰ The city's net zero plan identifies the 'Accelerate Green' pathway as the preferred route for driving climate action. This pathway takes in account the urgency to act, ambitious goals and targets, social justice, and delivery capability. This pathway can only be effectively realised by establishing innovative partnerships with diverse stakeholders, accessing substantial climate finance and citizen engagement.

The council is prioritising the built environment, transport, and energy sectors as it moves towards meeting bold net zero targets.⁸¹ Residential buildings contribute a third of London's greenhouse gasses. Therefore, heating and insulation of homes, is a key priority for the city as most of the housing stock are not well insulated and rely on gas for heating. The city's Retrofit Accelerator program aims to create warm, affordable low carbon home by upgrading the old and energy inefficient housings.

The transport sector is a major contributor to greenhouse gas emissions. The council has implemented number of initiatives such as the zero emission bus fleet that has placed 550 electric buses on London's roads, the largest in Western Europe. Charging infrastructure in the city is accessible and available with over 7000 charge points. Walking and cycling has increased due to the introduction of the Streetpace program, low traffic neighborhoods and the addition of cycle lanes have also boosted active transportation. Other initiatives aimed at decarbonising the transport sector include the introduction of hydrogen powered bus fleet under the 'Hydrogen London' program.

With increasing temperatures and heat waves exacerbated by the urban heat island effect, the London Environment Strategy aims to protect, increase, and improve green infrastructure. The Council is leveraging on the city's natural capital to mitigate against heat and aims to capitalise on the economic and environmental value of green infrastructure.



Energy sector: 'Be seen' energy monitoring guidance⁸²



The guidance document explains how developers and owners of new major developments should monitor and report actual operational energy performance of buildings. It sets out what each responsible party needs to do to comply with the policy from the inception stage of a development to full occupancy. It provides information on the reporting templates applicants will need to use to report and explains how and when to report to the Greater London Authority. Applicants are required to provide accurate and verified estimates of each of the performance indicators of each reporting stage through the appropriate 'be seen' reporting template.

The objective of the monitoring guidance is to assist London to have an informed understanding of actual operational energy performance of buildings to achieve net carbon buildings across the city. This can help bridge the performance gap between design theory and actual energy use.

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Net zero results at a glance for cities (global)



City net zero results at a glance

Cities	Energy sector	Mobility & connectivity	Built environment	Industry	Waste & sanitation
Accra	●	●	●	●	●
Addis Ababa	●	●	●	●	●
Alexandria	●	●	●	●	●
Amman	●	●	●	●	●
Amsterdam	●	●	●	●	●
Atlanta	●	●	●	●	●
Barcelona	●	●	●	●	●
Beijing	●	●	●	●	●
Bermuda	●	●	●	●	●
Bogota	●	●	●	●	●
Budapest	●	●	●	●	●
Buenos Aires	●	●	●	●	●
Cairo	●	●	●	●	●
Cape Town	●	●	●	●	●
Chicago	●	●	●	●	●
Dakar	●	●	●	●	●
Dubai	●	●	●	●	●
Hamburg	●	●	●	●	●

Source: Net Zero Readiness Spotlight: Cities. Insights Towards Progress, KPMG, 2022

Increasing order of transition readiness ● ● ● ● ●

City net zero results at a glance (continued)

Cities	Energy sector	Mobility & connectivity	Built environment	Industry	Waste & sanitation
Hong Kong (SAR), China					
Jeddah					
Kingston					
Kuala Lumpur					
Lagos					
Lisbon					
London					
Luanda					
Male					
Medellin					
Montevideo					
Montreal					
Mumbai					
Nairobi					
New Delhi					
New York					
Oslo					
Panama City					

Source: Net Zero Readiness Spotlight: Cities. Insights Towards Progress, KPMG, 2022

Increasing order of transition readiness

City net zero results at a glance (continued)

Cities	Energy sector	Mobility & connectivity	Built environment	Industry	Waste & sanitation
Paris	●	●	●	●	●
Port Morsbey	●	●	●	●	●
Quebec City	●	●	●	●	●
Rio De Janeiro	●	●	●	●	●
Santiago	●	●	●	●	●
Singapore	●	●	●	●	●
Sydney	●	●	●	●	●
Tel-Aviv Yafo	●	●	●	●	●
Toronto	●	●	●	●	●
Vancouver	●	●	●	●	●
Vienna	●	●	●	●	●
Warsaw	●	●	●	●	●

Source: Net Zero Readiness Spotlight: Cities. Insights Towards Progress, KPMG, 2022

Increasing order of transition readiness ● ● ● ● ●

03

Sector opportunities





Energy sector



Most cities have focused their efforts on decarbonising the energy sector due to its position as the highest emitter. This is sometimes referred to as deep decarbonisation. “Ambition to action” should be at the forefront of net zero strategies argues Mike Hayes, Climate Change and Decarbonisation Leader and Global Head of Renewable Energy, KPMG International and a Partner, KPMG in Ireland.

Most cities lack control over the core decarbonisation strategies in the energy sector such as removing unabated fossil fuels from the electricity grid as this sits at the national level. The interconnectedness of energy with other critical sectors in cities such as transport, building and industry, makes decarbonisation a major priority in the energy sector. Mike Hayes urges cities to have measurable climate transition plans in place to attract sustainable finance and to develop viable commercial projects that can help transform the energy sector.

As renewable energy slowly becomes ubiquitous, increases in energy generation from clean sources should be matched by increased capacity in transmission and distribution networks. To sustain the economic and financial viability of such projects, transmission and distribution needs to be adequate. Both investors and lenders will likely be averse to funding clean electrification projects if they perceive risks such as congestion and curtailment of transmission and distribution networks.

Net zero acceleration

Cities need to differentiate between their corporate climate action plans – those that reflect the direct control they have over their own operations – and community climate action plans that consider the GHGs emitted within the geographic and administrative boundaries of the city.

Barriers to decarbonisation

According to Saurabh Bansal, Managing Director, Infrastructure & Projects Advisory, KPMG in the US, access to capital and technology are some of the major barriers to decarbonisation in the energy sector. Furthermore, he argues that the move towards net zero in the sector will likely be slow and this is predicated by city targets that are scheduled to be met between 2030 and 2050 as building and putting in place renewable portfolios will take time.

Some cities in advanced economies have access to capital through their state, regional, national, or federal governments in the form of stimulus packages or grants, while those in developing economies typically lack financial resources to implement large-scale climate actions in the energy sector. The cost of decarbonisation and net zero solutions is greater than existing conventional choices in the market, mostly in emerging markets. This makes it difficult to invest in moving towards net zero and working to reduce the reliance on fossil fuels, especially in emerging and developing cities.

Mike Hayes notes that cities' abilities to attract climate finance will likely be increasingly dependent on them developing and putting in place decarbonisation plans. He adds that capturing scope three emissions, indirectly generated by those in an organisation's value chain, is challenging for cities, particularly those with heavy industrial activity. A successful energy transition is expected to require coordinated and effective collaboration between sectors, cities, and regions.

Leveraging digital technology

Scenario planning, digital technology and systems are central to decarbonisation. Acquiring the right digital tools to manage demand and supply, provide user and network level insights and control a complex mix of energy sources can help strengthen a city's pathway to meeting their net zero targets.

Energy transition and climate equity

Leveraging clean electrification and technology to harmonise city energy systems is critical for achieving net zero. Cities need to think beyond individual projects and instead consider impact on the wider city ecosystem. The energy transition in cities is not only about doing away with fossil fuels but also striving to ensure a simultaneous equitable socio-economic transition. Through a range of policies and tools, cities can ensure that equity and inclusivity remains at the core of low carbon energy pathways.

Mike Hayes notes that energy security is back on the climate change agenda. Furthermore, aiming to ensure energy efficiency and management in cities is an opportunity to manage the transition to net zero to help achieve equitable outcomes.

Climate adaptation in the energy sector

Climate vulnerability is central to understanding effects on energy uses. Systemic impacts such as changes in mountain hydrology can affect the energy output of a hydropower system over a large geographical area.¹⁵ Another example is localised impacts such as extreme weather events on energy infrastructure in coastal areas. Recent heat waves in cities around the world have presented significant challenges for the electricity generation sector, in particular an increased demand for cooling.

For cities in emerging and developing states, energy sector adaptation is important due to climate change effects such as reduced rainfall, sea level rises, and increased frequencies and severity of natural disasters that pose a threat to the transition to net zero. Bringing climate risk management into the mainstream of energy sector planning and operations is necessary as this also supports mitigation measures. To support adaptation efforts in the energy sector, there is need for knowledge to be transferred between sectors and cities to raise awareness that can support efforts to net zero pathways.

Climate governance and partnerships

Current and future technologies to accelerate the energy's sector transition to net zero must consider climate variability and changes. This requires cities to have requisite governance structures, partnerships and strong institutions that can link climate knowledge with action from a diverse set of key stakeholders.



Mobility and connectivity



Decarbonisation of the transport sector is considered a catalyst for broader transformation in energy systems and cities. Transport emissions which include road, rail, air, and marine transportation are a growing source of greenhouse gas emissions globally. In 2019, 33 percent of GHG emissions from major cities were generated by transport¹⁶ and they are also the primary source of air pollution.¹⁷ Although emissions dropped during the pandemic, the return to 'normal' has reversed some of the gains made during this period. Road transport has the largest impact on emissions in the sector.

The transport sector requires new models, technologies, policies and sources of energy. Cities need to be prepared to attract sustainable finance for green transport options. Decisions regarding transport strategies and modal mix options – use of several types of transport – are unique to different cities and therefore decarbonisation pathways will differ. Malini Bose, Associate Director, Future Mobility, KPMG in the UK notes that although the uptake of electric vehicles and modal mix are essential to a net zero city, transport infrastructure design, construction and operation is key. Limiting embodied carbon in vehicles and infrastructure is necessary for extensive decarbonisation of the transport sector. Cities' emissions transition plans must highlight lifetime carbon-efficient gains such as aiming to maximise the life-span of assets, repurposing infrastructure and striving to minimise material use across the supply chain.

The decarbonisation of the transport sector is dependent on the energy transition. Electricity and power suppliers serving transport networks from renewable energy sources will likely have a major impact on operational carbon.

The move from internal combustion engines to zero emission vehicles is key to helping reduce greenhouse gases. Cities are pursuing other forms of transport such as mass mode, intelligent rail, urban transit solutions and active transportation. Cities in Asia and Africa are taking the lead on micro mobility options such as electric bikes, scooters and tuk-tuks amongst others.

But Ben Foulser, Director, Infrastructure Advisory Group, KPMG in the UK, says that a stigma exists around micro mobility options, particularly in developed cities. He argues that despite mass decarbonisation policies and initiatives across cities, buying vehicles driven by fossil fuels has become much cheaper, allowing a growing middle-class to own vehicles. He adds that city dwellers are now demanding products and services faster which means that freight traffic across cities will likely increase contributing to an increase in emissions. Malini Bose, Associate Director, Infrastructure Advisory Group, KPMG in the UK argues that the demand for transport needs be managed effectively by cities by offering cleaner alternatives and investing in diverse zero emission transport options.

Most cities have clear mitigation actions and efforts as they transition their transport sectors to net zero. However, Foulser argues that system-wide thinking and demand management are key adaptation measures that cities should consider. Initiatives including longer term land use planning and design of cities and towns that are commutable by walking and cycling are critical for the transition to net zero. Cities may also apply low emissions zones, congestion pricing and limited traffic zones.

Referencing the concept of the 15 minute city, Foulser notes that this could remove barriers to non-motorised mobility infrastructure and help increase the use of public transportation, promoting the expected public health benefits of low carbon policies.



Adding value in the transition to net zero

Critical to the decarbonisation of the transport sector is the power of the circular economy, including old first-generation batteries being repurposed for new electric public transport vehicles. This addresses concerns around limited mineral resources that are required for producing batteries and other critical components.

Leaving no one behind: informal transport

In cities where the transport sector is largely informal, strengthening transport system resilience is important as it decarbonises. Striving to ensure the recovery capacity and flexibility of these transport systems is critical whilst working to reduce emissions and protecting jobs of people in the transport sector to help ensure a just transition.

Net zero rail

Rail has a crucial role to play in the decarbonisation of the transport sector. Electric and hydrogen trains are considered zero emissions at the point of use.





Built environment



The buildings sector accounts for over 38 percent of all energy related CO2 emissions when building construction industry emissions are included.¹⁸ As a high-emitting sector, decarbonising buildings is a major priority for cities. Analysis of variations in the built environment across cities and regions in this report shows a range of efforts towards mitigation and adaptation climate action in the sector.

With buildings accounting for approximately a third of energy related gas emissions globally, cities are in a position to drive decarbonisation of their building stock as opposed to focusing on individual buildings. Cities can take advantage of a variety of energy efficient measures, using on and offsite renewable energy. Decarbonisation solutions can largely depend on a building's heating and cooling demand, variable and limited capacities of renewable electricity supply, constrained grid, consumer preferences and costs. For example, recent heat waves across the globe have had a major impact on building performance and increased risk for occupants.

Early intervention and pro-active design

Sarah Varghese, Partner, Planning & Infrastructure Economics, KPMG Australia, says: "Early intervention and pro-active planning and design of not only buildings but precincts and cities is critical in our journey to net zero."

The pressure on developers, occupiers and real estate is intensifying as city governments set bold commitments to transition to net zero. Seizing the decarbonisation opportunity in the ecosystem of buildings should involve early intervention across their full life cycle as well as related infrastructure,

including design, materials manufacturing, construction, usage, and demolition. Typically, operations and use of buildings emit the most GHG emissions across the life cycle, followed by processing and raw materials.

Across the value chain of building professionals, architects, city planners and designers, many are engaging in climate proof proactive design at all scales. From eco-friendly interior finishes, net zero energy and various innovative strategies to help reduce and prevent physical damage to buildings in coastal cities, a range of mitigation and adaptation solutions can be leveraged.

Sarah Varghese argues that cities of the future including buildings, supporting infrastructure, parks and open spaces must aim for not just achieving net zero but moving towards net negative and aiming to reduce levels of GHGs in the atmosphere. She emphasises the power of and need for collaboration between government and the private sector to co-create appropriate policies and successfully deliver carbon neutral cities on government-owned lands as a priority opportunity. Government needs to lead by example and spearhead the movement towards net zero cities.

Climate-proofing informal settlements

Cities that are host to informal settlements have traditionally received less policy attention in the climate change space, exacerbated by them contravening regulations and laws. Climate-related risks are amplified for inhabitants of informal settlements and hazard prone areas.

With mostly low and middle income cities hosting nearly one billion people in informal settlements,¹⁹ the focus has shifted to 'risk reducing' infrastructure and services including safe affordable piped water, storm and surface drainage, electricity, and street lighting.

City governments and community initiatives that focus on upgrading and retrofitting informal settlements can enhance resilience to climate change risks. However, to design and implement effective upgrading initiatives there is great need for access to quality data to ensure targets and policies have positive distributive impacts.

Traditionally, most upgrading programs that have integrated environmental goals are complementary to the physical transformation of settlements. For cities to help ensure that their net zero goals are inclusive of vulnerable settlements, there needs to be accelerated action in funding and investing in sustainable upgrading initiatives. Cities also need to partner with communities to help ensure that initiatives are rooted in real needs and priorities.

Financing green cities

Greening the built environment is typically perceived as a costly endeavor. However, following COVID-19, cities are setting targets to improve the environmental performance of their cities. Evidence²⁰ demonstrates that investment in sustainable infrastructure can boost infrastructural productivity and lead to accumulated savings over time through lower maintenance costs and enhanced service provision.

Despite positive outcomes in the decarbonisation of buildings across cities, the concept of the built environment remains largely overlooked. It interacts with the natural environment through its use of land, water and energy resources and the emissions produced. The interconnectedness of the built environment with industry, transport, health, planning, community, equity, and the economy puts pressure on the decarbonisation pathways that cities develop, implement and monitor. The need for a holistic, systems thinking approach in this sector is critical for the transition to net zero.

Get your policy right, access your funds

Access to sustainable finance by cities is strengthened by the ability to develop policy efforts towards achieving climate objectives and mobilising resources for climate action not only for buildings but for the entire city ecosystem.

Green infrastructure

Rising urbanisation is intensifying densification and a demand for more building types. The demand for cooling and heating is likely to also increase. This means more energy is required leading to eventual production of emissions. Research also shows that urban environments can create microclimates that lead to temperatures increasing by as much as 10-15 degrees Celsius producing heat island effects.²¹

With rising heatwaves, floods and other climate risks, the concept of greening cities is becoming central to the net zero plans of cities. The recent heatwaves seen across Asia, Europe and North America have broken records according to the World Meteorological Organisation, with the highest temperatures recorded in cities.





Financing nature-based solutions

Climate finance for nature-based solutions has been low. A report by the World Economic Forum²² finds that nature-based climate adaptation projects receive less funding than mitigation projects from international climate finance. A study by the UN Environment Programme and the Global Commission on Adaptation estimates that approximately 1 percent of total climate finance goes to nature-based adaptation projects.²³

Climate change events such as storms, recurrent heatwaves and droughts pose a risk to the ability of green spaces such as parks, green roofs, plant walls and other types of green infrastructure to lessen associated impacts. As cities continue to urbanise, the ability for urban forests to absorb carbon from the atmosphere is further compromised by land use strategies that favor densification and expanding the built environment. Stephen Beatty, Global Head of Infrastructure, Head, Global Cities Center of Excellence, KPMG International, notes that green spaces whether natural or artificial can help cities address climate impacts by enhancing ecosystems and supporting urban residents in building resilience.

Cities across the world have put in place policy measures to address afforestation and to revive extensive tree planting initiatives. Research shows that urban forests can mitigate against rising heat waves. One tree can absorb up to 150,000g of CO₂ per year in carbon sequestration.²⁴ The World Economic Forum places emphasis on small green spaces such as backyard gardens, green roofs, and parks as urban cooling strategies. Apart from acting as carbon sinks, urban forests can also increase the quality of city life by helping to reduce air pollution, protecting biodiversity, and acting to cool temperatures such as by providing shade.

Making green spaces accessible and inclusive

To help ensure that green spaces are accessible, physical barriers such as steps, lack of sanitation facilities and lack of parking should be avoided. A second set of barriers are psycho-social, which may include personal safety concerns and segregated design.

Inclusive greenspaces must be planned to accommodate all people striving to ensure that differences are not reinforced by using the space. Regardless of age, race, gender, ability and income, public green spaces should be enjoyed by all.

Through innovative and landscape design, cities can construct green spaces that promote safety and movement through texture, plant choice and barrier-free environment especially for disabled people.

The location of green spaces is especially important for lower income groups and for those that live in peri-urban areas, where access can be a challenge. The focus should be on access, park experience and usership.



It is critical to ensure that the design and maintenance of green spaces is done in a manner that allows maximum amount of carbon dioxide to be sequestered. Stephen Beatty says that green spaces need to be culturally and climate appropriate. For example, the city of Helsinki in Finland has experimented with biochar to enhance the sequestration capacity of urban green spaces.²⁵ Biochar is a charcoal-like substance produced by burning organic material from agricultural and forestry waste through a controlled process called pyrolysis. Use of biochar in one of Helsinki's public parks has resulted in significant amounts of carbon storage in the soil.

Technological innovation in green spaces

The carbon storage and sequestration potential of small green spaces such as yards and other artificial networks of ecological systems is still unknown. However, researchers find that positive impacts increase with upscaling²⁶ Enhancing the potential of residential small green spaces is a way to encourage residents to be part of a city's mitigation plan.

For cities that are limited in natural resources such as trees, grass and space, green landscaping is an innovative approach to creating carbon sinks. Through design and the use of digital technologies, cities can make decisions on where green landscape design is optimal.

Smart urban forests involve the use of tree monitors and 3D imagery to use forests in monitoring air pollution, tree hydration levels and even soil health as way to help improve maintenance and optimise sequestration capacity.

Industry



The process of decarbonising the industrial sector is being challenged by high energy prices and energy supply chain disruptions.²⁷ In cities, competition for space and land use has often pushed industrial activities to the periphery. Research shows that many cities are adopting smart growth sprawl strategies that prioritise the conversion of industrial clusters into commercial and residential development.²⁸

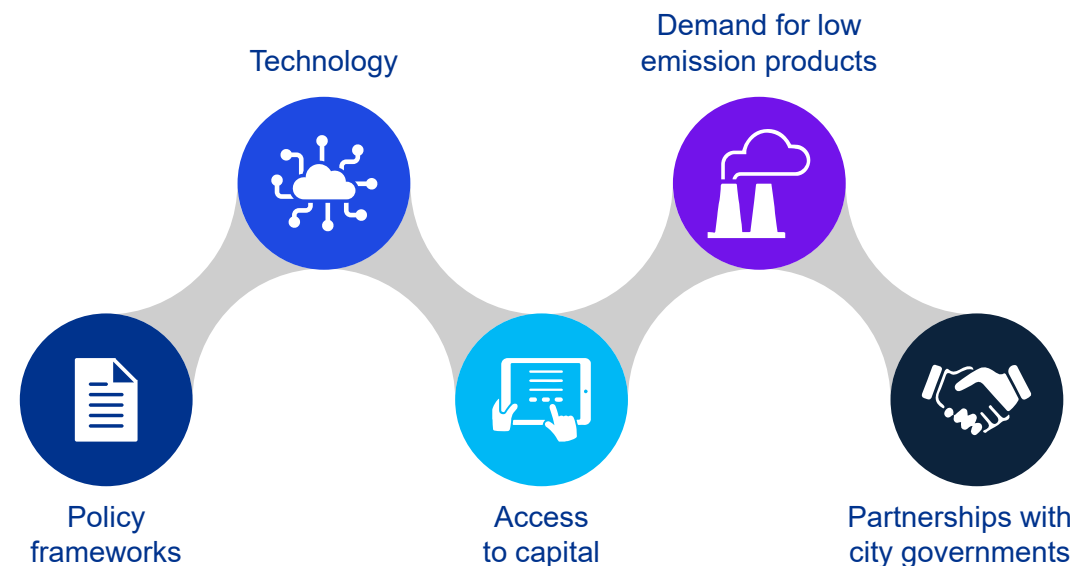
Nonetheless, some cities and their regions host industrial activities such as agriculture, manufacturing, mining, steel and cement production, oil, and gas amongst others. Efforts to transition to net zero will likely mean addressing a range of challenges such as waste, pollution, heating, and resource scarcity.

Achieving net zero requires a whole systems approach working across industry, city governance and policy structures, communities, researchers, and private sector to help ensure inclusive and sustainable pathways that can address the needs of urban areas. Research shows that adopting a place-based approach is critical for industrial decarbonisation.²⁹

What is an industrial city?

An industrial city is a zone or area that consists of a cluster of stand-alone industrial facilities, all operating simultaneously. It is usually located on the outskirts of a city, and is normally provided with good transportation access, including road and rail. Industrial cities offer integrated infrastructure for the various plants in one location, which would regulate the operation of all existing processes.³⁰

Decarbonisation of urban industrial hubs requires the following:



The role of technology is vital in the industrial transition to net zero. Digital infrastructure, artificial intelligence and machine learning can enhance decarbonisation. There are a number of supply side technologies such as energy efficiency, carbon capture, electrification and zero carbon hydrogen that can accelerate the transition to net zero. Demand side approaches include reduced material waste, material efficient design and circular economy approaches such as recyclability and reusability.³¹

Opportunity for green jobs

As cities juggle multiple priorities concerning climate action, smart growth, and economic development, coordinating urban industrial development is critical for the generation of green jobs.

Urban areas are incubators for innovative technologies that can lead to creative solutions to accelerate net zero.



Waste and sanitation



Water management

Waste water is a significant problem for cities globally, leading to them addressing issues around water safety, supply, sanitation, waste water treatment and drainage.³² One of the major causes of waste water in cities is poor and inadequate infrastructure. Alongside this is water governance and administrative arrangements at the city level. The management of water is better optimised in cities where there is shared management between several public and private actors. Several cities have demonstrated that management models with the intervention of the private sector have had a positive impact on the treatment of used water, ultimately limiting waste. Research further reveals that in city authorities where water management has been decentralised there are deficiencies when it comes to optimising the water cycle.³³

Eric Wolfe, Partner, Deal Advisory, Global Infrastructure Advisory, KPMG International and Partner, Deal Advisory, KPMG in Canada says that cities need to have requisite governance and management structures in place to help ensure everyone has adequate access to clean water. With increasing urbanisation particularly in developing countries and deteriorating infrastructure, a water crisis is looming. In cities experiencing high water stress, conservation is not adequate to meet demand. Arriving at a sustainable net zero urban water balance requires collaboration between public and private stakeholders, innovative technologies and robust planning and design. Subsequently, there needs to be regulatory and policy tools to accommodate net zero water projects in cities.

Achieving water equity

Climate impacts on water infrastructure and services are expected to become significant in the coming years if proper policies are not put into place. Water systems, operations and their design may have an impact on access and use by certain groups in cities.

Critical in water equity is not only access, but striving to ensure that water is safe, clean and affordable. Water systems should also be resilient against climate risks such as drought and floods.

Communities in cities should have a voice in decision-making on water management and use of water systems in their localities.



Managing city waste

Cities produce 50 percent of global waste³⁴ and 3-5 percent of direct GHG emissions are a result of waste disposal.³⁵ The emissions are typically in the form of methane which is emitted when organic waste breaks down in open dumps or landfills where gas is not collected. Despite the data, waste and materials management has been at the margins of the decarbonisation debate.

One of the major challenges in decarbonising waste is the cost of diverting materials from landfills. Despite advances in sorting technology, the cost per ton remains expensive for most cities hampering effective reuse and recycling of materials. Eric Wolfe says that public-private models can be a way to mitigate issues around cost and innovative technology.

Mitigation strategies have focused on minimisation of waste to landfill, reduction of CO₂ from combustion facilities, recovering and recycling specific carbon intense materials, capturing landfill emissions and the optimisation of transport logistics. Despite advances, one of the major pillars for driving the waste sector towards net zero is reducing consumption through materials management.

The circular economy is a system underpinned by a transition to renewable energy and materials based on eliminating waste and pollution, circulating products and materials at their highest value and regenerating nature. In a true circular economy, economic activity is decoupled from consumption of resources. A circular economy promotes the efficient use of natural resources and is key to achieving net zero from a climate adaptation point of view.

Eric Wolfe notes that adaptation is highly context specific, and cities should identify a range of options that are applicable and appropriate for their urban systems. The waste sector requires stakeholders across the supply chain to develop innovative decarbonisation pathways starting with material design and behavior change that shapes how and what people consume. Arriving at net zero waste further requires technological innovation and advancement for cleaner and greener cities. He adds that an increase in cities engaging with extended producer responsibility with regards to responsible packaging can help reduce plastic waste, while public education and sensitisation programs can be used by cities to encourage behavior change and consumption patterns.



Waste management: Electric and hydrogen refuse collection vehicles

Waste collection is a critical service. Zero emission refuse collection vehicles are an effective starting point for cities to showcase environmental leadership towards net zero in the waste sector. Innovative solutions such as hydrogen fuel cells can lessen environmental impact and hydrogen hubs can power not only refuse trucks but other commercial vehicles.

04

Sector scorecard analysis



Sector scorecards: Analysis

This section of the report assesses which sectors are performing and accelerating towards net zero in the 50 cities included in this report. Based on 48 indicators grouped under 'city enablers', decarbonisation status 'sector policies and preparedness' and climate equity', the analysis assesses the progress of cities in terms of climate action across the (energy, mobility, and connectivity, built environment and waste and sanitation sector).

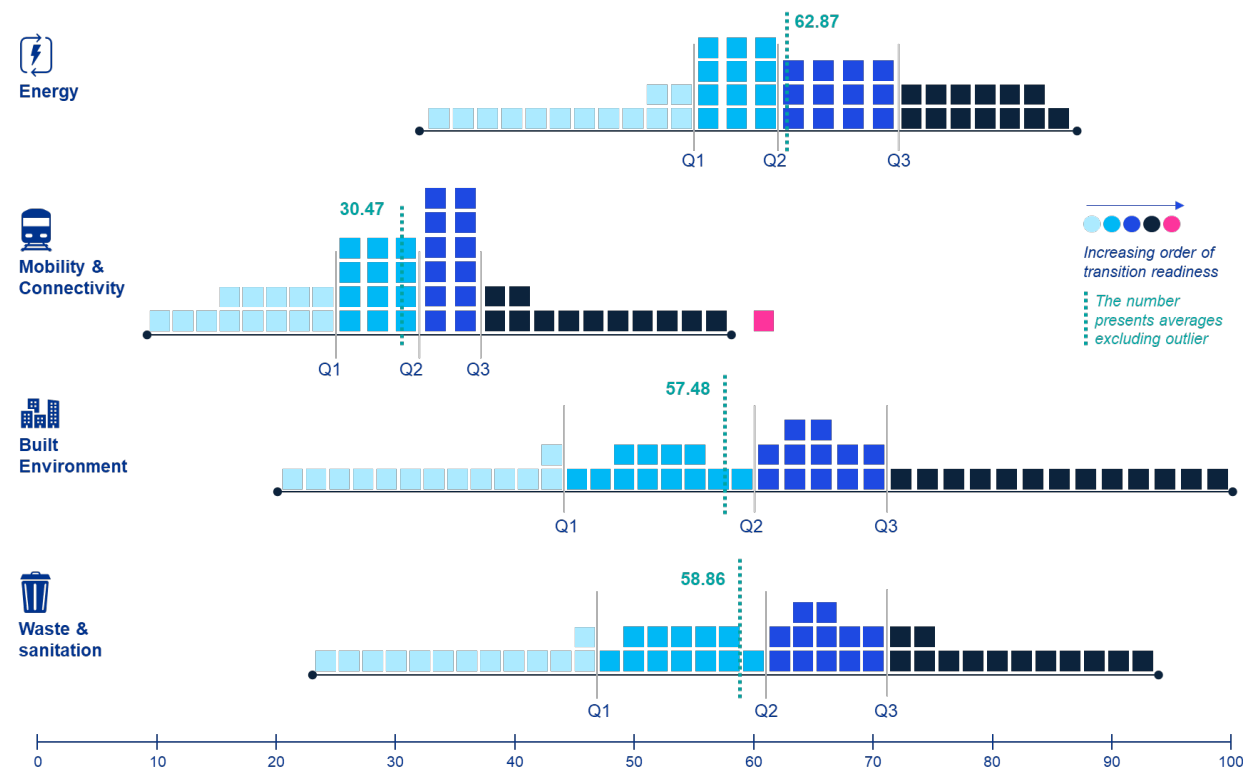
The framework categorises cities into two groups: Pacesetters, cities that score above average against the indicators in a sector, and Followers, cities that score below average in a sector.

*Industry does not feature in the sector scorecard analysis due to the data type collected and the scoring applied.



Averages of the sector

The below figures are the adjusted averages calculated for each sector against 48 indicators



05

Sources



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