Cities Outlook

2020

centreforcities

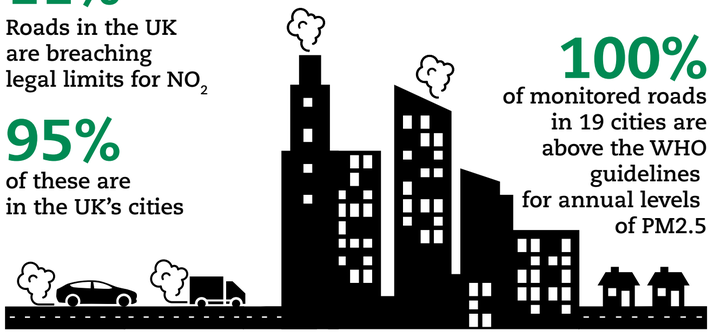
Air pollution is an urban problem

Levels of pollutants NO_2 and PM2.5 are higher in cities and large towns than their surrounding areas

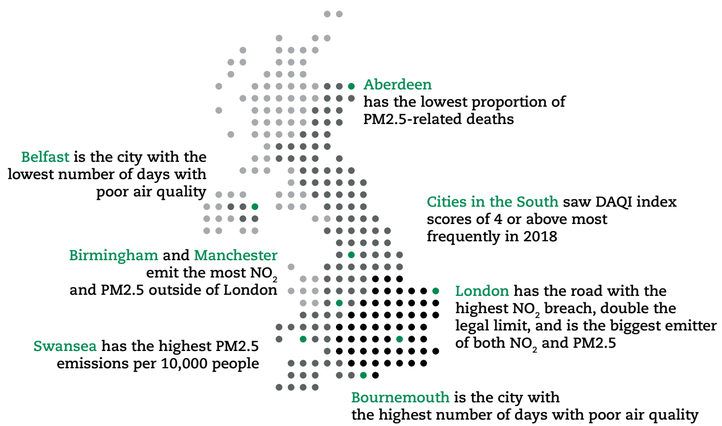
11%
Roads in the UK are breaching legal limits for NO_2

95%
of these are in the UK's cities

100%
of monitored roads in 19 cities are above the WHO guidelines for annual levels of PM2.5



There is a South / North divide and the South is worst affected



To clean up the air we breathe, the UK's largest cities and towns should:

Cities with poor quality air should introduce London-style Clean Air Zones

Set tighter minimum emission standards for burning stoves and ban domestic burning

The UK Government should:

Triple the size of the Clean Air Fund to **£660m**

Adopt World Health Organization stronger guidelines on PM2.5

Give cities more powers and resources to clean up their air

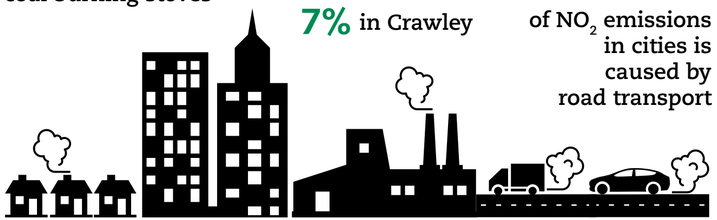
Introduce Environmental Improvement Bonds

Sources of air pollution vary across cities

50%
of PM2.5 emissions in cities come from domestic sources, including wood and coal burning stoves

Industrial processes in some cities contribute more to NO_2 emissions than others:
68% in Warrington
7% in Crawley

42%
of NO_2 emissions in cities is caused by road transport



It kills thousands every year and affects the health of many more

In 2017, just one pollutant, PM2.5, was estimated to have caused over
14,400
deaths in UK cities

This is in spite of the UK meeting current legal limits

That is an urban average of
1 in 19 deaths
Rising to
1 in 16 deaths in cities like London, Slough, Chatham and Luton
But it is lower, at
1 in 33 deaths in cities like Dundee and Aberdeen

Contents

01

Cities Outlook 2020

Political gains, economic realities

Political gains, economic realities

The political imperative for investing in the North and Midlands is clear from last month's election. But the Government must work with economic realities if it is to deliver for the voters who delivered its majority.

"*I believe that talent and genius and initiative and chutzpah are evenly distributed across the whole UK. But it is also clear that opportunity is not evenly distributed and it is the job of this one-nation Conservative government to unlock talent in every corner of the UK because that is the right thing to do in itself and because that is the way to release the economic potential of the whole country.*"

Boris Johnson, Conservative Party Conference 2019

The last decade was one of stagnation for the economy and of turbulence in politics. Four general elections, four prime ministers and two referendums have been set against a backdrop of public sector austerity, barely positive wage growth and poor productivity improvements.

The UK enters the third decade of this century with a former Mayor of London as Prime Minister. He presides over a government with the largest majority in almost 15 years, elected on a promise to level the country up and govern as a 'one nation' or 'people's government'.

Much has been written about how voters in towns helped secure the political ambition of a parliamentary majority. But if the Government is to achieve its economic ambitions – genuinely 'levelling up' regions across the country – then it is larger urban areas that hold the key.

The election result has led to calls for the Government to reward those areas that helped it win its majority with increased spending. The political imperative here is obvious. The make-up of the Conservative Government looks less southern than would ever have seemed feasible 10 years ago. In May 2010, the Tories held 107 seats in the North and Midlands compared to Labour's 143. Today, 150 are blue and 111 red.

Of this 43-seat increase, there is a distinctly urban flavour. Compared to 12 more in non-urban areas, the Conservatives gained 31 urban seats in the North and Midlands, of which 17 were part of larger urban areas such as Birmingham, Sheffield and Manchester.

There has been no such change in the geography of the economy in the last decade. In 2010, the south of England accounted for 53 per cent of all economic output, up from 51 per cent in 1998. By 2018 (the latest available data), this had continued to widen to 54 per cent, driven by the growth of London.

These patterns are not sustainable either economically or politically. But the economic reality means that the Government must be careful what it promises so as not to create a noose for its own neck. To govern is to decide – to deliver on pledges requires prioritisation driven by an understanding of both the politics and the economics.

A clear set of policies should be put in place to help all areas of the country – be they central London boroughs, cities, towns or villages – to improve the quality of public services available to people no matter where they live. This should be done in two ways.

The first is to **end austerity for local government in this year's Spending Review**. As Cities Outlook 2019[1] showed, local government is the part of government that has by far and away been hardest hit by austerity. This has had implications for the range and quality of services local government delivers, particularly those for which it does not have a statutory obligation. To protect spending in social care for example, other areas such as spending on planning and cultural services have seen even larger cuts.

The second is to make good on its election commitments to **increase spending on other public services**, such as education, policing and the NHS. In doing so it can pull a lever over which it has clear control to improve the standard of living for people everywhere, including in its newly-won constituencies.[2]

1 Centre for Cities (2019), Cities Outook 2019, London: Centre for Cities.

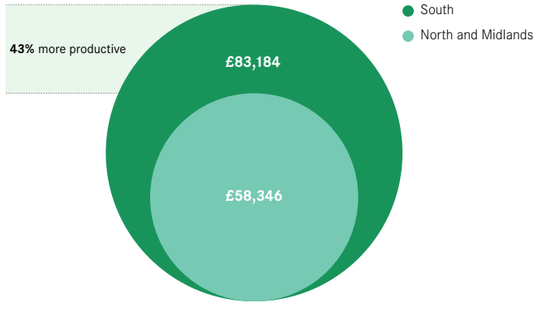
2 Westlake S (2019), Hunting for Hinzelmann, or: helping towns without magical thinking.

In stark contrast, the levers it has to pull to significantly reshape the economy – and specifically where certain parts of the economy locate – are much more limited, despite claims made by politicians for many decades.[3]

The move to a more knowledge-based economy that has happened in recent decades and that will most likely continue in the coming ones is one that, in principle, benefits the largest cities and towns. This has been seen in a number of developed countries,[4] and occurs because of what urban areas allow businesses to access – deep pools of talent and knowledge.

The major problem for the UK is not that these trends have left some smaller places behind, although clearly a number have suffered, but that many large cities in particular have not been able to sufficiently grasp the opportunities these global forces have presented to them. Cities such as Manchester and Liverpool lag behind the national economy in terms of productivity, when they should be leading it. In 2018, cities in the South[5] were 43 per cent more productive than those in the North and Midlands (see Figure 1). If the cities of the North and Midlands 'levelled up' to those of the South, the UK economy would be £183 billion – or 9 per cent – larger.

Figure 1:
Productivity of British cities (GDP per worker)



Source: ONS (2020), Regional gross domestic product (GDP) reference tables, Business Register of Employment Survey, 2018 data.

3 Swinney P and Thomas E (2015), A Century of Cities: Urban economic change since 1911, London: Centre for Cities.

4 For example, see Moretti, E. (2013) The New Geography of Jobs. Houghton Mifflin Harcourt, New York for how this has evolved in the USA.

5 Defined as the regions of London, South East, East and South West.

This has limited the increase in job opportunities and wages for the 16 million people who live in cities in the North and Midlands and those people living in smaller towns around them. The contrasting fortunes of places such as Hertford and St Albans to those of Hartlepool and St Helens help illustrate this.

This means that, in order to achieve its objective of 'levelling up', the Government needs to identify the cities that, with support, have the potential to be more successful than they currently are and can have a 'pull-up' effect on surrounding areas.

The support offered should take **two forms**:

The first is to **go further on devolution**. The last decade has seen the introduction of eight new metro mayors to add to the mayoralty in London. This did not seem likely in 2010 and constitutes welcome progress, but it has stalled since the EU referendum. Some major cities, such as Leeds, have no mayor in place and so have a very limited suite of powers to improve their economy. This needs to change.

And, while other city regions, such as Greater Manchester and Liverpool City Region, do have a mayoral devolution deal in place, the powers they have in a number of areas are inferior to those held by the Mayor of London, not to mention mayors elsewhere in the world. The Government should use May's metro mayoral elections to ensure that the existing and new metro mayors can stand as equals with global counterparts such as New York's Bill de Blasio, Paris's Anne Hidalgo and Berlin's Michael Mueller.

But market forces and policy challenges are too big and persistent for local effort to do this alone. While devolution is necessary, it is not sufficient on its own. So, secondly, there should be **direct intervention from the Government** in conjunction with the city regions it aims to improve, based on the following principles:

- **Selective investment** in a few places reflecting relative potential, rather than jam-spreading money across lots of areas.
- **Significant investment** – in the billions per year – rather than one-off pots of smaller sums of cash.
- **Sustained investment**, with funding over a 10-year period, rather than short, ad-hoc funds to deal with specific issues.

The 2010s will be viewed as a decade of austerity, uncertainty, stop-start policy and hiatus. The 2020s must represent a new decade of investment from national government and more devolution of power to help tackle the nation's number one economic problem: the underperformance of many of its largest cities and towns. For the success and cohesion of the country as a whole, we cannot afford for this decade to be anything else.

02

Holding our breath

How poor air quality blights cities

How poor air quality blights cities

The state of the environment has never been higher on the national and international agenda, driven by concerns about climate change. Air quality has received less attention but, given the impact it has on the health of residents and workers in cities in particular, urgent action is needed from local and national government to clean up the air we breathe.

Climate change has rightly risen up the national and international agenda over the last year, thanks to the actions of movements such as Extinction Rebellion and Youth Climate Strikes. And it has become a big issue for local government – in the UK, more than 260 local authorities have declared states of 'Climate Emergency'. In Centre for Cities and Arup's Urban Voices survey of elected city leaders at the end of last year, climate change was identified as a top policy priority.[6]

Less attention has been paid to tackling air pollution, which is more local in its impact. And yet it is a killer - with an effect equivalent to 40,000 deaths each year, air pollution is the largest environmental risk to public health in the UK. These health effects also directly impact productivity: air pollution causes over six million sick days a year in the UK.[7] Cities, as places that concentrate economic activity and the pollutants they produce, are particularly affected. But there is too little awareness of the geography of air pollution and its impacts. Using a range of measures (see Box 1), this chapter sets out how air quality varies across UK cities, and what this means for policy.

6 Jeffrey S, Neuhuber T, Arntzen S, and Wilcox Z (2019), Urban Voices, London: Centre for Cities.

7 Royal College of Physicians (2016), Every breath we take: the lifelong impact of air pollution. Report of a working party, London: RCP.

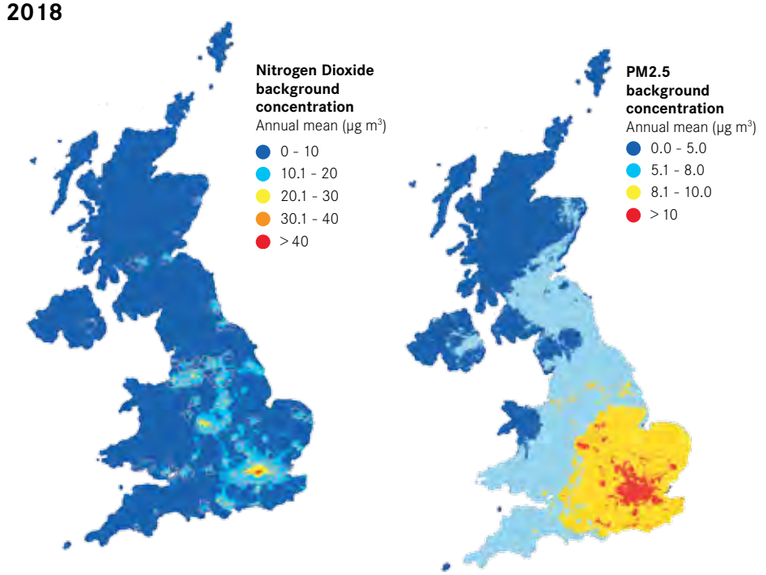
Air pollution is an urban problem

Air quality tends to be worse in cities than elsewhere in the country. Figure 2 shows the geography of background concentration levels of two major pollutants – nitrogen dioxide (NO_2) and fine particulate matter 2.5 (PM2.5)[8] - across the UK.

NO_2 has a clear local pattern and is mostly concentrated where it is emitted: in urban areas and by busy roads. NO_2 values are particularly high in the areas around London, but all urban areas have high levels.

PM2.5, which includes soot and dust generated by the burning of fuels and from brake pads being applied to tyres, is more widely spread. Despite this there is still a clear geography – levels are higher in cities than their surrounding areas, and particularly high in cities in the Greater South East.[9] The higher levels seen across the Greater South East as a whole result partly from emissions from London and from contributions from continental Europe.

Figure 2:
UK ambient air quality: NO_2 and PM2.5 annual mean concentration, 2018



Source: Defra, 2019. Background mapping for local authorities.

8 PM2.5, also known as fine particulate matter, refers to particles that have a diameter less than 2.5 micrometres.

9 Defined as the region comprising London, South East and East.

Box 1: Methodology box: how to measure air pollution?

Air pollution is difficult to measure and there is not one single way to present pollution or to assess the quality of air. While some work focuses on the pollution stemming from specific pollutants such as NO_2 or particulate matter, other methods look at several different pollutants within one index.

It is important to differentiate between emissions and concentration data. Emissions data is mostly used for the identification of the source and its origin (such as transport or domestic combustion). But, as local emissions are only part of the story, it is the concentrations of pollution that give an indication of how polluted a place is. Concentration levels are measured at monitoring sites, located either nearby (roadside) or further away (background) from roads.[10]

To give a comprehensive, comparative picture of air quality across the UK, this chapter uses different approaches to measure air pollution. It uses data from the Met Office's Daily Air Quality Index, which uses five different pollutants[11] to give an overview of air pollution in the UK, and complements this by looking in more detail at nitrogen dioxide and particulate matter 2.5.

For nitrogen dioxide concentration, the UK is not currently meeting the legally-binding target of an annual mean of 40 micrograms per cubic metre ($\mu g/m^3$). And, while legal limits for PM2.5 (set at 25 $\mu g/m^3$) are not being breached, they do exceed World Health Organisation guidelines of 10 $\mu g/m^3$.

10 While roadside concentration helps measure traffic-related concentration levels, it is important to consider components coming from outside the local source, in order to obtain a broader picture of air pollution in an area, hence the use of background concentration. It can be defined as the remaining pollution concentration if all the local sources were removed. These two elements provide an accurate estimate of air pollution concentration in an area.

11 The index is based on five pollutants: nitrogen dioxide (NO_2), sulphur dioxide, ozone, and two types of particulate matters, PM10 and PM2.5.

Box 2: Defining cities

Centre for Cities' research focuses on the UK's 63 largest towns and cities, defined as primary urban areas (PUAs).

Unless otherwise stated, Centre for Cities uses data for PUAs in its analysis – a measure of the "built-up" area of a large city or town, rather than individual local authority districts. In this report PUAs are used in the analysis because they provide a consistent measure to compare concentrations of economic activity across the UK. This makes them distinct from city region or combined authority geographies.

You can find the full definitions table and a methodological note at: **www.centreforcities.org/puas.**

Poor air quality is a particular problem in southern cities

While cities generally show higher levels of pollution compared to non-urban areas, not all cities experience the same levels of air pollution.

The Daily Air Quality Index (DAQI) measures daily air quality in a place on a scale from 1 (low) to 10 (very high), and is made up of a basket of five pollutants. A score of 4 or above can affect adults and children with lung or heart problems, while values equal to 7 or above are likely to have immediate impacts even on those without existing health issues.[12] In the UK, average daily values are usually between 2 and 4, but these mask spikes in pollution in specific areas.[13]

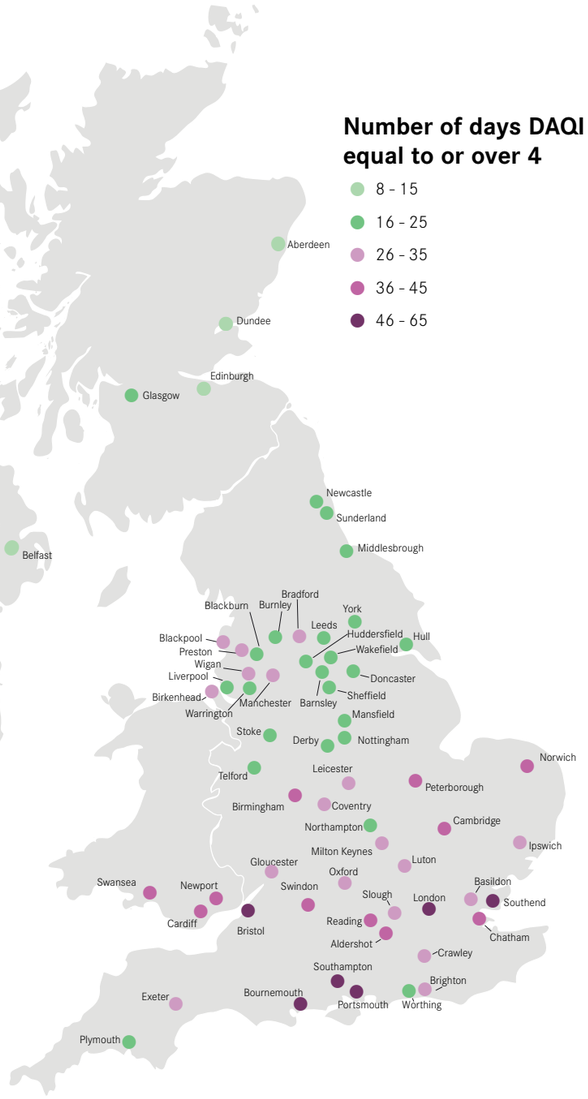
12 Above 7, the UK Air website recommends to the general population to consider reducing outdoor activities.

13 The data of the DAQI models background air quality, which does not consider the impact of local sources such as roadsides and or industrial sites. The air pollution close those local sources may be larger.

Figure 3:

Number of days the maximum modelled DAQI was equal to or above 4 in 2018

City	Number of days DAQI equal to or above 4	City	Number of days DAQI equal to or above 4
Bournemouth	62	Bradford	26
London	56	Crawley	26
Southampton	52	Leicester	26
Portsmouth	49	Wigan	26
Bristol	48	Blackburn	25
Southend	48	Liverpool	25
Norwich	45	Northampton	25
Swansea	44	Plymouth	25
Reading	42	Telford	25
Aldershot	41	Middlesbrough	25
Cambridge	40	Worthing	25
Chatham	40	Stoke	24
Birmingham	39	York	24
Cardiff	38	Burnley	23
Peterborough	38	Hull	23
Swindon	37	Leeds	23
Newport	36	Mansfield	23
Slough	35	Nottingham	23
Basildon	35	Warrington	23
Gloucester	34	Newcastle	22
Ipswich	33	Sheffield	22
Luton	33	Sunderland	21
Manchester	31	Barnsley	19
Coventry	30	Doncaster	19
Oxford	30	Huddersfield	19
Brighton	29	Derby	16
Exeter	29	Glasgow	16
Blackpool	29	Wakefield	16
Milton Keynes	29	Dundee	11
Preston	28	Aberdeen	9
Birkenhead	27	Edinburgh	7
		Belfast	7



Source: Met Office, 2019.

Figure 3 shows the number of days during 2018 when the maximum DAQI in one place in a city was equal or above 4 in a year, i.e. the number of days where air quality was poor enough to affect those with pre-existing health issues.

Cities in the South saw scores of 4 or above most frequently in 2018. Bournemouth had the highest number, with DAQI measuring 4 or above on 62 separate days of the year. It was followed by London and Southampton, which had over 50 days where this score was met or exceeded.[14]

Edinburgh and Belfast had the lowest number, with just seven days at or above 4. They were followed by two other Scottish cities, Aberdeen and Dundee, with respectively 9 and 11 days.

Of the basket of pollutants in the DAQI, two are of particular concern for human health. The first, nitrogen dioxide (NO_2), is the only pollutant for which the UK breaches existing legal limits. And, while the UK complies with the law for the second, particulate matter 2.5 (PM2.5), it is well above the guidelines recommended by the World Health Organisation (WHO).

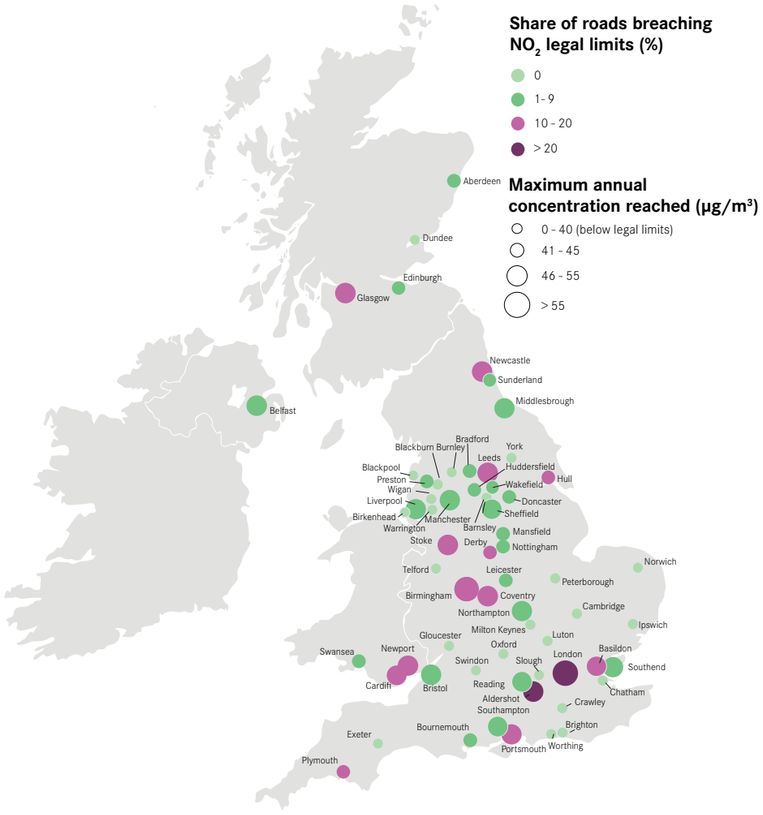
For NO_2, there are two measures to consider – the number of roads that breach legal limits (shown by the colours in Figure 4) and by how much the worst performing roads breach this limit (shown by the size of the circles). The map shows that 38 of 63 cities had monitored roads which record excessive NO_2 concentrations and 15 cities had 10 per cent or more of their roads above legal limits. They are relatively spread across the country, but London had the highest proportion with nearly 40 per cent of monitored roads on average above the legal limit. The capital was followed by Aldershot, Coventry and Basildon.

London also had the road with the highest reading of NO_2 in the country, which was more than twice the legal limit, followed by roads in Birmingham, Southampton and Middlesbrough.

14 The Met Office notes that modelling for air quality in coastal areas is more challenging than elsewhere.

Figure 4:

Share of roads breaching NO_2 legal limits and the maximum concentration reached, 2018



Source: Defra, 2019. Annual average nitrogen dioxide concentrations for all modelled UK road links.

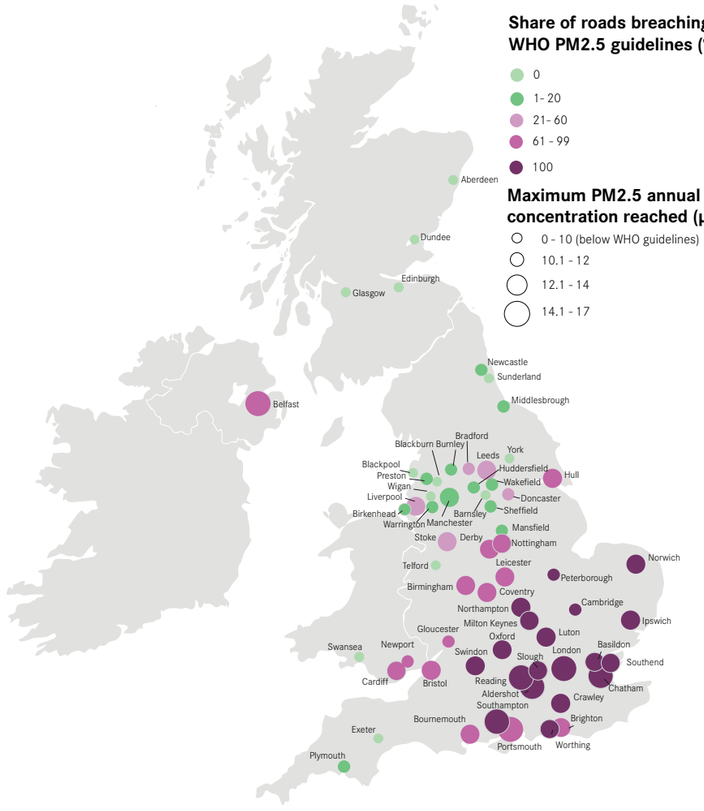
Turning to PM2.5, data shows that around 62 per cent of monitored roads[15] in UK cities exceed the WHO guidelines for annual levels of PM2.5 (10 micrograms per cubic metre (µg/m^3)) as illustrated by the large share of purple circles in Figure 5. If the WHO guidelines were law in the UK, all the monitored roads in 19 cities would breach this limit.

15 There are more than 9,900 monitoring sites located on A roads and motorways across the UK. The readings are dependent on the location and monitors available. Not all roads are monitored and the existence of monitors may be skewed towards more densely-populated areas.

The geography of cities exceeding the WHO guidelines for PM2.5 is more clear cut than that of those breaching legal limits for NO_2. Cities in the South of England tend to perform more poorly on this measure, with Scottish cities having amongst the fewest breaches. In terms of highest concentration reached, the worst monitored road was once again located in London (17 µg/m^3), followed by other cities in the South East of England: Portsmouth, Aldershot, Chatham and Reading, which all have a maximum recorded value of around 15 µg/m^3.

Figure 5:

Share of roads breaching PM2.5 WHO guidelines and the maximum concentration reached, 2018



Source: Defra, 2019. Annual average PM2.5 concentrations for all modelled UK road links.

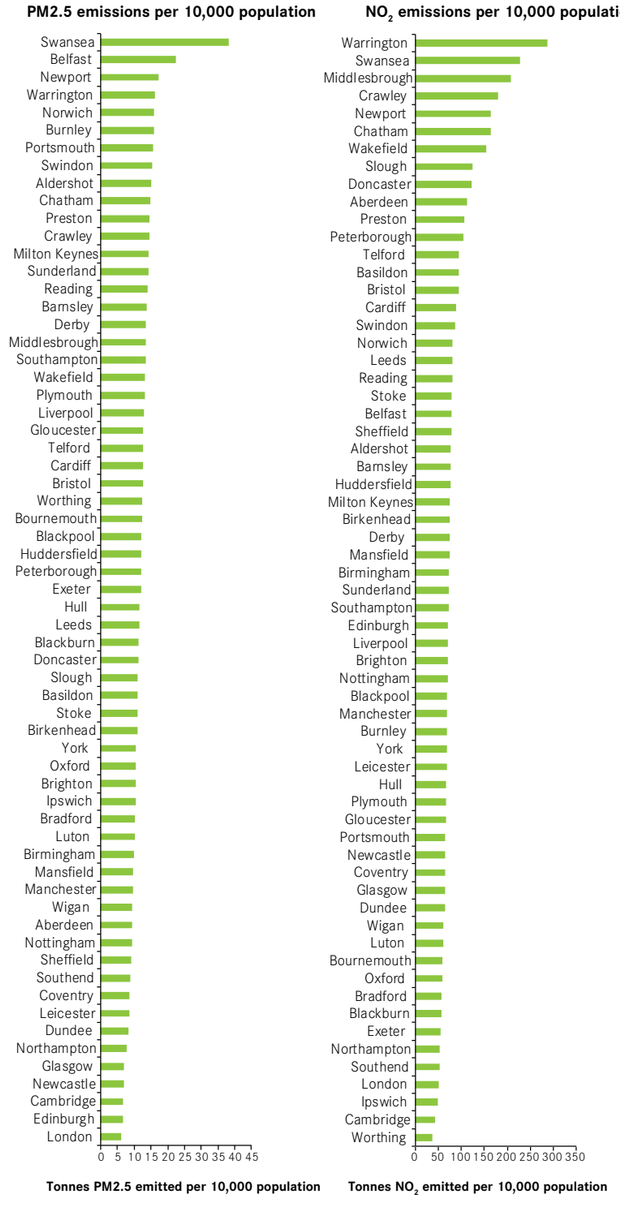
Not all air pollution in a city is generated by that city

Air quality in a city is not only determined by the activities in a city itself. Some air pollution is blown in from elsewhere. For example, high levels of PM2.5 in the Greater South East, as shown earlier, are partly explained by pollution coming across the Channel from the continent. There is little cities can do about this and addressing it will require international agreements and action.

But national and local policy has much more control over locally-generated air pollution and looking at the data on emissions shows the size of this problem. In absolute terms, London, Birmingham and Manchester emit the highest tonnages of emissions, both for PM2.5 and NO_2. London particularly stands out, as it emits more than 6,000 tonnes of PM2.5, and 51,000 tonnes of NO_2, which is as much as three times the tonnage emitted in the other two.

On a per-capita basis, Swansea and Belfast have the highest PM2.5 emissions per 10,000 inhabitants, while London has the lowest (see Figure 6). For NO_2, Warrington, Swansea and Middlesbrough have the highest emissions per 10,000 inhabitants.

Figure 6:
PM2.5 and NO_2 emissions per 10,000 population across UK cities, 2018



Source: BEIS 2019. UK National Atmospheric Emissions Inventory (NAEI).

The sources of air pollution vary across cities, and road transport is just one of a number of causes

Transport is the main source of NO_2 emissions but not the only one. At a national level, road transport accounts for 34 per cent of all NO_2 emissions,[16] and this rises to 42 per cent in cities – it represents the biggest source of local NO_2 in 54 cities (see Figure 7).

But transport plays a smaller role in PM2.5 emissions, accounting for 12 per cent of these emissions at a national level, with similar levels in UK cities. Instead, it is domestic combustion (for example, through coal or wood fires) that is the biggest contributor. Around 38 per cent of PM2.5 levels in the UK can be explained by domestic wood and coal burning.[17] In cities, this rises to 50 per cent, and is the largest source of PM2.5 in 57 UK cities. Some of this is to do with the rise in the use of wood stoves. The industry body HETAS estimated that the number of wood stove registrations increased 10-fold between 2004 and 2014.[18]

The sources of air pollution vary significantly between cities, both for NO_2 and PM2.5. Figure 7 shows, for instance, that in Slough a relatively large part of NO_2 comes from combustion in energy production, whereas in Middlesbrough, Warrington and Swansea, industrial processes contribute more to NO_2 emissions. Meanwhile, in places like Chatham or Worthing, PM2.5 is almost exclusively driven by combustion in commercial, institutional and domestic activities. In Aberdeen and Crawley, non-road transport (such as shipping or air transport) contributes a larger share of PM2.5 emissions.

Even looking at the level of a city hides variation in the sources of air pollution within them. Figure 8 shows a sector breakdown of PM2.5 emissions in city centres and suburbs. While road transport's contribution is much higher in city centres, in suburbs more than half of PM2.5 emissions come from domestic and commercial combustion. Such a difference can be explained in part by higher congestion rates and traffic flows in city centres, and residential wood burning in less central areas. This shows that in tackling air pollution, different approaches will be required even within a city.

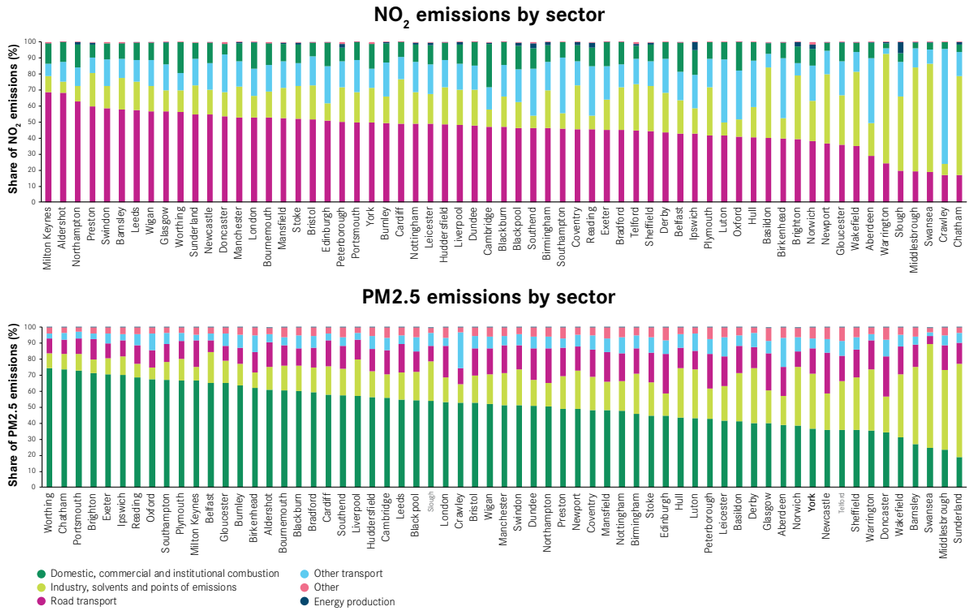
16 Defra (2019), Clean Air Strategy. London: The Stationery Office. Note: this figure is provided for nitrogen oxides, which are here expressed as NO_2.

17 Defra (2019), Clean Air Strategy. London: The Stationery Office.

18 Defra (2018), Domestic burning consultation. Impact assessment.

Figure 7:

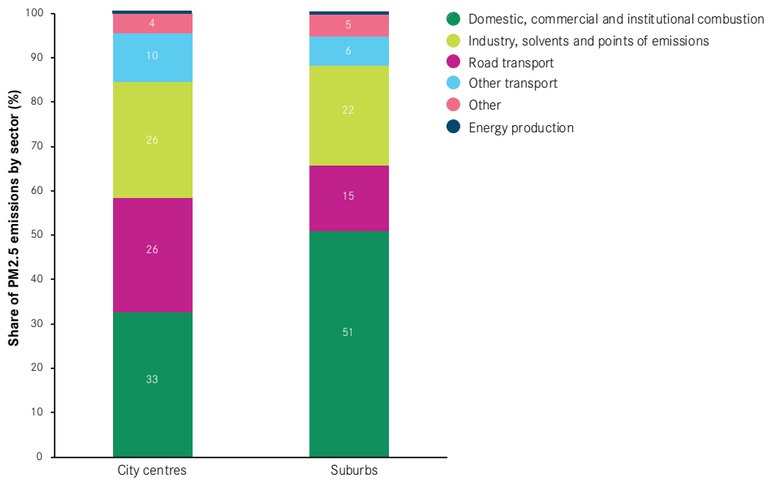
NO_2 and PM2.5 sector breakdown for UK cities, 2018



Source: BEIS 2019. UK National Atmospheric Emissions Inventory (NAEI).

Figure 8:

The composition of sources of PM2.5 emissions for city centres and suburbs, 2018



Source: BEIS 2019. UK National Atmospheric Emissions Inventory (NAEI).

Air pollution kills thousands of people each year, and affects the health of many more

Local data on the number of people whose health is affected by poor air quality is limited – asthma attacks brought on by poor air quality, for example, are difficult to record in a systematic way. Box 3 looks at the broader health impacts in more detail.

What can be estimated are the deaths attributable to one pollutant, PM2.5, in cities across the UK. These estimates show that, even on this very limited measure, poor air quality is a killer.[19]

This one pollutant is estimated to have caused just over 14,400 deaths of those aged 25 or older in UK cities in 2017 (see Figure 9). In absolute terms, large cities had the largest number of residents estimated to have died due to PM2.5. London had the highest number, followed by Birmingham and Manchester.

Figure 9:

Estimated absolute number of attributable deaths caused by PM2.5, 2017

Source: Defra 2019, Population-weighted annual mean PM 2.5 data. National Records of Scotland 2019, Deaths Time Series Data, 2017 data. Northern Ireland Statistics and Research Agency 2019, Registrar General Annual Report 2017 Deaths, 2017 data. ONS 2019, Mortality statistics, 2017 data.

19 Calculations use attributable fractions and are based on the methodology of Gowers AM and Stedman JR (2014), Estimating Local Mortality Burdens associated with Particulate Air. Estimates are of attributable deaths as 'an effect on mortality equivalent to X deaths at typical ages'.

Box 3: What are the health impacts of air pollution?

The Royal College of Physicians has estimated that air pollution is responsible for more than 20,000 hospital admissions a year due to respiratory or cardiovascular diseases.[20] There is no comprehensive local data on the various health impacts of air pollution. However, research conducted by King's College London and UK 100[21] has estimated the following effects on nine UK cities:

- Living near a busy road in London may contribute to 230 hospital admissions for strokes every year.
- Living near a busy road may stunt lung growth in children by 12.5 per cent in London and 14.1 per cent in Oxford.
- In Birmingham, the risk of outside-hospital cardiac arrest is 2.3 per cent higher on high pollution days.
- Higher air pollution days are responsible for 43 more people going to hospital for respiratory disease in Southampton, 68 in Bristol, 98 in Liverpool.

Public Health England[22] estimates that there could be around 2.5 million new cases of coronary heart disease, stroke, lung cancer and other health conditions by 2035 if pollution levels remain the same.

20 Royal College of Physicians (2018), Reducing air pollution in the UK: progress report, London: RCP.

21 Williams M et al (2019), Personalising the Health Impacts of Air Pollution – Summary for Decision Makers, London: King's College London.

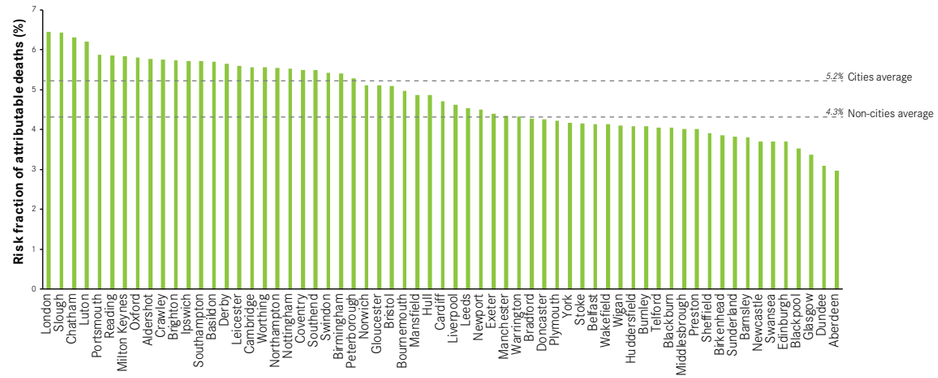
22 Public Health England (2018), Estimation of costs to the NHS and social care due to the health impacts of air pollution.

When looking at the proportion of local deaths that can be attributed to long-term exposure to PM2.5, the rank of cities changes as illustrated in Figure 10. London as the biggest city in the UK still tops the list but it is followed by a number of smaller cities – Slough, Chatham and Luton. For these cities, around one in 16 deaths is attributed to PM2.5 pollution (more than 6 per cent).[23]

This is in contrast to cities like Dundee and Aberdeen, where around one in 33 deaths is related to PM2.5 exposure (around 3 per cent). This echoes the outcomes of the DAQI index: the five worst cities in Figure 10 all had more than 30 days a year when DAQI was 4 or above, while the Scottish cities with the lowest share are ranked at the bottom of the DAQI index.

Figure 10:

Proportion of local deaths that can be attributed to long-term exposure to PM2.5, 2017



Source: Defra 2019, Population-weighted annual mean PM 2.5 data

These deaths occur in spite of the UK meeting current legal limits. Local authorities in Scotland follow the stricter WHO guideline for PM2.5,[24] after the Scottish Parliament published its Clean Air Strategy in 2015 in which the annual concentration objectives were set at 10 µg/m^3. But this is not the case elsewhere in the UK.

23 That the risk fraction is higher for cities in the South East cannot exclusively be attributed to their comparatively higher levels of economic activities. Emissions from the continent can also have an impact.

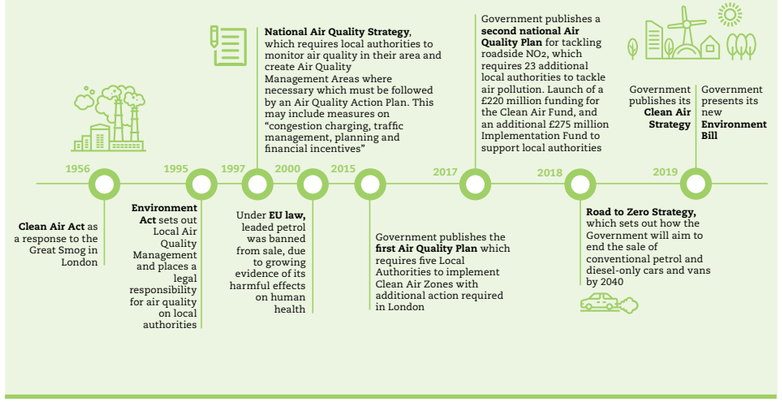
24 The 10 µg/m^3 target is not binding.

Cities have not responded sufficiently to the impact of air pollution on their residents and workers

Local policy aimed at limiting air pollution in recent years has at best been slow and at worst absent. The rush to declare Climate Emergencies by local authorities in the last year – a global issue over which they have very little direct control - strongly contrasts with action on air pollution, an issue where their actions can more clearly make a difference.

National policies addressing air pollution have a long history in the UK and have been successful when concrete action was undertaken. In 1956, the first national policy to target air pollution – the Clean Air Act - was introduced in response to the 'Great Smog' in London. Box 4 sets out a timeline of national policies in this area since the 1950s.

Box 4: Timeline of air pollution policies



More recently, two place-based policies have been introduced at the local level - Air Quality Management Areas (1995) and Clean Air Zones (2015).

Air Quality Management Areas

Air Quality Management Areas (AQMAs) were first introduced by the 1995 Environment Act. They are areas designated by local authorities that face air quality challenges, and vary in size, from one street to, in Liverpool's case, the whole city centre. When national air quality standards and objectives have been met, and will continue to be, an AQMA can be revoked.[25]

Since their implementation, a total of 902 AQMAs have been introduced by 285 local authorities. Despite the concentration of air pollution in UK cities, 56 per cent of currently-active AQMAs are located outside cities.

The main issue of AQMAs is that, on the whole, they have been ineffective. Of the 902 AQMAs established in the last two decades, 670 are still active today, as illustrated in Figure 11. And 29 cities have not revoked *any* of their AQMAs. This suggests that a significant number of areas have so far failed to sufficiently address their local air quality issues.

This perhaps is not surprising given that local authorities are not legally obliged to meet the objectives set by their action plans.[26] There is, then, little incentive to do anything about poor air quality within them.

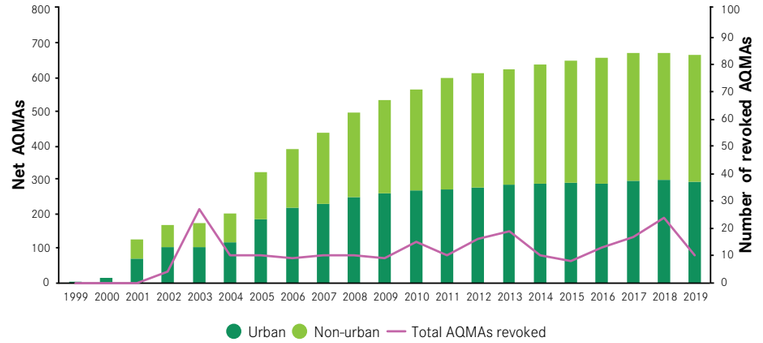
In addition, most AQMAs are focused only on NO_2. But, as shown above, although important, NO_2 is just one of a number of pollutants contributing to poor air quality.

25 Local Authorities can have more than one AQMA, which can range in size from one street to larger urban areas. In some cities, AQMAs were merged.

26 Although this recognises that local authorities are not solely responsible for air pollution levels in their area, it demonstrates there is a lack of clear duty for local authorities.

Figure 11:

Creation and revocation of AQMAs



Source: Defra 2019. Air Quality Management Areas

Clean Air Zones

The successive legal challenges brought by the environmental law charity ClientEarth against the UK Government for breaching its duty to meet the legal limit for NO_2 have sparked more recent action on air pollution. As set out in the Air Quality Plan,[27] Clean Air Zones (CAZs) are the Government's preferred policy tool. CAZs can either be 'charging' zones, where they involve a fee on vehicles that do not meet the emission standards,[28] or 'non-charging': where they do not impose fees, but rely on other measures to improve air quality. These include developing cycle lanes, improving public transport or introducing traffic-flow management.

27 Defra (2017), UK Plan for tackling roadside nitrogen dioxide concentrations, London: The Stationery Office.

28 It is up to the local authority to decide which type of vehicle will be charged.

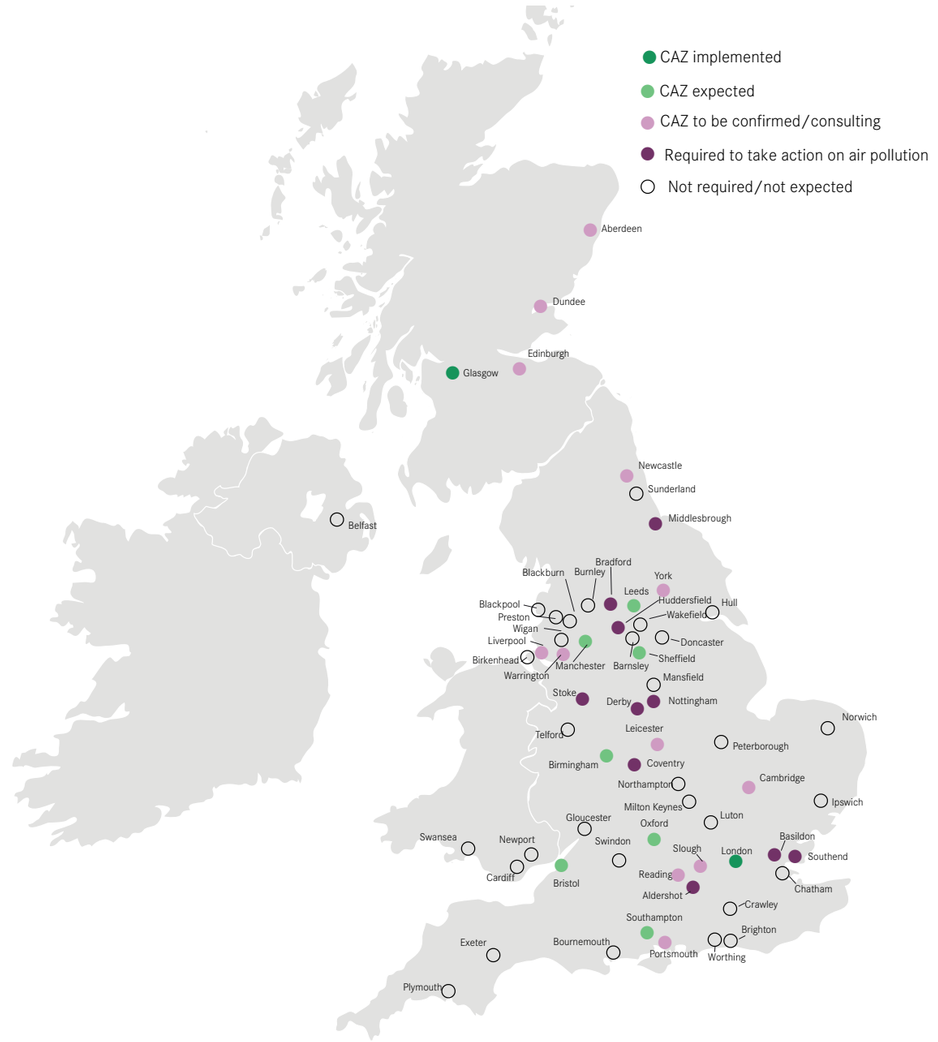
The UK Government has mandated a number of areas to tackle their levels of NO_2:

- Six 'first wave' local authorities in 2015 – London, Birmingham, Nottingham, Southampton, Leeds and Derby – with the Government suggesting that CAZs were the preferred action to take.
- A further 23 English local authorities in 2017 to carry out feasibility studies on ways to reduce NO_2 pollution.
- Another 33 were designated to do the same in 2018, including eight where NO_2 concentration projections were worse than expected.[29]

Despite the requirement from Government, the local response has largely been disappointingly slow. Figure 12 shows the current implementation of Clean Air Zones in the UK. Just two CAZs have been put in place, in London and Glasgow.[30] The lack of action is more frustrating because the evidence from London suggests that CAZs have an impact on reducing NO_2 emissions (see Box 5).

While there are plans to introduce CAZs of various forms elsewhere, none of the other 'first wave' cities, that were required to put a CAZ in place by 2020, have yet done so, nor do they have sufficient alternative arrangements. Despite the problems of air pollution illustrated above, most cities have either delayed the introduction of a CAZ, or have decided against implementing it.

Figure 12:
Clean Air Zones in the UK



Source: UK 100 (2019) Clean Air Zones briefing. Defra (2015,2017,2018).

29 These include Bradford, Portsmouth, Stoke, Leicester and Liverpool.

30 In Glasgow, the Clean Air Zone implemented is a Low Emission Zone, launched in 2018 for buses only. It will charge all non-compliant vehicles in 2022.

Of those that have developed proposals, some go further than others. For example, while Birmingham has taken the politically-courageous decision to charge non-compliant private cars, Greater Manchester and Leeds have not, and Southampton will not charge at all, implementing a 'non-charging' CAZ. After some delay, Bristol recently approved its plan, which will not charge private cars but will ban all diesel vehicles in the city centre from 2021, and York has recently decided to ban all private cars from its city centre by 2023.

One argument made against introducing charging zones is that charges will disproportionally affect poorer people, but poorer households are less likely to own a car. In addition, toxic air harms low-income households more, for example, because they are more likely to live near a busy road. This means that charges that effectively reduce local air pollution should disproportionately benefit poorer households.[31]

A further issue with CAZs is that like the AQMAs before them, they tend to be very narrow in focus, looking to target NO_2 emissions from transport. While this may be a pragmatic first step, ultimately future interventions will need to be broader in scope than just transport.

31 Defra (2017), Air Quality: a briefing for directors of public health, London: Public Health England.

Box 5: How London's Ultra Low Emission Zone has reduced air pollution

In April 2019, London launched its first Ultra Low Emission Zone (ULEZ), which operates in the existing central London Congestion Charge Zone. By implementing stricter emission standards, the aim of the ULEZ is to reduce the number of old, polluting vehicles circulating in the central zone, and therefore improve air quality. The evaluation of the first six months of the zone showed significant progress[32] (although some improvements reflect the impact of the Toxicity Charge introduced in 2017):

- Increase of the average compliance rate with ULEZ standards from 39 per cent in February 2019 to 77 per cent in September 2019.
- Reduction of 36 per cent of NO_2 concentration in central London between February 2017 and September 2019.
- Reduction of NO_2 concentration equivalent to 29 per cent in central London, compared to a scenario with no ULEZ , based on average data between July and September 2019.
- Reduction of nitrogen oxides emissions from road transport in the central zone by 31 per cent.
- Reduction in the number of polluting and non-compliant vehicles in the zone by 38 per cent, which corresponds to 13,000 fewer on an average day.

London has also introduced a near £50 million scrappage scheme to incentivise people to switch to cleaner vehicles, allocating £25 million for low-income motorists, in addition to an existing £23 million scrappage scheme for micro-businesses, sole traders and charities.

32 GLA (2019), Central London Ultra Low Emission Zone - six month report, London: GLA..

What needs to change

Laudable environmental concerns in relation to climate change need to be mirrored in action on the linked issue of air pollution, on which progress has been frustratingly patchy and, in places, too slow. Politically, it is difficult given the strength of the motoring and other lobbies but it is by no means impossible as London has shown.

After all, this is an issue that is affecting the health of people living and working in cities, that increases the number of sick days taken in workplaces and in the most extreme cases kills residents. It is difficult to think of a more compelling case for action.

So this is what needs to change. In **the UK's largest cities and towns**:

1. Those cities with poor quality air should 'level up' to London-style CAZs, charging the most environmentally-damaging vehicles to enter their centres.
2. Expand their policy action to have a broader focus than just transport:
    - Set tighter minimum emission standards for burning stoves and ban domestic burning in areas with high PM2.5 levels.
    - Work on raising public awareness on the effect of domestic combustion.
    - Restrict the sale of polluting fuels.
3. Advocate collectively to central government for more powers and resources to clean up their air.

To support this, **the UK Government** should:

1. Triple the size of the Clean Air Fund, which currently is £220 million for the period 2018/19 to 2020/21 to help cities introduce policies to improve air quality. A share of the budget should be specifically used to fight cross-boundary air pollution by funding authorities to make interventions that improve the air quality of their neighbours.
2. Introduce Environmental Improvement Bonds, based on the current Social Impact Bond model, allowing cities to keep some of the savings made from reduction in NHS treatment of air quality-related illness.
3. Expedite passing its Environment Bill, which should legislate to:
    - Adopt the WHO's stricter guidelines on PM2.5 as a target to be met by 2030.
    - Give local authorities greater powers to declare and enforce smoke control areas.
    - Establish an independent body to hold the Government to account on environmental issues after the UK leaves the EU.
4. Secure an international agreement with the EU to tackle trans-boundary air pollution coming from the continent.

03

City monitor

The latest data

City monitor: the latest data

There is considerable variation in the economic performance of cities and towns across the UK. The purpose of this chapter is to show the scale and nature of this variation by highlighting the performance of the 63 largest urban areas[33] on 17 indicators covering:

- Population
- Employment
- Wages
- Business dynamics
- Innovation
- Productivity
- Skills
- Housing
- Digital connectivity
- Environment

For most indicators, the 10 strongest and 10 weakest performing places are presented.

Tables of the full list of cities can be found at www.centreforcities.org/data-tool

Population

- In 2018, cities accounted for 9 per cent of land, but for 54 per cent of the UK population (36 million) and for 56 per cent of population growth between 2017 and 2018.
- The four biggest cities (London, Birmingham, Manchester and Glasgow) accounted for almost a quarter of the total UK population (24 per cent) and for 45 per cent of the total population living in cities.
- London alone was home to 15 per cent of the UK population and accounted for 23 per cent of all population growth in the UK between 2017 and 2018.
- Every city has experienced population growth compared to 10 years ago but, in eight cities, population declined compared to 2018. This is twice as many cities compared to 2017, when only four cities saw a decline.

33 Data for Bournemouth in this chapter reflects the geography of the new BCP local authority area.

Table 1:
Population growth

Rank	City	Growth rate, 2017-18 (%)	Population, 2017	Population, 2018	Change, 2017-18
10 fastest-growing cities by population					
1	Coventry	1.8	360,150	366,790	6,640
2	Wakefield	1.2	340,790	345,040	4,250
3	Exeter	1.2	128,920	130,430	1,510
4	Telford	1.2	175,770	177,800	2,030
5	Peterborough	1.1	198,910	201,040	2,130
6	Newport	1.1	243,750	246,350	2,600
7	Bristol	1.1	738,280	746,050	7,770
8	Edinburgh	1.0	513,210	518,500	5,290
9	Reading	1.0	328,060	331,180	3,120
10	London	0.9	10,062,280	10,151,260	88,980
10 slowest-growing cities by population					
54	Dundee	0.0	148,710	148,750	40
55	Plymouth	0.0	263,070	263,100	30
56	Hull	0.0	260,670	260,650	-20
57	Warrington	-0.1	209,700	209,550	-150
58	Oxford	-0.2	154,580	154,330	-250
59	Northampton	-0.2	225,660	225,150	-510
60	Luton	-0.3	214,660	214,110	-550
61	Aldershot	-0.3	184,580	184,020	-560
62	Aberdeen	-0.5	228,800	227,560	-1240
63	Ipswich	-0.7	138,480	137,530	-950
	United Kingdom	0.6	66,040,230	66,435,550	395,320

Source: ONS, 2019, Population estimates, 2017 and 2018 data.

Employment rate

- Overall, the UK employment rate continued to increase in 2019, and was up by 0.6 percentage points compared to 2018. The city average (73 per cent) was unchanged, and remained slightly lower than the national average (76 per cent).
- Thirty-four cities had employment rates below the national average. To bring these cities up to the current UK average, a further 513,600 residents in these places would need to find employment.
- Bradford, the UK city with the lowest employment rate in 2019 (66 per cent), would need 29,600 of its residents to find employment to reach the UK average. Birmingham remains the city with the highest deficit in absolute terms (-113,000) despite an increase in its employment rate (1.4 percentage points).
- Large cities tend to fare worse than smaller cities. Two of them – Birmingham and Liverpool – are among the cities with the lowest employment rate. Only Bristol features in the top 10 cities with the highest employment rate.

Table 2:
Employment rate

Rank	City	Employment rate, Jul 2018-Jun 2019 (%)	Employment rate, Jul 2017-Jun 2018 (%)	Percentage point change
10 cities with highest employment rate				
1	Oxford	82.4	81.3	1.1
2	Aldershot	82.2	78.9	3.4
3	Ipswich	81.8	76.4	5.4
4	Southend	80.4	82.9	-2.5
5	Cambridge	80.4	75.2	5.1
6	Reading	79.7	78.3	1.3
7	Northampton	79.5	76.5	3.0
8	Preston	79.4	82.8	-3.4
9	Bristol	79.0	79.2	-0.1
10	Bournemouth	78.9	76.5	2.4
10 cities with lowest employment rate				
54	Swansea	69.9	67.7	2.2
55	Luton	69.8	69.7	0.1
56	Sunderland	69.7	71.0	-1.3
57	Liverpool	68.6	68.4	0.2
58	Blackburn	68.4	64.2	4.2
59	Burnley	68.4	71.5	-3.2
60	Birmingham	68.3	66.9	1.4
61	Middlesbrough	68.3	67.8	0.5
62	Dundee	66.8	65.1	1.7
63	Bradford	66.3	68.1	-1.8
	United Kingdom	75.5	74.9	0.6

Source: ONS 2019, Annual Population Survey, July 2017 - June 2018 and July 2018 - June 2019.
DfE NI 2019, District Council Labour Market Structure Statistics for Belfast, 2017-2018 and 2018-2019 data.

Unemployment benefit claimant count

- More than two-thirds (72 per cent) of those claiming unemployment benefits lived in cities in November 2019.
- The claimant count rate in cities is at 3.3 per cent, more than twice the average rate for elsewhere in the country and only 18 cities have a claimant count rate lower than the UK average of 2.6 per cent.
- None of the 10 cities with the highest claimant counts are in the North or Midlands, with Dundee being the only exception.
- Eight of the 10 cities with the lowest claimant counts are in the South, with York and Edinburgh being the exceptions.

Table 3:
Unemployment benefit claimant count

Rank	City	Claimant count rate, Nov 2019 (%)
10 cities with the lowest claimant count rate		
1	York	1.3
2	Aldershot	1.3
3	Exeter	1.5
4	Cambridge	1.5
5	Oxford	1.9
6	Edinburgh	1.9
7	Reading	1.9
8	Bristol	2.2
9	Portsmouth	2.3
10	Norwich	2.4
10 cities with the highest claimant count rate		
54	Newcastle	4.5
55	Liverpool	4.6
56	Dundee	4.6
57	Middlesbrough	4.7
58	Bradford	4.8
59	Blackburn	4.8
60	Sunderland	4.9
61	Blackpool	5.0
62	Hull	5.3
63	Birmingham	5.5
	United Kingdom	2.6

Source: ONS 2019, Claimant Count, November 2019 data. ONS 2019, Population estimates, 2018 data.

Note: The data differs to ONS claimant count rates as latest available population estimates are used to calculate the figures above.

Wages

- In 2019, the average weekly workplace wage in cities was £612, compared to the UK average of £571.
- Only 13 cities had wages above the UK average, with London's average weekly workplace wage being 35 per cent above the national average.
- Derby maintains its position as the only English city not in the Greater South East in the top 10, while Southend maintains its position as the only city in the Greater South East to be in the bottom 10.

Table 4:

Average workplace earnings

Rank	City	Wages, 2019 (av £ pw, 2019 prices)	Wages, 2018 (av £ pw, 2019 prices)	Real wages growth 2018-2019 (£ pw)
10 cities with the highest weekly workplace earnings				
1	London	768	768	0
2	Slough	731	660	71
3	Aldershot	707	662	45
4	Reading	678	684	-6
5	Derby	668	638	29
6	Cambridge	656	671	-15
7	Milton Keynes	651	623	29
8	Aberdeen	636	616	20
9	Crawley	617	655	-38
10	Oxford	608	624	-16
10 cities with the lowest weekly workplace earnings				
54	Preston	489	514	-25
55	Leicester	487	475	12
56	Mansfield	485	512	-27
57	Norwich	484	478	6
58	Stoke	483	473	10
59	Swansea	478	478	0
60	Wigan	478	446	31
61	Burnley	467	492	-25
62	Huddersfield	463	451	11
63	Southend	450	448	2
	United Kingdom	571	566	5

Source: ONS 2019, Annual Survey of Hours and Earnings (ASHE), average gross weekly workplace-based earnings, 2019 and 2018 data; DfE NI 2019, Annual Survey of Hours and Earnings (ASHE), average gross weekly workplace-based earnings, 2019 and 2018 data. Own calculations for PUA-levels weighted by number of jobs, CPI inflation adjusted (2015=100). Earnings data is for employees only, whereas the rest of the tables use employment data.

Note: ASHE statistics are based on a sample survey, so the statistical significance of the results should be treated with caution.

Business starts and closures

- Two out of three businesses (63 per cent) that started up in 2018 were located in cities. This has increased in recent years: in 2011, 58 per cent of business starts were in cities.
- Despite this, only 13 cities had a start-up rate higher than the UK average of 57 per 10,000 population.
- At the same time, 61 per cent of UK business closures occurred in cities in 2018.
- The three cities with the highest number of business closures – London, Manchester and Milton Keynes – were also among the top 10 cities for business start-ups.
- Liverpool, Southampton and Brighton had the highest churn rate – these cities saw the greatest difference between new businesses setting up and existing businesses closing.

Table 5:

Business starts and closures per 10,000 population

Rank	City	Business start-ups per 10,000 population, 2018	Business closures per 10,000 population, 2018	Churn rate*
10 cities with the highest start-up rate				
1	London	105.0	84.9	3.0
2	Brighton	90.0	56.3	6.1
3	Manchester	82.1	76.7	1.1
4	Milton Keynes	81.0	60.9	3.6
5	Northampton	80.2	59.3	4.4
6	Southampton	80.0	52.9	6.4
7	Luton	74.7	56.3	4.6
8	Liverpool	73.8	49.3	7.0
9	Slough	72.8	56.0	3.5
10	Reading	67.2	57.7	1.8
10 cities with the lowest start-up rate				
54	Middlesbrough	36.5	33.1	1.2
55	Wakefield	35.5	34.1	0.5
56	Mansfield	34.5	28.6	2.2
57	Wigan	34.5	30.7	1.3
58	Dundee	34.3	29.9	1.7
59	Belfast	33.4	29.3	1.2
60	Stoke	33.2	30.8	0.9
61	Hull	31.7	27.8	1.5
62	Plymouth	31.2	27.0	1.7
63	Sunderland	27.6	27.0	0.2
	United Kingdom	57.3	50.5	1.5

Source: ONS 2019, Business Demography, 2018 data. ONS 2019, Population estimates, 2018 data.

*Difference between start-ups and business closures as a percentage of total business stock.

Business stock

- Cities were home to 56 per cent of all UK businesses in 2018.
- However, only 10 cities had a higher business stock per 10,000 population than the UK average (442).
- London alone accounted for 23 per cent of the total UK business stock and for 42 per cent of total cities' business stock, far larger than Manchester and Birmingham (accounting for 4 per cent and 3 per cent of the total UK business stock respectively).
- London also ranked first for business stock per capita, with 677 businesses per 10,000 population.

Table 6:

Business stock per 10,000 population

Rank	City	Business stock per 10,000 population, 2018	Business stock per 10,000 population, 2017	Change, 2017-18 (%)
10 cities with the highest number of businesses				
1	London	677	678	-0.2
2	Milton Keynes	553	545	1.6
3	Brighton	551	526	4.6
4	Reading	539	541	-0.4
5	Warrington	510	536	-4.8
6	Aldershot	489	491	-0.4
7	Slough	483	472	2.5
8	Manchester	474	463	2.4
9	Northampton	471	476	-1.0
10	Basildon	465	464	0.1
10 cities with the lowest number of businesses				
54	Barnsley	284	282	0.7
55	Middlesbrough	282	282	-0.2
56	Swansea	282	265	6.2
57	Stoke	278	278	-0.1
58	Mansfield	270	273	-0.9
59	Hull	262	264	-0.8
60	Dundee	254	252	1.0
61	Plymouth	247	250	-1.0
62	Sunderland	229	234	-1.9
	United Kingdom	442	443	0.1

Source: ONS 2019, Business Demography, 2017 and 2018 data. ONS 2019, Population estimates, 2018 data.

Note: Luton has been removed from the latest data due to irregularities compared with previous years' data.

Private sector jobs growth

- Between 2017 and 2018, the number of private sector jobs increased slightly faster in cities (1.2 per cent) than the country as a whole (1.0 per cent).
- In 2018, 59 per cent of all private sector jobs were located in cities, and 70 per cent of the 190,500 jobs created between 2017 and 2018 were created in cities.
- Forty cities increased their number of private sector jobs compared to 2017, and 30 did so by more than the British average.
- Four of the cities with the highest private sector jobs growth in 2017 were amongst the cities with the lowest private sector jobs growth in 2018. These were Middlesbrough, Newcastle, Bradford and York.

Table 7:
Private sector jobs growth

Rank	City	Change, 2017-2018 (%)	Private sector jobs, 2017	Private sector jobs, 2018	Net job gains or losses
10 cities with the highest net private sector jobs growth					
1	Blackburn	12.4	44,500	50,000	5,500
2	Edinburgh	7.8	231,000	249,000	18,000
3	Derby	5.2	95,500	100,500	5,000
4	Manchester	4.4	917,000	957,500	40,500
5	Newport	4.3	80,500	84,000	3,500
6	Barnsley	4.3	58,500	61,000	2,500
7	Leeds	4.2	348,000	362,500	14,500
8	Oxford	3.3	61,500	63,500	2,000
9	Chatham	3.1	64,500	66,500	2,000
10	Crawley	3.1	81,500	84,000	2,500
10 cities with the lowest net private sector jobs growth					
53	Newcastle	-1.2	285,500	282,000	-3,500
54	Cardiff	-1.3	149,500	147,500	-2,000
55	Birmingham	-1.8	809,500	795,000	-14,500
56	York	-2.0	76,500	75,000	-1,500
57	Swindon	-2.1	96,500	94,500	-2,000
58	Middlesbrough	-2.3	129,000	126,000	-3,000
59	Sunderland	-2.9	87,500	85,000	-2,500
60	Bradford	-3.1	145,500	141,000	-4,500
61	Gloucester	-3.4	44,000	42,500	-1,500
62	Luton	-3.5	72,000	69,500	-2,500
	Great Britain	1.0	22,733,500	22,952,000	218,500

Source: ONS 2019, Business Register and Employment Survey, 2017 and 2018 data.

Note: Northern Ireland data not available, so the figure for Great Britain is shown.

Public and private sector jobs

- In 2018, the private to public sector employment ratio in Great Britain was 2.9.
- In general, the job market in cities tends to be more dominated by publicly-funded activities than the national average. Out of 62 cities, only 19 had private to public employment ratios above the British average.
- Crawley had the highest private to public sector ratio, with seven private-sector jobs for each public one. At the other end of the spectrum, Oxford had almost the same number of private and public sector employees, mainly the result of its universities.

Table 8:

Ratio of private sector to publicly-funded jobs

Rank	City	Private to public ratio, 2018	Private sector jobs, 2018	Publicly-funded jobs, 2018*
10 cities with the highest proportion of private sector jobs				
1	Crawley	7.3	84,000	11,500
2	Slough	4.8	70,000	14,500
3	Warrington	4.4	111,000	25,500
4	Swindon	4.0	94,500	23,500
5	Aldershot	3.8	85,500	22,500
6	London	3.7	4,645,000	1,261,500
7	Milton Keynes	3.7	145,000	39,500
8	Reading	3.6	153,500	42,500
9	Peterborough	3.5	92,000	26,000
10	Basildon	3.4	67,000	20,000
10 cities with the lowest proportion of private sector jobs				
53	Liverpool	2.0	212,500	107,500
54	Gloucester	1.9	42,500	22,000
55	Plymouth	1.9	72,500	38,500
56	Exeter	1.8	61,000	33,500
57	Birkenhead	1.8	66,500	37,500
58	Swansea	1.7	102,500	59,000
59	Dundee	1.6	47,000	30,000
60	Cambridge	1.5	65,500	43,000
61	Worthing	1.5	29,500	20,000
62	Oxford	1.1	63,500	59,000
	Great Britain	2.9	22,952,000	7,862,500

Source: ONS 2019, Business Register and Employment Survey, 2018 data.

Note: Northern Ireland data not available so the figure for Great Britain is shown.

*Publicly-funded jobs are defined as those jobs that fall into the sectors of public administration and defence, education, and health. This means that this definition captures private sector jobs in these sectors but also captures jobs such as GPs and those in universities that the standard ONS definition does not.

Innovation

- In total, there were about 7,800 patent applications in 2018. Of these, 48 per cent were in cities.
- The overall number of patent applications fell compared to the previous year. In 2018, there were on average 12 patent applications per 100,000 residents, an average of six patents fewer than in 2017.
- Cambridge continues to be the city with the highest number of published patent applications.
- The top 10 cities for patent applications accounted for 17 per cent of all applications in the country and for 35 per cent of all applications in cities.

Table 9:

Patent applications published per 100,000 residents

Rank	City	UK patent applications published per 100,000 residents, 2018
10 cities with highest number of published patent applications		
1	Cambridge	148.1
2	Coventry	95.5
3	Oxford	64.5
4	Derby	61.0
5	Aldershot	39.0
6	Aberdeen	34.1
7	Edinburgh	31.6
8	Gloucester	24.0
9	Bristol	20.1
10	Birkenhead	19.9
10 cities with lowest number of published patent applications		
54	Liverpool	5.4
55	Sunderland	4.9
56	Glasgow	4.4
57	Southend	4.3
58	Luton	4.3
59	Doncaster	4.1
60	Ipswich	4.1
61	Barnsley	3.6
62	Wakefield	2.9
63	Wigan	2.6
	United Kingdom	11.9

Source: PATSTAT 2019, January-November 2018 data. Intellectual Property Office 2019, Patents granted registered by postcode, January-October 2018 data. ONS 2019, Population estimates, 2018 data.

Productivity

- In 2018, productivity, measured as GDP per worker, was higher on average in cities (£71,100) compared to the national average (£68,900). In addition to this, GDP per worker saw a greater average increase in cities, rising by 2.9 per cent compared to a 2.3 per cent national average.
- However, only 12 cities out of 62 had levels of productivity above the British average. With the exception of Edinburgh, all of them are in the Greater South East.
- In 16 cities, productivity per worker was at least 20 per cent lower than the national average. In Blackburn, it was almost 30 per cent lower than the national average.

Table 10:
GDP per worker

Rank	City	GDP per worker, 2018 (£)
10 cities with the highest GDP per worker		
1	Slough	100,000
2	London	91,300
3	Swindon	86,800
4	Milton Keynes	84,800
5	Reading	83,800
6	Worthing	81,300
7	Luton	80,900
8	Edinburgh	75,100
9	Ipswich	75,100
10	Basildon	74,200
10 cities with the lowest GDP per worker		
53	Newcastle	53,500
54	Huddersfield	53,500
55	Doncaster	53,300
56	Barnsley	52,900
57	Blackpool	52,700
58	Oxford	52,200
59	Dundee	52,100
60	Newport	52,000
61	Mansfield	49,700
62	Blackburn	48,700
	Great Britain	67,400

Source: ONS 2019, Regional Gross Domestic Product (GDP), 2018 data. ONS 2019, Business Register and Employment Survey, 2018 data.

Note: Northern Ireland data not available so the figure for Great Britain is shown.

High-level qualifications

- Cities are home to 58 per cent of the UK working-age population with a degree or equivalent qualification.
- However, the UK's high-skilled population is concentrated in a few cities. The top 10 cities combined account for over 29 per cent of the UK's high-skilled population (compared to 22 per cent of the working-age population).
- In 2018, 43 cities had a share of population with high-level qualifications lower than the UK average (39 per cent), less than in 2017, when 46 cities were below the national average.
- Scottish cities perform particularly well on this measure, and three out of four are now in the top 10 for share of population with high-level qualifications.
- Eight of the 10 cities with the lowest share of population with high-level qualifications do not have a university. Hull and Sunderland are in the bottom 10 despite having universities.

Table 11:
Residents with high-level qualifications

Rank	City	Working age population with NVQ4 & above, 2018 (%)
10 cities with the highest percentage of people with high qualifications		
1	Oxford	63.2
2	Cambridge	61.4
3	Edinburgh	58.8
4	Reading	53.8
5	London	52.1
6	Aberdeen	48.9
7	York	47.9
8	Brighton	47.2
9	Cardiff	46.8
10	Glasgow	46.7
10 cities with the lowest percentage of people with high qualifications		
54	Southend	26.9
55	Burnley	26.2
56	Barnsley	25.8
57	Wakefield	25.4
58	Peterborough	25.1
59	Sunderland	25.0
60	Hull	24.2
61	Basildon	23.0
62	Doncaster	22.6
63	Mansfield	20.3
	United Kingdom	39.2

Source: ONS 2019, Annual Population Survey, resident analysis, 2018 data. DETINI 2019, District Council Area Statistics for Belfast, 2018 data.

No formal qualifications

- Cities were also over-represented for people with no qualifications, although the share of people with no qualifications living in cities has slightly decreased compared to last year, from 59 to 58 per cent.
- Despite accounting only for 10 per cent of the UK's overall working-age population, the 10 cities with the highest share of population with no qualifications account for 15 per cent of all the national total.
- Some cities have very polarised skills profiles: Glasgow had the 10th highest share of population with high qualifications but also the ninth highest proportion of population with no qualifications. Similarly, Dundee ranked 12th in terms of high qualifications but also had a high share of population with no formal qualifications (11 per cent).

Table 12:
Residents with no formal qualifications

Rank	City	Percentage working age population with no formal qualifications, 2018 (%)
10 cities with the lowest percentage of people with no formal qualifications		
1	Bristol	4.1
2	Exeter	4.3
3	Gloucester	4.9
4	Southampton	4.9
5	Bournemouth	5.1
6	Plymouth	5.2
7	Crawley	5.2
8	Norwich	5.3
9	Reading	5.4
10	York	5.5
10 cities with the highest percentage of people with no formal qualifications		
52	Mansfield	11.8
53	Glasgow	11.9
54	Blackburn	12.4
55	Middlesbrough	12.5
56	Luton	13.2
57	Birmingham	13.3
58	Bradford	13.8
59	Leicester	14.6
60	Belfast	15.9
61	Burnley	19.6
	United Kingdom	8.0

Source: ONS 2019, Annual Population Survey, resident analysis, 2018 data. DETINI 2019, District Council Area Statistics for Belfast, 2018 data.

Note: Oxford and Belfast were excluded due to incomplete data.

Housing stock growth

- In 2018, cities accounted for 52 per cent of the UK's housing stock, but only for 49 per cent of new dwellings between 2017 and 2018.
- Housing stock growth exceeded the UK average in 20 cities only.
- For the third year, Cambridge is the city with the highest growth in housing stock and the city now has 16 per cent more homes than it did in 2008.
- In absolute terms, London is the city that added the most (36,700) new houses. However, this represented a housing stock growth of 0.9 per cent, ranking London only 22nd nationally.

Table 13:
Housing stock growth

Rank	City	Change 2017-2018 (%)	Housing stock 2017	Housing stock 2018	Change 2017-2018
10 cities with the highest housing stock growth					
1	Cambridge	2.2	53,180	54,330	1,150
2	Reading	1.6	134,440	136,650	2,210
3	Slough	1.6	54,390	55,240	850
4	York	1.5	88,280	89,580	1,300
5	Telford	1.4	74,360	75,410	1,050
6	Milton Keynes	1.4	109,970	111,460	1,490
7	Leicester	1.3	199,210	201,860	2,650
8	Exeter	1.3	53,930	54,640	710
9	Plymouth	1.3	117,210	118,680	1,470
10	Edinburgh	1.2	246,818	249,810	2,992
10 cities with the lowest housing stock growth					
54	Portsmouth	0.5	232,360	233,560	1,200
55	Birkenhead	0.5	147,630	148,340	710
56	Cardiff	0.5	107,587	108,088	501
57	Blackburn	0.5	60,520	60,800	280
58	Basildon	0.4	77,350	77,690	340
59	Warrington	0.4	91,660	92,020	360
60	Brighton	0.4	155,440	156,000	560
61	Oxford	0.3	58,720	58,910	190
62	Dundee	0.2	74,354	74,531	177
63	Ipswich	0.2	61,070	61,210	140
	United Kingdom	0.9	28,747,674	29,003,410	255,736

Source: Ministry of Housing, Communities and Local Government (MHCLG) 2019, Dwelling stock estimates by local authority district 2017 and 2018. Scottish Neighbourhood Statistics 2019, Dwelling stock estimates 2017 and 2018 data. Northern Ireland Neighbourhood information service 2019, Land and Property Services, 2017 and 2018 data.

House prices

- House prices in Great Britain increased on average by 0.5 per cent compared to 2018, with 33 cities seeing an increase.
- In 2019, house prices in London (£592,900) – the most expensive city – were almost twice the national average (£281,000), while house prices in Burnley (£106,800) – the least expensive city – were less than half the British average.
- The most expensive cities are not necessarily those building the most. Basildon, Brighton and Oxford are among the top 10 most expensive cities, but have some of the lowest housing stock growth in the country. In contrast, Cambridge, Reading and Slough are also among the most expensive places, but they lead the table for house building.

Table 14:
House price growth

Rank	City	Annual growth, 2018-2019 (%)	Average price, 2018 (£)	Average price, 2019 (£)	Difference in average prices, 2018-2019 (£)
10 cities with the highest rises in house prices					
1	Aldershot	5.5	374,100	394,700	20,600
2	Dundee	5.0	137,300	144,200	6,900
3	Ipswich	4.0	208,700	217,000	8,300
4	Gloucester	3.7	206,000	213,700	7,700
5	Derby	2.8	173,600	178,500	4,900
6	Bournemouth	2.8	336,000	345,400	9,400
7	Luton	2.7	242,800	249,500	6,600
8	Brighton	2.2	390,800	399,300	8,600
9	York	2.0	270,000	275,300	5,300
10	Mansfield	1.9	150,800	153,800	2,900
10 cities with the lowest rises in house prices					
53	Wakefield	-2.4	168,200	164,100	-4,100
54	Crawley	-2.6	303,800	296,000	-7,800
55	Wigan	-2.7	149,400	145,300	-4,100
56	Exeter	-3.0	284,000	275,300	-8,700
57	Middlesbrough	-3.3	146,200	141,400	-4,800
58	Peterborough	-3.4	207,900	200,800	-7,100
59	Cambridge	-3.7	533,800	514,200	-19,600
60	Blackpool	-3.7	161,100	155,200	-5,900
61	Sunderland	-3.9	135,400	130,100	-5,300
62	Milton Keynes	-5.7	306,300	288,800	-17,500
	Great Britain	0.5	279,500	281,000	1,475

Source: Land Registry 2019, Market Trend Data, Price Paid, 2018 and 2019 data. Scottish neighbourhood statistics 2019, Mean House Prices, 2018 and 2019 data.

Note: Northern Ireland data not available so the figure for Great Britain is shown.

Housing affordability

- In 2019, on average, house prices in Britain were 9.4 times the annual salary of residents. This is slightly more affordable than the previous year, where the affordability ratio was 9.8.
- In total, only 15 out of 62 cities were less affordable than the British average.
- Only 18 cities have become more affordable over the last decade. However, all of them were already among the most affordable places 10 years ago.

Table 15:

Housing affordability ratio

Rank	City	Affordability ratio	Average house price, 2019 (£)	Annual wages, 2019 (£)
10 cities with the highest affordability ratio				
1	Oxford	17.2	501,300	29,100
2	London	15.8	592,900	37,500
3	Cambridge	15.3	514,200	33,700
4	Brighton	13.5	399,300	29,500
5	Bournemouth	12.1	345,400	28,500
6	Reading	11.7	404,600	34,600
7	Aldershot	11.3	394,700	35,000
8	Basildon	11.2	329,900	29,600
9	Bristol	10.8	308,200	28,400
10	Southend	10.8	337,100	31,300
10 cities with the lowest affordability ratio				
53	Middlesbrough	5.6	141,400	25,200
54	Dundee	5.6	144,200	25,800
55	Doncaster	5.5	141,800	25,600
56	Wigan	5.4	145,300	26,900
57	Stoke	5.4	135,800	25,300
58	Sunderland	5.4	130,100	24,300
59	Liverpool	5.3	142,600	26,900
60	Barnsley	5.3	139,400	26,500
61	Hull	5.3	118,100	22,500
62	Burnley	4.0	106,800	26,600
	Great Britain	9.4	281,000	29,800

Source: Land Registry 2019, Market Trend Data, Price Paid, 2019 data. Simple average used. Scottish House Price Statistics 2019, Mean House Prices, 2018 and 2019 data. ONS 2019, Annual Survey of Hours and Earnings (ASHE), average gross weekly resident earnings, 2019 data.

Digital connectivity

- The share of UK premises that had access to 'ultrafast' broadband (>100 Mbps) increased from 56 per cent in 2018 to 59 per cent in 2019.
- In 54 out of 63 cities, the proportion of properties with access to ultrafast speeds exceeded the UK average.
- Milton Keynes and Aberdeen experienced the largest growth in properties with access to ultrafast broadband (23 and 21 per centage point increases respectively).
- While there is variation in the coverage of ultrafast broadband (>100 Mps), the next level down in speed, 'superfast' broadband (>30 Mbps), is more consistently available, with all cities having at least 90 per cent of their properties covered by 'superfast' broadband.

Table 16:

Premises achieving ultrafast broadband speeds (>100 Mbps)

Rank	City	Properties achieving ultrafast broadband, 2019 (%)
10 cities with the highest ultrafast broadband penetration rate		
1	Hull	98.7
2	Luton	95.4
3	Worthing	94.9
4	Belfast	94.4
5	Brighton	93.6
6	Cambridge	93.5
7	Dundee	93.3
8	Portsmouth	93.1
9	Plymouth	92.2
10	Ipswich	91.7
10 cities with the lowest ultrafast broadband penetration rate		
54	Huddersfield	63.2
55	Sunderland	58.2
56	Newport	58.1
57	Milton Keynes	55.2
58	Sheffield	53.3
59	Southend	49.4
60	Barnsley	49.3
61	Wakefield	44.7
62	Doncaster	44.6
63	Aberdeen	23.3
	United Kingdom	58.8

Source: Thinkbroadband.com, percentage of premises covered with ultrafast broadband (>100 Mbps) as at the end of 2019. http://labs.thinkbroadband.com/local/postcode-search. Ultrafast coverage figures include FTTP (fibre to the premises) coverage only, and do not include business grade leased line services and other on-demand connectivity solutions. To qualify as covered by FTTP, fibre must reach to the kerb near premises, with no additional construction required. Aberdeen has a low proportion of such FTTP but other connectivity options are available.

CO_2 emissions

- In 2017, cities accounted for 54 per cent of the UK population but for only 45 per cent of the UK's total CO_2 emissions.
- Average UK emissions per capita in 2017 totalled 5.3 tonnes (down from 5.5 tonnes in 2016), but the city average was lower at 4.5 tonnes.
- Swansea and Middlesbrough are significant outliers, emitting far more than the national average. However, Middlesbrough has seen a fall in its emissions (down 8 per cent compared to 2016), while emissions in Swansea increased by 3 per cent compared to 2016.
- Big cities are significant emitters, but they are very efficient when emissions are considered on a per capita basis. London, for example, accounted for 10 per cent of total emissions in 2017, but was 10th lowest out of 63 cities for per capita emissions with only 3.6 tonnes emitted for every resident.

Table 17:
Total CO_2 emissions per capita

Rank	City	Total CO_2 emissions per capita, 2017 (t)	Total CO_2 emissions per capita, 2016 (t)
10 cities with the lowest emissions per capita			
1	Ipswich	3.0	3.1
2	Worthing	3.1	3.3
3	Brighton	3.2	3.4
4	Southend	3.2	3.4
5	Luton	3.2	3.3
6	Chatham	3.3	3.3
7	Exeter	3.4	3.7
8	Plymouth	3.4	3.6
9	Bournemouth	3.5	3.7
10	London	3.6	3.8
10 cities with the highest emissions per capita			
54	Crawley	5.3	5.5
55	Aberdeen	5.4	5.7
56	Barnsley	5.6	5.7
57	Wakefield	5.8	6.3
58	Preston	5.8	6.0
59	Newport	6.1	6.6
60	Warrington	6.6	7.0
61	Doncaster	6.7	6.7
62	Middlesbrough	12.1	13.1
63	Swansea	22.4	21.9
	United Kingdom	5.3	5.5

Source: Department of Energy and Climate Change (DECC) 2019, CO2 emissions per capita, 2017 and 2016 data. ONS 2017, Population estimates 2016 and 2017 data.

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