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# Cities and Climate Change

## The key piece of the puzzle

Cities are responsible for most of the world's emissions...

...and will feel the impact of climate change disproportionately...

...making urban policies key in the move towards net zero

*This is an abridged version of a report by the same title published on 06-Dec-21. Please contact your HSBC representative or email [AskResearch@hsbc.com](mailto:AskResearch@hsbc.com) for more information.*

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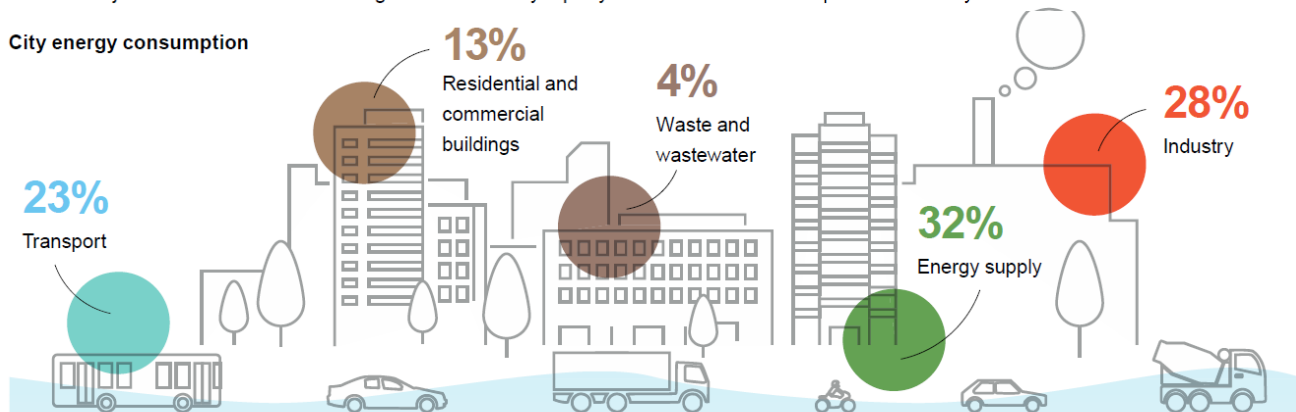


# Snapshot: cities and climate change

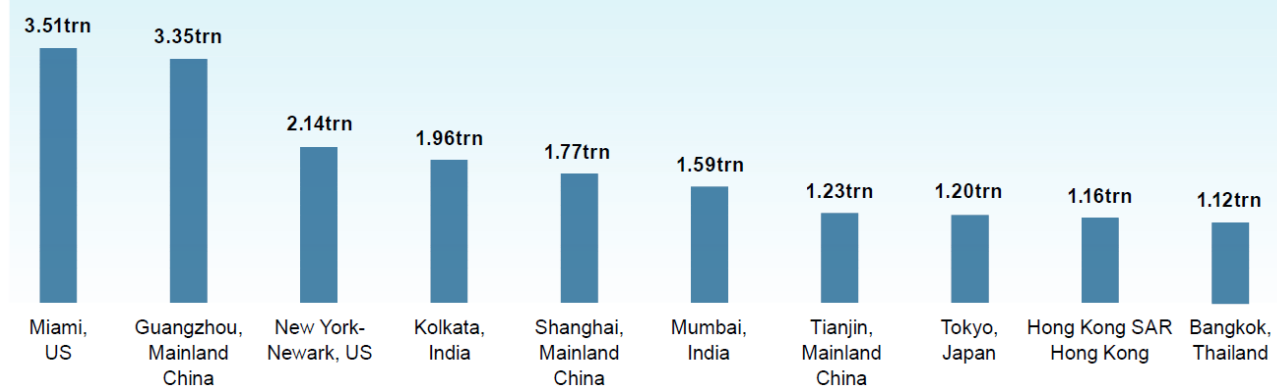
## Cities are likely to feel the impacts of climate change more acutely

Cities are the lifeblood of the global economy, but consume 78% of the world's energy, produce more than 60% of greenhouse gas emissions and are a major contributor to climate change – but cities may equally be where we see the impact most clearly

### City energy consumption

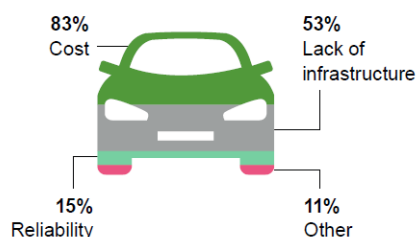


### Top 10 cities exposed to coastal flooding on the basis of assets exposed in future (exposed assets USDtrn)



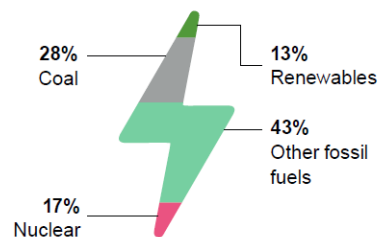
## Yet obstacles remain for sustainability adoption

### Reasons for not switching to all-electric vehicles in next decade



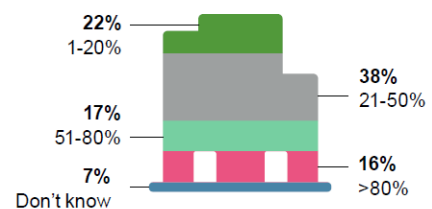
ONS survey between 22 Sept – 3 Oct 2021, London

### Sources of electricity production across large metropolitan regions



35 OECD countries, 2017

### Share of projects from existing buildings and buildings under construction which can be considered sustainable



Sustainable Buildings Market Study 2019

## What can cities do?

**USD208bn**

Annual investment in public transport needed to meet emissions targets across 100 cities, globally

**100%**

In 2020, 834 cities had a 100% renewable energy target and more than 10,500 have emission-reducing targets

**COP26**

With GBP27.5m of funding, the UK Urban Climate Action Programme will help cities across developing markets with decarbonisation of new buildings

# Climate change and cities

- ◆ Cities are likely to feel the impacts of climate change more acutely
- ◆ But as they are responsible for the bulk of global emissions...
- ◆ ...the need to act rests on their shoulders too

## How does climate change affect urban areas?

### Rising temperatures

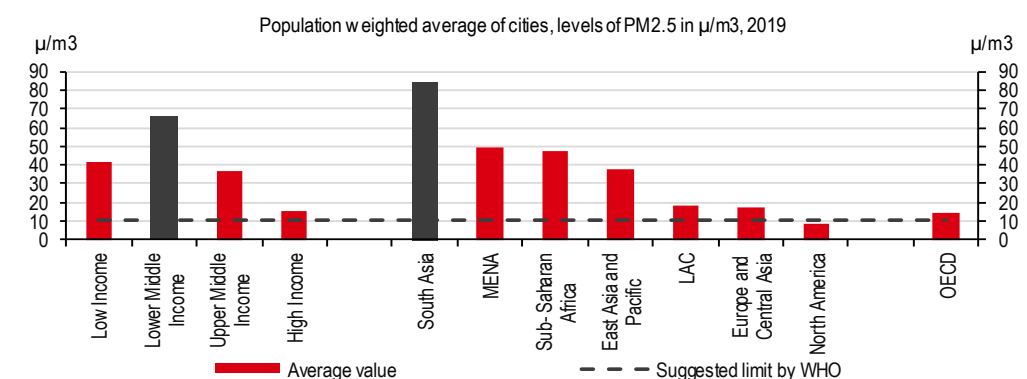
Today, nearly one-third of the world's population is exposed to life-threatening levels of extreme heat for 20 days a year or more<sup>1</sup>. The UN estimates that c.1.6 billion people living in cities will be regularly exposed to "extremely high temperatures" – effectively living in urban heat islands – by 2050.

This will likely create higher demand for air-conditioning and refrigeration, an industry that consumes up to 30% of global electricity and generates 8% of GHG emissions worldwide. The number of air conditioners projected to increase by two-thirds by 2030, and electricity demand for cooling buildings expected to rise by as much as 50% globally<sup>2</sup>.

Extreme heat can also have direct economic impact if governments have to restrict working hours as a result. Extreme heat can lead to productivity loss due to heat stress, especially in manufacturing and in services, such as tourism, transportation and trade.

Higher temperatures also carry health risks, and these are particularly acute in cities. Risks can include heat-related illnesses, some vector-borne diseases, and air pollution. Governments will need to work with health departments for early warning alerts for some events, such as heatwaves and elevated air pollution levels, to mitigate these effects.

### 1. South Asia and lower-middle-income countries are the most polluted...



Source: OECD (2020). Note: LAC stands for Latin America and the Caribbean, MENA for Middle East and North Africa.

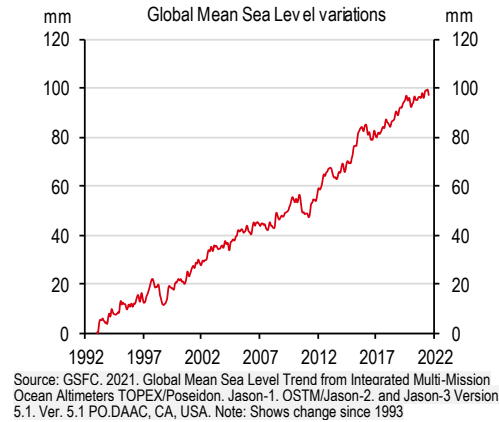
### Water: too much or too little?

Higher sea levels due to climate change increase the risks of flooding and tsunamis for coastal cities. But equally, if climate change makes weather more erratic, some regions may face extreme droughts and water shortages while others may see heavy precipitation.

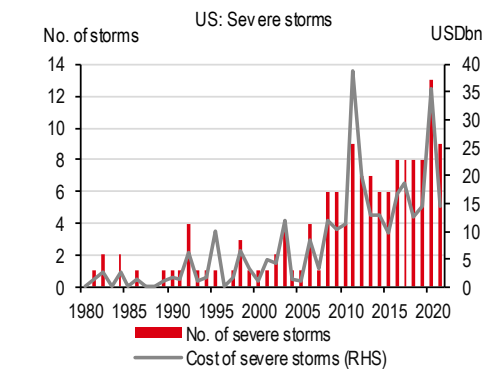
<sup>1</sup> The future we don't want, C40 cities, February 2018

<sup>2</sup> IEA (2020), Cooling, IEA, Paris

## 2. Rising sea levels pose risks



## 3. Severe storms are getting more frequent



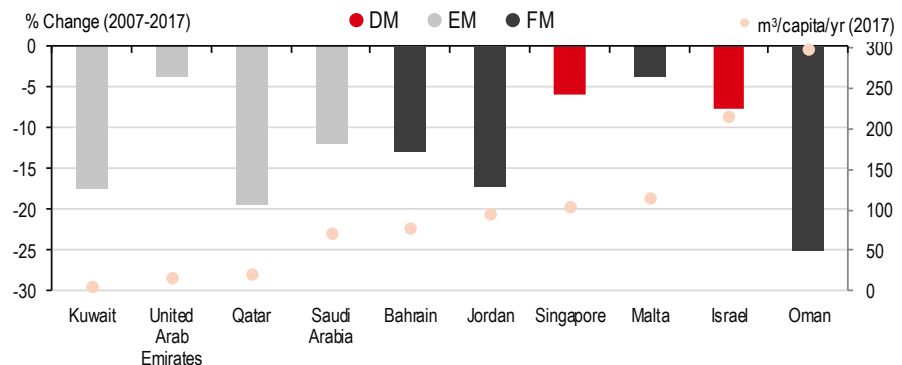
This greater risk of flooding could have a range of health, social and economic costs. Property damage, loss of life, water-borne diseases, higher insurance premiums, loss of tourism and land erosion are some of the consequences. Additionally, supply chain disruptions could have a severe impact on businesses and frequent extreme events may hinder trade and transportation.

### Droughts and water scarcity

On top of rising sea levels, some cities across the world could be at risk from water scarcity and droughts. Droughts can have long-term impacts such as malnutrition, starvation and famine which could all impact potential growth.

Water scarcity is often worse in rural areas than urban ones. But rapid rates of urbanisation in the emerging world are leading to cities that are not being matched by the required infrastructure to meet water demand. But this is not confined to the emerging markets. Cities including the likes of London, Miami and Tokyo have been flagged in various reports too.

## 4. Declining water availability for all of the 10 most water stressed countries



Water scarcity and droughts have significant economic consequences as they impact the manufacturing and power generation sectors to a great extent. This is particularly the case given the increasing reliance on water in the power sector under the energy transition as hydro power and green hydrogen are now some of the replacement fuels to. We think cities and local regions will need to factor this into future climate change mitigation *and* adaptation planning.

As with rising temperatures and flood risks, droughts and water scarcity also have significant implications for society. Droughts and water scarcity can both contribute to water pollution and the associated health risks. Water-related conflicts in times of scarcity are another major risk, with evidence of this occurring throughout history. Even in the present day, issues with water scarcity have caused social unrest in some cities and regions around the world.

# What can cities do?

- ◆ Cities will also have to act to limit climate change...
- ◆ ...both by mitigating to cut emissions...
- ◆ ...and adapting to be more resilient

## What should cities do?

Cities need to react to the threat of climate change. The solutions are two-fold – mitigation and adaptation. Broadly speaking, mitigation involves actions that lead to a reduction of GHG emissions to combat climate change and adaptation involves preparing societies and businesses for a more volatile climate

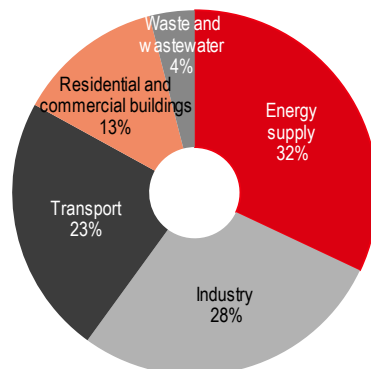
## Mitigation: the essential big steps

### Transport: Public, green and healthy

Transportation holds the key in the fight against climate change as more than 20% of CO<sub>2</sub> emissions by cities can be attributed to transport<sup>3</sup>.

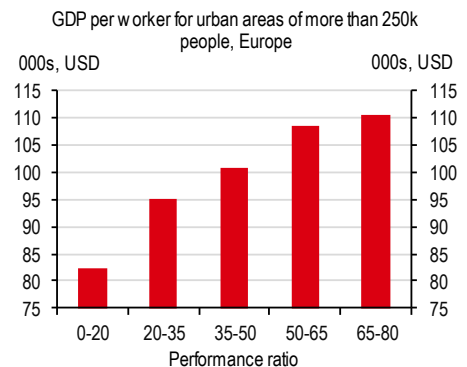
The COVID-19 pandemic has accelerated many pre-existing trends when it comes to urban areas. But not all changes have been a positive for climate - due to high fears of contracting COVID-19 people might deem public transport unsafe and switch to private vehicles, which in turn creates a funding issue for public transport departments. The authorities first need to draw people again to use public transport. Public transportation is not only cost effective or a tool to deal with congestion and pollution, but there is evidence from Europe that a well-connected public transport network can have huge positive upside on productivity and can have huge positives for the economy<sup>4</sup>.

### 5. Transport and buildings consume a lot of energy



Source: UN-Habitat, Global report on human settlements 2011.

### 6. Public transport is efficient and productive



Source: OECD. Note: Performance Ratio is the people that can be reached by 30min of public transport per 100 people located in a radius of 8km.

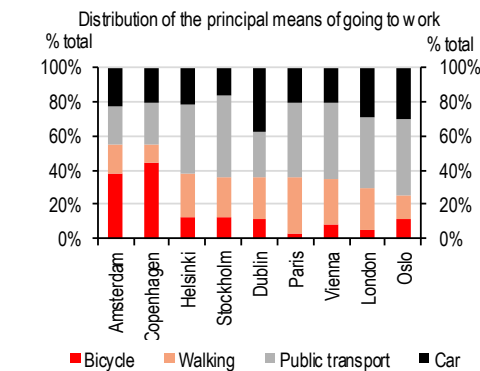
<sup>3</sup> UN-Habitat data

<sup>4</sup> OECD Regions and Cities at a glance 2020, OECD

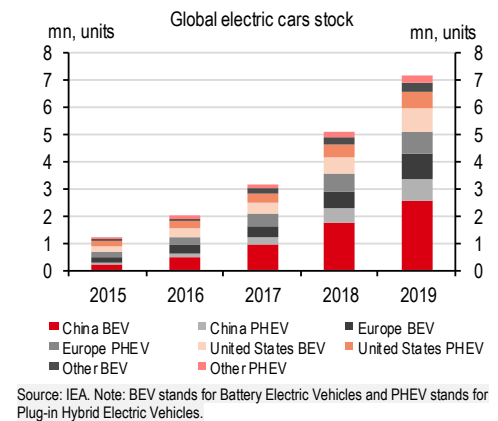
### On your bike

When the pandemic struck, bike sales shot up dramatically as people deemed walking and cycling as safer transport options, but longer term, cities need to invest in policies to encourage the use of self-powered transport - but with a neutral impact on climate due to new road and pavement construction.

### 7. Amsterdam is cycling towards net zero



### 8. China leads the way on EVs



### Electrification

Private vehicles will have to play a role in the transportation mix as not everyone is able or willing to walk and cycle so electrifying existing forms of transport will be key. Challenges remain, however, with concerns over the cost, charging infrastructure and reliability proving to be headwinds.

On top of this, autonomous vehicles look set, one day, to play a big part in cutting emissions – with shorter journeys (without the need to find parking), better use of space in cities (without the need for as many parking spaces) and allowing a rapid shift towards electric vehicle fleets.

### Public transport is key

But while electric and autonomous vehicles will play a big part in cutting urban emissions, there is still a big role for public transportation. During COP26, the C40 organisation announced that public transport usage needs to double by 2030 if the world is to reach 1.5°C alignment.

Infrastructure-heavy transportation options can be extremely expensive. Buses, however, can be implemented quickly, cheaply and easily. Though, in the aftermath of the pandemic, with fewer people using public transport, funding could be a challenge.

### Clean energy

Energy production is responsible for over 70% of total CO<sub>2</sub> emissions (IEA). A shift from polluting energy-producing methods to more renewable energy can reduce CO<sub>2</sub> emissions significantly.

Citizens can also act as a catalyst for this switch to renewables. This can be in a number of ways: giving preference to energy suppliers that use renewables, or becoming prosumers of energy (through rooftop solar PV or micro wind turbines).

*The full note contains sections on Smarter and Greener buildings, how the World Green Building Council is a force for change, a discussion on why nudging Behavioural Change can be a powerful method to combat climate change, and a look at how Circular Cities are pulling it all together*

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## Adaptation

An estimated 95% of global funding on climate action goes on mitigation according to IPCC, and more is generally known about how to decarbonise global energy and industrial sectors. Adaptation action looks different, and is more varied; it can focus on infrastructure resilience, water and food security, prevention of weather-related economic losses, or protecting lives. The need to adapt to climate change is also uneven by geography and skewed towards EM/FM countries.

The goals for COP26 in terms of adaptation were focused on financing resilience, habitat protection and restoration and adaptation communication. During the conference, it was agreed that adaptation finance flows will be “at least double” 2019 levels by 2025 – so to USD40bn – in an effort to help meet some of the needs of heightened adaptation spend. The recently agreed structure of a new carbon market for use by countries also includes a levy of 5% that will direct money towards an Adaptation Fund, which is designed to build resilience in developing economies. COP26 also saw new requirements for any countries that have not yet provided information on climate adaptation in their Paris Agreement pledges to do so by COP27, in 2022.

## What's next?

### Urban investment to step up

To tackle the enormous environmental and social challenges created by climate change we expect cities to step up their investment in the coming years. Some of this is simply because it makes sense economically.

But on top of the direct economic impact, making cities appealing places to live is now more paramount than at any time in recent history, with a much more geographically mobile labour force being able to choose where they live in the coming years. As a result, making cities work better or cleaner will be key priorities. We could see cities reform the way they work, with the growth of 15-minute cities, something that we expect to gain even more prominence in the future.

### COP26 accelerates the moves

One of the initiatives announced during COP26 is the declaration on accelerating the transition to 100% zero emission cars and vans. A number of cities (and states) are aiming to have all owned or leased car and van fleets be zero emissions by 2035. We are hopeful that these pledges will pave the way for more ambition and progress on this in future.

On buildings, the UK Urban Climate Action Programme was launched during COP26. The programme is designed to help cities to transition to lower carbon, primarily via decarbonisation of building in urban areas. The programme, with GBP27.5m of funding will focus on support for cities across Africa, Asia, and Latin America regions.

## Who pays?

All this investment needs to be funded somewhere. The estimated more than USD200bn spending needed on public transport every year for the next decade amounts to 0.2% of global GDP per year. That's 2% of global GDP – just on that infrastructure in 100 cities. clearly a huge funding cost.

The green bond market potentially has a big role to play in this financing. Three green bond project types stand out as being particularly suited to funding cities: clean transportation, climate change adaptation and green buildings. Social bonds could also be aimed at providing affordable housing, and are well suited to funding cities.

Green, social and sustainability bonds offer two advantages: they bring visibility to the underlying projects and they typically provide cheaper funding – the “greenium” or spread at which green bonds trade to non-green bonds is on average slightly negative due to the demand from ESG investors.

Getting funding, no matter where it comes from, is going to be crucial to how well cities are able to fight climate change – and given their importance in that battle this will be a key part of the global fight against rising temperatures in the coming years.

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