LOCALIS

A MODERN TRANSPORT INFRASTRUCTURE STRATEGY

Cleaner air through better transport infrastructure

About Localis

Who we are

We are a leading, independent think tank that was established in 2001. Our work promotes neo-localist ideas through research, events and commentary, covering a range of local and national domestic policy issues.

Neo-localism

Our research and policy programme is guided by the concept of neo-localism. Neo-localism is about giving places and people more control over the effects of globalisation. It is positive about promoting economic prosperity, but also enhancing other aspects of people's lives such as family and culture. It is not anti-globalisation, but wants to bend the mainstream of social and economic policy so that place is put at the centre of political thinking.

In particular our work is focused on four areas:

- **Reshaping our economy.** How places can take control of their economies and drive local growth.
- **Culture, tradition and beauty**. Crafting policy to help our heritage, physical environment and cultural life continue to enrich our lives.
- **Reforming public services.** Ideas to help save the public services and institutions upon which many in society depend.
- **Improving family li**fe. Fresh thinking to ensure the UK remains one of the most family-friendly places in the world.

What we do

We publish research throughout the year, from extensive reports to shorter pamphlets, on a diverse range of policy areas. We run a broad events programme, including roundtable discussions, panel events and an extensive party conference programme. We also run a membership network of local authorities and corporate fellows.

Advisory panel

This research project was supported by an advisory panel, whose members are listed below. Advisory panel members were interviewed and provided comments on report drafts as part of a roundtable event. They may not necessarily agree with every analysis and recommendation made in the report.

- Allan Andrews, Senior Policy Advisor to the Mayor of the West Midlands
- Sir Merrick Cockell, Chair of the London Pension Fund Authority
- Barbara Cooper, Corporate Director of Growth, Environment and Transport at Kent County Council
- Sir Peter Hendy, Chair of Network Rail
- Nicola Kane, Head of Strategic Planning and Research at Transport for Greater Manchester
- Sam Markey, Head of Executive Office at Future Cities Catapult
- Simon Neilson, Executive Director of Economy & Environment at Walsall Council
- William Roden, Senior Policy Lead at Midlands Connect.

Contents

Executive summary

The fight for cleaner air is one of liveability. What changes and investments are society willing to take for their place to be a more pleasant one to live and work in? How willing are people, businesses and governments to change the way they operate for a more sustainable economy? At what point do questions of future planning and prosperity become those that must be answered now?

Given clean air is an issue that spans boundaries – global, national and local – there is no single agent or institution that can instigate change in the direction and at the scale required. Moreover, there is no ready made solution. In the UK, 95% of Air Quality Management Areas are associated with transport sources but beyond this common element, every place's air quality problem looks different – its source, its extent, its impact – and so, therefore, should each place's policy response. As trends in lifestyles and technology continue to change, and people continue to move to cities, what *is* common to all air quality strategies across the country, and the world, is the central role of infrastructure. By improving the efficiencies of existing infrastructure, and building much-needed new infrastructure, places can shift people and businesses onto lower-emitting transport or can reduce the need to travel.

Following a raft of government strategies for tackling air quality on a national scale – for instance the Department for Environment, Food and Rural Affairs's (Defra's) Clean Air Strategy and the Department for Transport's (DfT's) Road to Zero strategy – this report therefore asks what can be done locally as part of modern infrastructure strategies. With the policy and procurement capacity of the local state, and its convening power, there is much places can do within their tight financial situations. Yet it is also true that better infrastructure costs money. A large portion of this should come from central government, particularly in areas with a limited fiscal base. However, places should also take the lead on arranging funding themselves. Both in attracting private capital and using local tax powers more actively.

What should a modern infrastructure strategy include?

From ship idling to online delivery markets, there are many issues a place can look to address as part of their infrastructure strategy. This report puts forward a number of interventions to that end. Yet, the reality is there is no one suite of reforms we can recommend. Infrastructure need varies across the country, while causes of dirty air are often hyper-local. They depend on the economic make-up of a place and, moreover, the capacity of people and businesses to adapt varies significantly. Despite this, some needs should be consistent across infrastructure strategies:

- **Strategic leadership**. Alongside air quality action plans led by individual local authorities, strategic authorities (combined authorities and county councils) should respond to air quality as part of their infrastructure strategies - some, such as Greater Manchester, already do this. This should include identifying the local infrastructure gap and reviewing funding and financing options for the delivery of better infrastructure in their area.

- **Collecting and using data more**. To enable better-designed policies, and wider use of technologies across a place and its population, greater collection and use of data intelligence is essential.
- **Taking a punt**. Whether it be people's use and adaptability to new technologies, or linking infrastructure funding to a growing tax base, many of the initiatives of a modern and more powerful infrastructure strategy will necessitate greater risk-taking by the public and private sectors.
- **Working within legal parameters**. High Court rulings mean places need to accelerate their air quality strategies. Achieving cleaner air quicker is clearly desirable, yet the rulings also pressure places to introduce 'visible' policies. The aim must remain the most effective and most viable policies.
- **Working within political parameters**. Many policy measures for tackling air quality carry significant trade-offs. Each necessitates one portion of society, or one set of organisations, changing their behaviour and sometimes that may bring a financial burden. As a result, it is important measures are supported by the public and businesses.
- **Focusing on all causes of pollution**. As recognised in government's Clean Air Strategy, there are many types and sources of pollution. For places, this necessitates a focus on all polluters and all types of transport infrastructure – roads and vehicles, idling ships and ports, planes and airports.

Financing and funding better infrastructure

A more powerful infrastructure strategy necessitates greater expenditure. Whether physical or digital, the reality is better infrastructure costs money. In this regard, there is opportunity in government's forthcoming Spending Review. Government should announce cleaner air as a main objective of future spending pots. This should be both in broad principles of all infrastructure spend and in the form of a dedicated funding pot. However, places must also take the lead in arranging funding for better infrastructure in their area. History suggests much-needed infrastructure will go unbuilt if places rely solely on government. In this regard, two themes stand out:

Firstly, greater partnering with private sources of capital. While not every project in every place will be suitable for private finance, case studies across the world suggest with the right governance model, private and long-term capital can take a more prominent role in local infrastructure strategies. A key option to explore is asset recycling, a model where the state leases a public asset to a private company, typically a pension fund. The state forgoes the revenues raised in the lease period and the capital generated from leasing the asset is invested in a new piece of infrastructure.

Secondly, using local tax powers more actively. City-region mayors should look to use their new powers to introduce business rates supplements and council tax precepts for funding new infrastructure (in many cases they already are). Government should also extend these powers to county councils and look to pilot a payroll levy and tourist tax in places which hypothecate raised-revenues to better infrastructure.

Central support

There is a great deal places can do in delivering more powerful infrastructure strategies – for cleaner air, but also for wider prosperity – but the role of central government remains essential. Both in coordinating and investing in infrastructure that needs a national policy response, for instance electric vehicles, and in supporting places where air quality is poor and their capacity to respond is weak, for instance mid-tier cities like Hull and Stoke-on-Trent. Places with poor air quality are often also associated with wider social deprivation, and so are even less likely to be able to fund solutions.

1. Introduction

For decades, the belief that infrastructure drives economic growth has been the locus of state planning and investment. By better connecting one place to another, the sense is people and capital will be attracted to locate there. Opportunity and a sense of potential will be created. This view was surmised in government's industrial strategy, which said: "Infrastructure is the essential underpinning of our lives and work, and having modern and accessible infrastructure throughout the country is essential to our future growth and prosperity."[1]

Within these parameters, government's infrastructure strategy has broadly been a success. London and the UK's regional cities' economic success is testament to this. They are places of vibrancy and production in ways unimaginable decades ago. Yet, as people and businesses have relocated to urban centres, placing greater pressure on infrastructure mostly built centuries ago, so have a new set of problems arisen. They compromise liveability, they impact quality of life, and a central feature of this is air quality.

Although significant improvements have been made in air quality over the past few decades,[2] the high proportion of people working in UK towns and cities, where emissions tend to be concentrated, makes air quality a central concern of central and local public policy. In 2016, EU legal limits for annual ambient concentrations of nitrogen dioxide were breached in thirty-seven of the forty-three zones in which air quality is recorded. Government's plans for tackling air quality have also been deemed unlawful three times in the High Court. Both for these reasons, and because air quality can be more readily and widely measured than several years ago, the issue has risen in public consciousness.

In this report we contend the locus of future infrastructure strategies should shift towards achieving cleaner air. This does not mean a superseding of jobs and the wider economy, nor fiscal efficacy, but making clean growth and liveability a more central feature of infrastructure planning and investment. Responding to government's Clean Air Strategy – which outlines plans to reduce emissions for a number of pollutants by targeting their wide range of emitters, with new primary legislation to be introduced accordingly – and alongside government's recently-published Road to Zero strategy, it also means strategies which ask what actions, borrowing and risk places are prepared to take to improve the quality of their air.

In line with the bigger role that places, notably city-regions, have provided

1 BEIS (2017) - Industrial Strategy

2 Defra analysis shows emissions of sulphur dioxide, particulate matter, nitrogen oxides and non-methane volatile organic compounds reduced by over sixty percent between 1970 and 2016. Defra (2018) - Emissions of air pollutants in the UK, 1970 to 2016

in the direction and delivery of local infrastructure,[3] the report focuses on actions places can take at a local level to tackle poor air quality with regard to infrastructure planning and investment:

- In Chapter Two the report outlines the challenge ahead, highlighting where air quality is worst and the governing role places should take in its improvement.
- In Chapter Three the report highlights interventions places can make around transport planning and traffic management.
- And in Chapter Four, it sets out financing and funding options for the building of better infrastructure within places as they tackle congestion.
- The report concludes with a set of recommendations to central government and strategic authorities.

Within the report, we hope to illustrate the broad intersection of infrastructure and air quality. This necessitates actions and changes in mind-set both centrally and locally. For central government, its Clean Air Strategy has now been publsihed, nevertheless its primary role in the funding and permission of infrastructure sometimes holds places back. Locally, air quality is an issue on which city-mayors and other local leaders can make their mark – and for which there is a political, as well as moral, dividend to being 'green' – but it also necessitates political courage and policy endeavour.

The research has been informed by extensive reading, semi-structured interviews with members of the advisory panel and other experts; and, a roundtable discussion. The report draft was reviewed by members of the advisory panel. While the geographical scope of research was limited to England – air quality is a devolved matter – we believe much of our analysis and recommendations are applicable to the whole of the UK.

3 In the past decade, government has devolved a suite of powers and responsibilities to local areas. Places have been given greater policy capacity on issues such as planning, transport and housing to capitalise and address their opportunities and challenges with a diligence and sense of local priority that central government often lacks. City-regions have been the biggest recipients of new powers, through combined authorities and associated directly-elected mayors, while county councils and a number of sub-national bodies have been granted new policy platforms too.

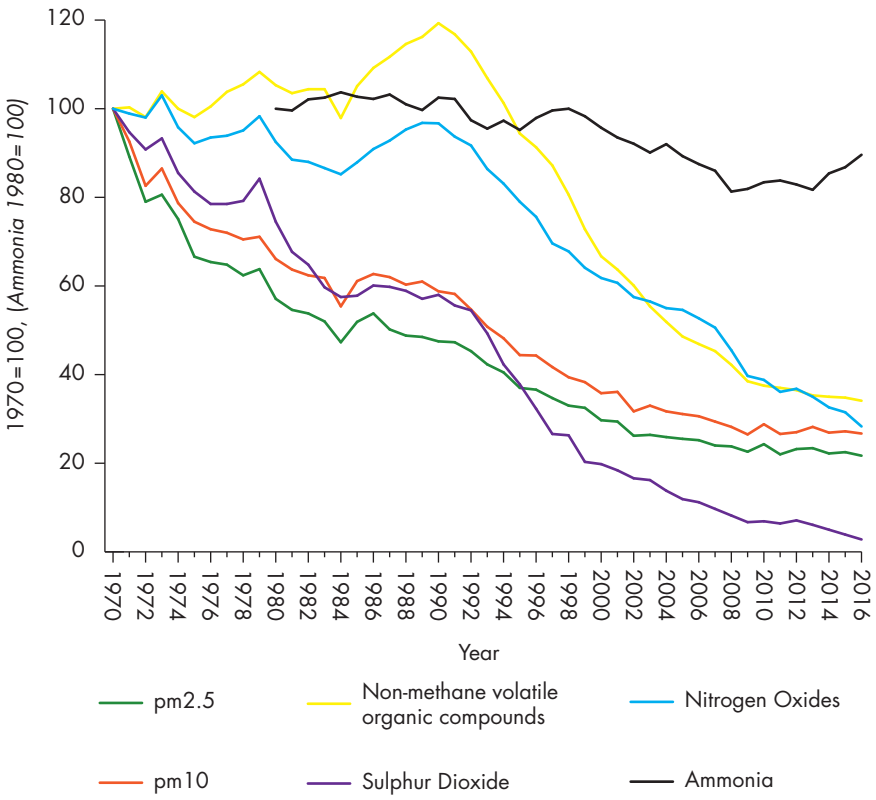
2. England's air quality

From nitrogen dioxide (NOx)[4] to sulphur dioxide to particulates, a range of pollutants impact air quality in England. Each pollutant has a range of emitters, so their sources range from the highly-localised to the trans-national, and each pollutant has a different impact on people's health and the environment more widely. In short, air pollution and its causes make air quality a hugely complex issue. This is reflected in the breadth of government's Clean Air Strategy whose aim "is to drive down the national emissions of pollutants, reducing background pollution, and minimising human exposure to harmful concentrations of pollution".

Across the UK, emmissions have improved significantly in the past few decades. Figure 1 shows how since 1970, emission rates have decreased significantly for a number of pollutants. Sulphur Dioxide, a cause of acid rain, decreased by 97 percent between 1970 and 2016. These trends illustrate that coordinated and measured actions by the state, industry and citizenry can achieve significant improvements in air quality.

4 NOx is a generic term for the nitrogen oxides that are most relevant for air pollution.

Figure 1: Indexed change in pollutant emissions in UK, 1970 to 2016

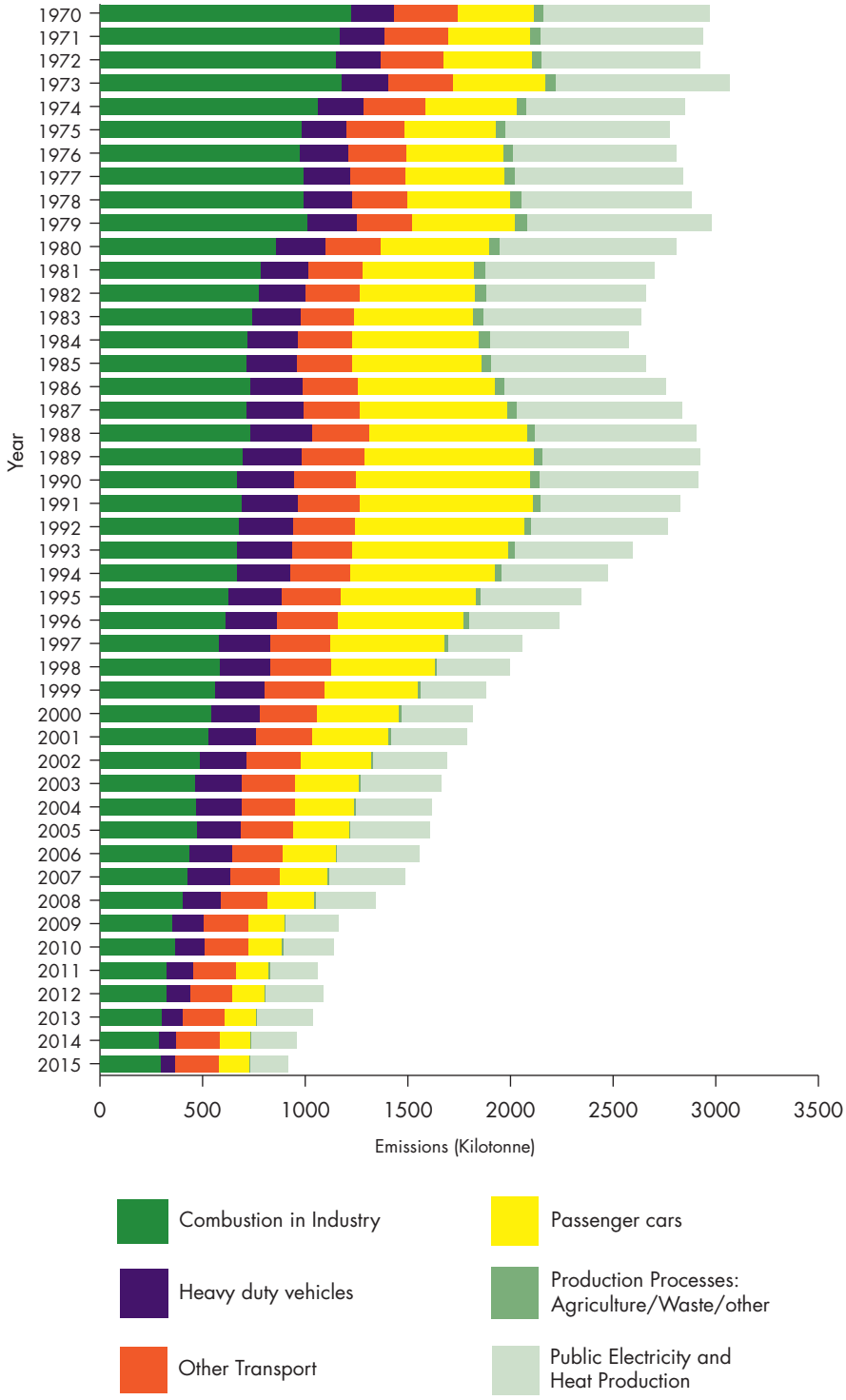


Source: Defra, 2018.

As described in government's Clean Air Strategy, NO_2 is "the immediate air quality challenge". Although UK emissions of NOx dropped by 72 percent between 1970 and 2016,[5] NO_2 concentrations exceed legal limits in a number of highly-populous places in the UK. The reality is people tend to live, work and therefore breathe air near major sources of NOx like roads, railways and air/sea ports. This means people are generally subject to certain types of NOx emitters, like road and rail vehicles, more frequently than others, like factory chimneys and power plants. The sources of NOx emissions are illustrated by figure 2.

5 Defra, 2018. Trends in UK sulphur dioxide, nitrogen oxides, non-methane volatile organic compounds, ammonia and particulate matter (PM10, PM2.5) emissions.

Figure 2: Source of Nitrogen Oxides emissions between 1970 and 2015.



Source: Nitrogen Oxides emission summary data, National Atmospheric Emissions Inventory.

Despite technological advances in many of the worst emitters, higher demand and changing consumption patterns mean high concentrations of NO_2 remain a significant problem in many parts of the UK. For example, modern vehicles emit much less than their older equivalents, but there are also far more vehicles on the

road today. The guiding focus of this report is therefore what places, alongside provisions introduced in government's Road to Zero strategy, can do to tackle the sources of NOx emissions in their area. As a pollutant whose emitters are influenced by a significant proportion of state infrastructure spend and strategy. NOx is a key metric for places to improve on in their infrastructure strategies.

2.1 Where air quality is worst

Demonstrating where concentrations of NOx and NO_2 are highest is complex. For national scale assessments, because NOx is not measured in many places – data from Defra's Automatic Urban and Rural Network is provided at just 110 locations in England – concentrations between measured locations are based on a complex modelling process last run in 2017, on a 2015 base and using a method definition from 1998.[6] NOx concentrations are highly localised, and the uncertainty associated with each forecast is said to be +/- 29 percent.[7] Many local authorities are sceptical of the modelling used, wary of assumptions made on traffic flow and mix[8] or local action plans, indeed for local action plans authorities undertake local assessments using their own monitoring and data.. Oddly, government has argued the lack of measuring stations is a good thing, as resources can be directed elsewhere.[9]

While data coverage is poor and government's modelling has been criticised for being unreliable,[10] it is clear the problem is acute in urban areas. All major cities have illegal levels of NO_2, exceeding statutory European Union (EU) targets – and often by significant amounts. In non-urban areas, although less widespread, Defra analysis shows poor air quality is a significant issue where there are pinch points of congestion, such as tunnels, bridges and some motorway junctions, especially in counties reliant on the transport and logistics industry.[11] NOx emissions are also particularly high on other pieces of major strategic infrastructure throughout the country, for instance airports and non-electrified railways.[12]

The flipside to high roadside NOx concentrations is high rates of congestion, a useful variable to illustrate the challenge ahead. Figure 3 shows average speed on A-roads by upper-tier authority. As can be seen, congestion is highest in city centres. It varies significantly across the country – a difference in average speed of 33mph between the fastest place, Rutland, and the slowest, Camden – and twenty-one of the thirty slowest places are in London.

2.2 Responding to poor air quality

Government's 2017 plan for tackling roadside NO_2 concentrations places greater responsibility on those parts of the country where air quality is worst and exceeds legal limits. The strategy outlines a "leading role for local authorities" based on the need for local solutions for air quality suited to the businesses and communities impacted. It announced twenty-three local authorities will be expected to "consider a wide range of innovative options" in new plans to be finalised and approved by government, by the end of 2018. Each plan will be judged against whether they will achieve compliance "within the shortest time possible". As a result of a court order, a further thirty-three local authorities were directed by government in March 2018 to also set out similar plans. This is on top of local authorities in five cities which have been mandated to introduce clean air zones by 2020 (illustrated in figure 4).

6 Defra (1998) - An empirical model for estimating roadside nitrogen dioxide concentrations in the UK

7 NAO (2017) - Air quality

8 Some places have done their own modelling and some are investing in monitoring.

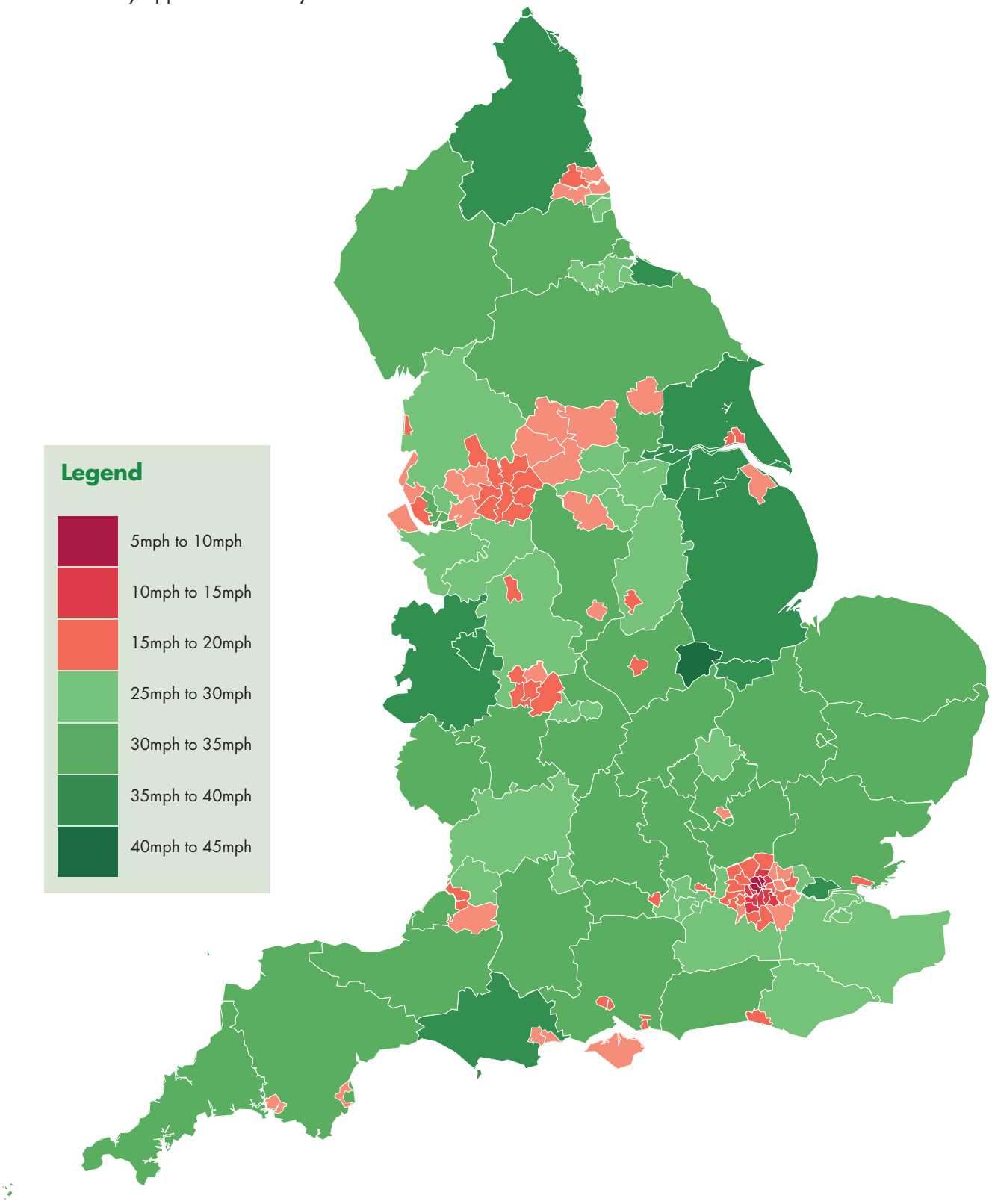
9 Air Pollution in the UK report, Defra 2017

10 NAO (2017) - Air quality

11 Defra (2017) - Air Pollution in the UK 2016

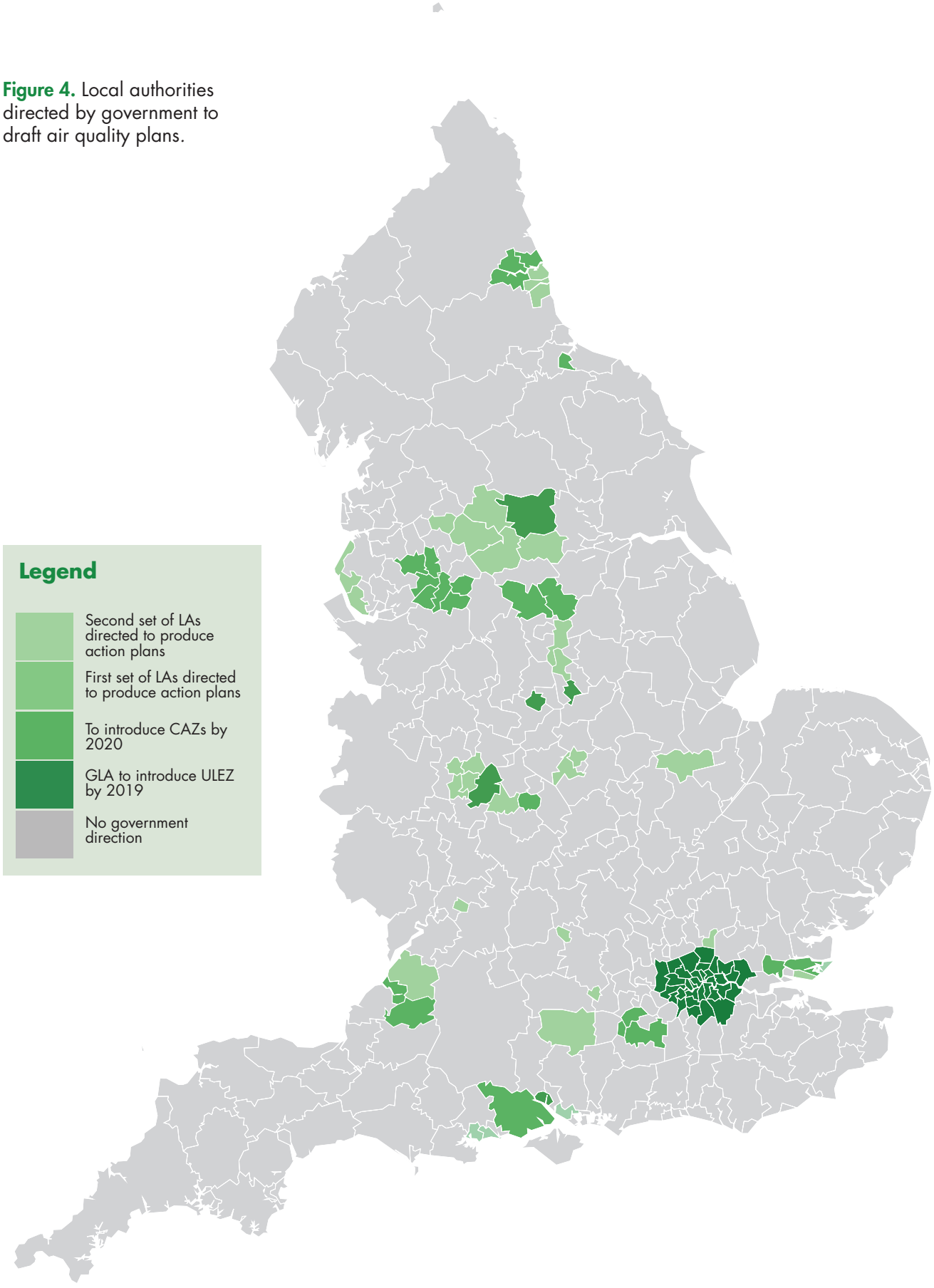
12 In research by King's College London, the NOx emissions of Heathrow in Hounslow are clear and on a level with central London: KCL (2018) - King's and the London Air Quality Network tackling air pollution

Figure 3. Average speed on A-roads by upper tier authority.



Data source: Author's calculations from DfT

Figure 4. Local authorities directed by government to draft air quality plans.

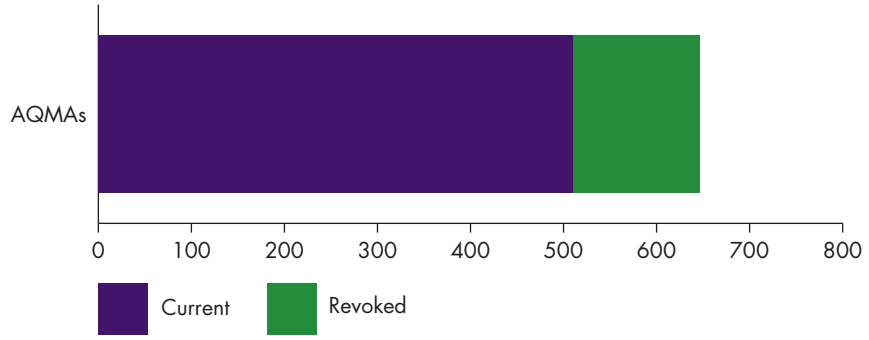


Source: Defra.

The direct role local authorities are provided with in government's strategy to address poor air quality isn't new. Since 1995, they have had statutory duties pertaining to air quality and have been required to establish Air Quality Management Areas (AQMAs) where it falls below national standards. More generally, as recognised in the Clean Air Strategy, "Local government has been the main agent for cleaning up local air since before the first Clean Air Act of 1956."

Yet, as the economy, lifestyles and use of public and private transport have changed in the past two decades, there is an urgency today focused on making towns and cities more liveable. As several interviewees noted, air quality has tended to fall between the gaps of other local authority policy areas, like public health, traffic management and infrastructure investment. Policies have been too weak with often little priority given to improving air quality. As illustrated by the graph below, Defra data shows 146 AQMAs for NO2 have been revoked, with 535 still in place.[23]

Figure 5: Current and revoked AQMAs declared in England for NO_2. (including London)



Data source: Defra AQMA summary.

The necessity for places to devise stronger responses to air quality is mainly driven by the country's failure to comply with European Union (EU) regulations on limits for NO2 in the air. Government has been defeated three times in the High Court on the legality of their plans for improving air quality and, most recently, referred to the European Court of Justice.[24] The UK is failing to meet legal requirements in thirty-seven of forty-three air quality zones and, unless they achieve compliance by 2021, will be fined accordingly. Although some places are on track to be compliant, the most recent court case ruled that passive measures were insufficient and additional measures are necessary.

2.3 Strategic leadership is required

The emphasis on local leadership in government's air quality strategy is welcome. Although the national strategy could and should include much stronger provisions to tackle dirty air with more substantial funding to back it up – and has been criticised as such by environmental groups for 'passing the buck'[25] – the reality is places can do much more too. Local leadership is especially important given the "governance gap" that could exist after the country is no longer bound by EU law. Although, as part of the Clean Air Strategy, Defra is consulting on "a new, independent statutory body to hold government to account on environmental

23 Defra (2018) - AQMAs

24 The Guardian (2018) - UK taken to Europe's highest court over air pollution

25 The Times (2017) - Pollution plan leaves charges on diesel drivers to councils

commitments following EU exit. Ensuring that there is transparency and accountability in how we achieve our clean air ambitions will be a priority in this work".[26]

Yet there is a tension at the heart of relying on local authority leadership on air quality. While the causes of high concentrations of NO_2 tend to be localised, and some of the most effective measures to improve NO_2 levels will be designed and delivered locally, the capacity of local authorities to lead is limited by a number of factors:

Firstly, resource. All local authorities have faced significant reductions to their budgets in the last few years. As a non-frontline service, air quality has been impacted greatly by these funding pressures. One interviewee from a metropolitan borough council said just four people dealt with pollution control in their local authority, from air quality to land contamination to noise to water. Although government has set up a £255m fund for supporting those local authorities directed to prepare plans, alongside other initiatives such as the soon-to-be-announced Clean Air Fund, they remain woefully under-resourced despite the air quality challenge some places face. The National Audit Office has described local authority resourcing as a risk to the success of government's strategy.[27]

Secondly, scale. Travel to work areas often extend way beyond one authority, and longer freight routes will cover even more. 80 percent of roadside NOx emissions derive from movement on roads, so a local authority will struggle to reduce impact if focusing only on their road network. As one interviewee described their city-region, "it is a functioning economic area which means people who live in one part tend to work in another, so we need to address air quality at that level".

And thirdly, power. Local authorities have limited means to influence travel patterns in their area. Transport powers sit with upper-tier councils and lower-tier council revenue-raising capacity to fund better infrastructure is weak. The most effective strategies to improve air quality will integrate planning between land-use and the movement, both privately and publicly, of people and goods. Although by its Clean Air Strategy, government plans to introduce a "single coherent legislative framework for local authorities", the reality is much of the policy capacity places can use to tackle air quality does not sit with local authorities.

Each factor points to the need for responses to air quality at the strategic level as part of infrastructure strategies, alongside air quality action plans led by local authorities individually. In its Clean Air Strategy consultation, government rightly asks whether the balance of responsibility could be better shared between lower- and upper-tier authorities. We believe greater emphasis and direction should be placed on strategic authorities.[28] The box overleaf summarises what this strategic role should entail. In city regions, the strategic response should be led by combined authorities and associated mayors. And in non-urban areas, it should be led by county councils. It is important all strategic authorities take on this role as part of their infrastructure strategies, not just those where air quality exceeds legal limits.

26 Defra (2018) - Clean Air Strategy

27 NAO (2017) - Air quality

28 In previous Localis research we have identified forty-seven strategic authorities across England. Their geographies cover city-regions and counties. They are illustrated in a map in the report's appendix.

The role of strategic authorities in tackling air quality:

- Writing regional infrastructure strategy which is longer-term than local authority-led air quality action plans
- Providing regional evidence base
- A single voice to government, businesses and residents
- Using transport powers to gear car travel away from urban hubs
- Scaling investment and revenue-raising capacity to fund better infrastructure
- Working with people and businesses to change travel behaviours (e.g. personal usage, delivery times, feet change)
- Coordinating local authority policy so congestion and dirty air isn't simply displaced to a neighbouring area
- Using an assumed authority on air quality, even if power isn't always there

In many places this process is already happening. Greater Manchester, for instance, introduced its first air quality strategy in 2002, a second in 2006 and a third as part of the 2011-2016 Local Transport Plan. In the West Midlands, the role of the combined authority in tackling poor air quality is codified in the region's devolution deal. Kent County Council is preparing a low emissions strategy for publication later this year. It is happening outside of formal governance structures too – Newcastle, Gateshead and North Tyneside councils are working together on tackling air quality, as outlined in the box below. Finally, the role of sub-national transport bodies, where they exist, is also important, providing guidance to places and government on wider transport corridors.

Joint approach in Newcastle, Gateshead and North Tyneside

In March 2018, Newcastle, Gateshead and North Tyneside councils were jointly awarded £1.7 million in funding by the Government's Air Quality Unit to help improve air quality in the region. The funds will be invested in improvements to cycle and walking routes and in upgrades to traffic signals. Upgraded traffic signals will be able to better manage the flow of traffic. New cameras and traffic signals will be linked to the regional traffic management centre, which will enable more effective coordination of traffic movement, helping to prevent congestion from building up in Newcastle city centre.

The three councils are working together to improve air quality after being identified by the Government last year as needing to address excessive levels of harmful nitrogen dioxide on certain roads. Planned improvements to cycling routes and traffic signals demonstrate the benefits of working across council boundaries to ensure regional air quality targets are met.

2.4 Making clean air a more formal part of infrastructure strategies

To be clear, we believe it is right for government and places to dedicate more

of their infrastructure spend and strategy to achieving goals around air quality. A long history of literature suggests environmental and economic ends can be pursued together[29] – something recognised in government's industrial strategy through announcements such as the 'clean growth' grand challenge. So, as infrastructure strategies are put together, a focus on cleaner air and liveability in infrastructure strategies can align with, rather than displace, more traditional aims of infrastructure spend like jobs and regeneration.[30]

Attention should be paid across Whitehall but, given it is where major decisions on infrastructure are taken, the role of the Department for Transport (DfT) should be made more formal. The formation of JAQU (joint air quality unit) to coordinate response to EU compliance issue is an existing example. However, members of the advisory panel felt air quality is too often seen as an objective rather than a responsibility of DfT. One member of the advisory panel said the department needed to "state what they are going to do about it" and for the department to be "front and centre of any strategy going forward". The responsibility of DfT for cleaner air, and its priority in the allocation of future spending pots, should therefore be made more formal in the forthcoming Spending Review.

Locally, while we believe strategic authorities should lead in the design and delivery of infrastructure strategies, all bodies with control and influence over infrastructure spend have responsibility and a role to play in the aim for cleaner air. Along with combined authorities and county councils, this includes local authorities, local enterprise partnerships (LEPs), parts of the public sector like health authorities, anchor institutions like universities; and, any other organisation with significant bearing on the local economy.

The aim should be for air quality to be treated like climate change. Climate change transcends departmental concerns in central government, and is a strategic concern of much of the public sector. Air quality should be seen in the same light.

2.5 The role of citizens and businesses is most important

In this report we argue for air quality to be a greater strategic concern of state infrastructure strategy and spend. This necessitates greater prioritisation by politicians and officers but, most of all, success depends on people changing the way they live their lives and businesses changing the way they operate. The step change needed for shifting towards a cleaner economy will only be achieved if both are provided the capacity to attain knowledge and change behaviour accordingly.

Policies such as the smoking ban and 5p bag charge suggest a society that can change quite rapidly. Yet, a policy like the roll-out of smart meters – broadly seen to have had a slow uptake and early signs of disinterest by consumers – suggests otherwise. The challenge, therefore, is designing policy in tandem with how lives are lived and livelihoods made. The rest of this report and its recommendations are written accordingly.

29 For instance see United Nations (2017) – Green Industrial Policy

30 As places take a prominent role in the industrial strategy, reorienting their economies to the modern economy, this is especially important.

3. Planning for cleaner places

Debates concerning infrastructure tend to gravitate toward questions of new projects and direction of spend. From new roads to rail electrification, the debate tends to follow regional lines, almost always concluding that not enough infrastructure is built or replaced, albeit with some places worse off than others. Building new, and upgrading existing, infrastructure is hugely important to improving congestion and, therefore air quality. As we detail in Chapter Four, places should use their revenue-raising capacities more widely and agilely to begin to close their infrastructure gaps.

However, modern infrastructure strategies should also exist beyond spades in the ground and ribbons to be cut. They must consider how existing infrastructure – roads, airports, ports and more – can be used more effectively too, with less pollutants in consequence. In practical terms, this should mean measures to improve traffic flow. It means measures to facilitate a shift to lower-emitting vehicles by private and public vehicles. It should mean provisions to nudge human and business behaviour towards 'greener' choices. And it should mean greater capital expenditure geared towards improving local air quality.

A great deal of air quality change will be achieved by national and global regulation. This is particularly true for train networks, for instance via the government-controlled franchising model, and trans-national transport, for instance heavy-fuel usage for air travel and shipping. Government's Clean Air Strategy has been introduced to this end and so has the Road to Zero strategy. However, with their policy capacity, capital budgets and procurement power, places have means to instigate significant change in their area too.

In the rest of this chapter, we detail some of the interventions places can make as part of a suite of reforms to use infrastructure more efficiently. First, however, we detail what impacts a place's capacity to implement these measures.

3.1 Capacity to tackle air quality varies from place to place

The causes and significance of dirty air varies from place to place, so it follows the requisite and viable policy response will look different across the country. There is not a particular set of reforms that would be appropriate to the environmental, economic or political circumstance of UK towns and cities. We note this upfront because it is instructive for the course of action a place can take as they look to tackle air quality. The reality is the design and delivery of air quality policies contend with a number of factors that impact their implementation. Each points to the need for partnership with citizens, businesses and civic institutions (e.g. hospitals, schools and universities):

Tensions with supporting economic growth. Many of the measures places can take to improve their air quality will impact the business models of local firms. This could be taxi companies encouraged t o replace their fleet with cleaner vehicles. Or, more broadly, the reorientation of a place's whole economy if it relies on freight. For instance port cities are reliant on the loading and unloading of ships, yet idling ships are heavy polluters. Overly-onerous regulations could force logistics firms to use other shipping routes. This is reflected in Southampton's air quality action plan, one of the five cities mandated by government to introduce a clean air zone by 2020.[31] As one interviewee noted, the port and measures to reduce emissions from idling ships are barely mentioned.[32] Moreover, air quality and its causes are measured at a motorway junction several miles from the port, thereby dampening its impact on paper.[33]

In truth, air quality is one priority up against many others for local policymakers. Fiscally and politically, concerns around jobs and growth tend to trump those that are environmental. This is especially important in places whose economies are weak, where rates of deprivation are high and both are sensitive to shocks. Government's clean growth strategy, a part of its industrial strategy, announced national provisions for accelerating towards a low carbon economy, but on a local scale, its implementation is sensitive.

Active planning to take advantage of new technologies. Through electric vehicles, recent advances in diesel engines – the technology group Bosch has recently announced engines achieving NOx readings of 13 milligrams per km, ten times lower than EU limits set for 2020[34] – and, in the longer-term, via autonomous and connected vehicles, the capacity of technology to reduce emissions is significant. In a sense, solutions for solving poor air quality already exist. They just need careful planning and implementation.

Public support. Many of the measures open to places in tackling air quality carry significant trade-offs. Each necessitates one portion of society, or one set of organisations, changing their behaviour. And sometimes that may bring a financial burden. As a result, it is important measures are supported by the public and businesses. The rejection of congestion charge proposals in Edinburgh and Greater Manchester suggests strategies should begin from the point that people like using cars and a modal shift away from them will be a long-term process. Given advances in technology, methods to combat poor air quality need not always involve access restrictions which people do not like. In Sheffield for instance, the clean air strategy rules out measures that involve charging private car users and instead focuses on buses, coaches and heavy and light goods vehicles.[35]

The capacity of people, places and businesses to change. High concentrations of NOx (and other pollutants) are known to often be located in places which are most deprived.[36] Given the importance of people making 'greener' choices to infrastructure strategies – for instance in their choice of vehicle or mode of transport – there is a risk some people, and large parts of the population where air quality is worst, will not have the financial capacity to do so. Linked to this, a large number of places where air quality is above legal limits are lower-tier cities. Local authorities are often already cash-strapped, with no formalised strategic authority to provide support. There is a second risk that the places worst impacted by poor air quality are least well-equipped to respond. Finally, strategic infrastructure plans focused on improving air quality will need to affect business behaviours. Many transportation and freight business models run on tight business models, which necessitates policy sensitive to this fact.

31 Southampton City Council (2016) - A Clean Air Strategy for Southampton

32 Interviewee

33 Interviewee

34 FT (2018) - Bosch claims breakthrough in cleaning up diesel fuel

35 Sheffield City Council (2017) - Sheffield's Clean Air Strategy

36 Defra (2006) - Air Quality and Social Deprivation in the UK: an environmental inequalities analysis

Achieving compliance by 2021. Under the Localism Act, government can pass all or part of any fines to local authorities where EU legislation has been breached. Alongside the threat that government will impose charging clean air zones where they deem air quality plans insufficient, this illustrates the importance of places bringing forward more effective policies at an accelerated pace. However, as a number of interviewees writing infrastructure strategies indicated, this urgency has also translated to a need for "visible" policies which has "ended up creating a narrow focus of activity rather than pursuing other more-effective policies as otherwise hoped".

3.2 Traffic flow intelligence

Perhaps the greatest step a place can take in strategies to use their transport network more efficiently is greater collection and use of intelligence. From establishing popular freight routes to gathering information on speeds around junctions and hot-spots, a more extensive use of quantitative data and modelling around traffic flow can establish causes of congestion and then unlock policy measures that reduce idling in areas worst affected. For instance, the repositioning of traffic lights, speed cameras and bus lanes can improve vehicle flow and thereby reduce congestion and emissions (this has been achieved in Stuttgart).

Greater data collection can also enable the use of geo-fencing technology. Geo-fencing allows a signal to be sent when a device enters or leaves a defined geographical boundary. It is used for drones, marketing and law enforcement, amongst other functions, and there is significant scope with regard to air quality and transport. A transitory clean air zone could be established that is enforced when rates of emissions or congestion reach a certain level in a town or city. Drivers of certain vehicles could be notified that they are entering a restricted or charging area. Another option, being explored in Leeds, would be for hybrid vehicles to automatically switch to low-emissions mode when they enter the zone.[37] One of the creators of the idea in Leeds has suggested how the technology could be taken further, for instance tied to when children leave school in term time, thereby reducing their exposure to emissions.[38]

The potential of greater monitoring could be used for parking too. If an authority can monitor whether a space is occupied or not, vehicle-users would have more knowledge to plan their trip around – thereby reducing congestion. In Los Angeles for instance, where the source of 30 percent of congestion has been found to be due to drivers looking somewhere to park,[39] demand-based parking has been introduced in place of a zone-based system. Underground sensors detect when a space is occupied and this is transmitted to a central computer system.[40] The system determines the price – the busier the street, the higher the price and vice-versa – and this information is accessible to drivers by apps, websites and road signs.

Examples across the world show the untapped potential of collecting and using private and public sector data more readily in UK towns and cities. Yet there are a number of barriers too. The biggest barrier tends to be the lack of existing sensors and associated computing systems. Both cost money and many local authorities do not have the resource to update theirs to the latest technology. One way round this would be classing necessary technology as capital spend rather than revenue. A second barrier is the lack of internal expertise to effectively use this technology. One interviewee noted a number of local authorities they had spoken to did not have the staff to make the initial investment worth it.

Other barriers revolve around privacy. While a local authority and the wider

37 SMMT (2017) - How geofencing technology is improving air quality on city streets

38 SMMT (2017) - How geofencing technology is improving air quality on city streets

39 Los Angeles Times (2014) - LA's Express Park

40 Apolitical (2017) - Los Angeles cuts downtown congestion with smart parking

public sector has procurement powers over vehicles they operate – e.g. buses – and powers over vehicles they license – e.g. taxis – they have limited influence on the type of vehicle a person chooses to use privately. This makes transmitting information to private vehicles difficult, although not insurmountable with near universal ownership of other technologies like mobiles or smartphones. Further to this, there are a number of privacy concerns for *smart city* policies dependent on greater data gathering. Although analysis of personal driving patterns has long been collected – for instance by insurance companies – there are concerns about both the extent of that reach and the potential for that portal to be hacked.

3.3 Facilitating public sector fleet change

A second component of strategic infrastructure plans should be policies that facilitate the replacement of high-polluting vehicles with low-emitting vehicles. In the long-term, this will happen anyway. The average age of vehicles on the road is said to be 11.4 years,[41] so older cars will gradually be replaced with newer cars which are highly-likely to emit less. Yet local transport authorities and partner civic institutions have significant capacity to speed this process up. Using their policy control and procurement power, they can facilitate fleet change for almost every vehicle on the road:

Buses. Fleet change of buses is a priority because they are responsible for a high proportion of NOx emissions – Transport for London (TfL) say their buses account for 8 percent of total pollution in London[42] – and, because they cover large distances in their lifetime, the business case for doing so is easier than other types of vehicle.

Through the Green Bus Fund, Low Emission Bus Scheme and Ultra-Low Emission Bus Scheme, government has had grant schemes in place for a long time to facilitate fleet change in buses (and other vehicles too). For instance Essex County Council, working with Colchester Borough Council, Rochford District Council and Southend-on-Sea Unitary Authority, will use Defra grant-funding to retrofit sixty buses to Euro VI engine standard.[43] With new franchising powers, a regulatory boost available to city-regions since the 2017 Buses Act, there is action mayoral combined authorities can take too. Like with fares, frequencies and routes, they can take a strategic role with regard to buses used too. Tender contracts could include stipulations that operators use certain low-emitting vehicles.

A key national consideration for fleet change policy is the risk of cascading. In a place like London where bus usage is high, the business case for replacing or retrofitting buses is much greater than those where usage is low. The result has been poorer authorities have tended to purchase London's older and higher-polluting buses – with the air quality impact displaced.[44] This risk transcends all types of vehicle.

Taxis. Government also provides subsidy for taxi fleet change. For example, using award-funding from Defra, Bristol City Council is offering one-hundred Hackney Carriage taxi owners a financial package to switch to a low-emission model. Over five years, taxi owners are being offered a total of £3,635 to cover taxi operating fees.[45] Alongside grant-funding, local authorities can also use their taxi licensing powers. Places could add provisions to licenses, regulating how old private-hire vehicles can be and what engines they can use.

Public sector fleet. From bin vans to company cars, the combined

41 IHS Markit (2014) - Average Age of Vehicles on the Road Remains Steady at 11.4 years, According to IHS Automotive

42 TfL (2017) - Euro VI Bus NOx Abatement

43 Essex County Council (2018) - £1 million secured for greener Essex buses

44 Interviewee

45 Air Quality News (2018) - Bristol to offer incentives for low-emission taxi switch

procuring power of local authorities and other civic institutions, like hospitals, is significant when it comes to public sector fleet. In Northamptonshire this 'total place' approach has been developed since 2015, with spend geared towards achieving operational efficiencies and lower costs.[46] Although the county council's wider financial position is now unsustainable, the principles of the scheme have merit for replacing high-polluting vehicles with low-emitting vehicles.

Places can alter their procurement policies to prioritise companies with low-emitting fleets and that stipulate a certain number of deliveries per day. More widely, local authorities could also develop accredited schemes where private firms sign up to these procurement rules. In Hackney, Tower Hamlets and Islington, for instance, the councils have established a Zero Emissions Network where businesses commit to cleaner air.

3.4 Accelerating the take-up of electric vehicles

Supported by government's industrial strategy and associated grant funding since 2011, a feature of many place's infrastructure strategies will be the accelerated take-up of electric vehicles (EVs). Along with alternative fuels – e.g. biofuels – and increasingly low-emitting vehicles, they are an important part of a place-wide solution to replacing high-emitting vehicles. In the long term, the potential market for EVs is huge, particularly in cities. However, factors like battery durability, grid capacity and charging times hamper their take-up.

Throughout our research it was suggested a more coherent and coordinated national strategy is required to accelerate EV take-up. Working with manufacturers, this needs national standards on charging sockets. It needs greater structure in grant-funding for charging infrastructure – both in its timetable and the capacity of places to match-fund contributions. And a national perspective on where chargers are located, given the number of journeys which will extend beyond one region. In effect, government needs to take a market-making role by developing a wider grid.

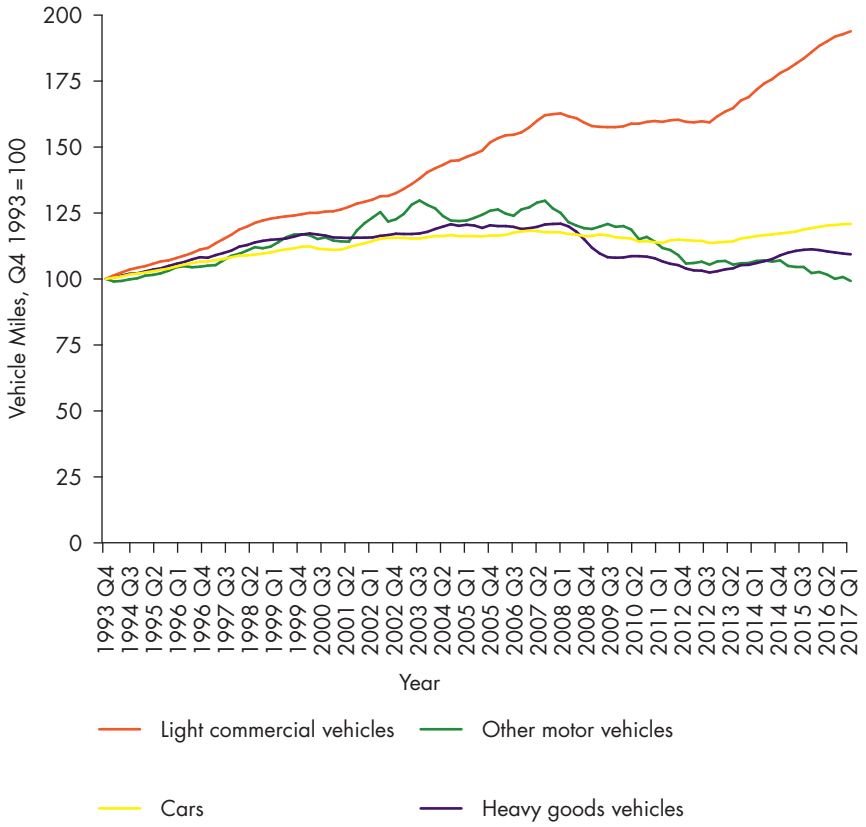
Yet there is a great deal strategic authorities can do too. Firstly, identifying locations where EV charging points would be most useful and, in collaboration with utility providers, identifying local market conditions/expectations. Secondly, using the planning system to prioritise commercial and residential buildings that include EV charging infrastructure (for instance, shopping centres could only be approved if they include a certain number of charging points per parking space). Thirdly, working with government to alter franchising contracts at local motorway service stations to ensure they install EV charging points. And finally, as the market matures, considering when places should move towards a revenue model, rather than part-subsidy, for use of their EV networks. This would provide funding for more charging points on a longer-term model.

3.5 Changing delivery markets

The number of light-goods vehicles (LGVs) on the road network has increased significantly in the past few decades. As shown by figure 7, traffic from LGVs has almost doubled in Great Britain since 1993. The growth of the e-commerce market and smaller commercial areas devoted to storage space, to maximise selling space, are often pointed to as the driving factors of this trend.

46 LGA (2017) - A country in a jam: tackling congestion in our towns and cities

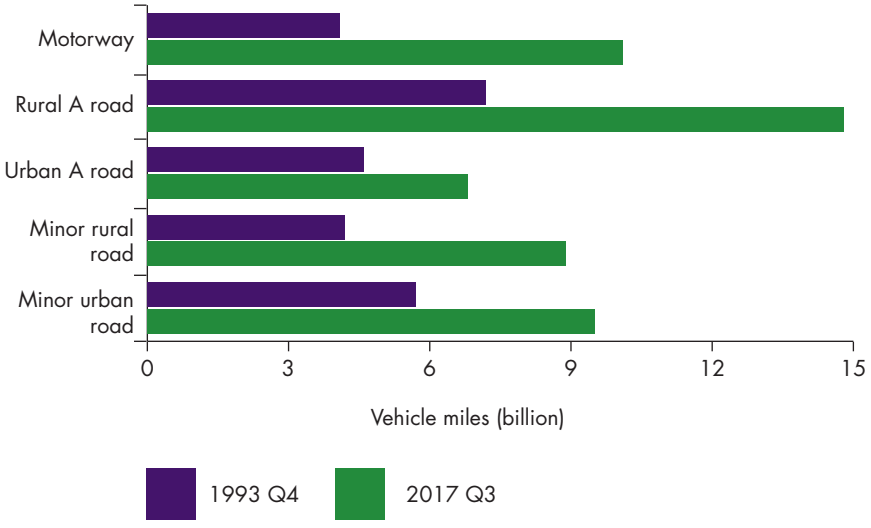
Figure 6: Road traffic (vehicle miles) by vehicle type in Great Britain, rolling annual totals from 1993.



Source: Table TRA2501b, DfT.

Increasing LGV traffic is an issue common across the country and, as illustrated by the graph below, particularly so in rural areas. In close to twenty five years, LGV traffic has more than doubled on rural A-roads and minor rural roads.

Figure 7: Light Goods Vehicle traffic in Great Britain by road class.



Data source: Table TRA2503a, DfT.

The rise in van numbers is a new challenge for places as they tackle congestion. The operating model of online and light goods deliverers means vans will only be packed for what they will deliver in a day. This means vans are rarely packed to capacity (it is reported the average delivery van is loaded 38 percent full).[47] Furthermore, goods bought online are often delivered to central town and city workplaces during working hours, often the busiest time on the road network, and a high proportion of goods bought online are returned.[48]

The challenge for strategic authorities and central government is working with delivery operators to change their business model. Operators themselves could offer different pricing options to consumers and limit daytime deliveries into town and city centres. Working with the local public sector, they can also look to extend the number of shared delivery centres, be that lockers at train stations or pubs, cooperatives or post offices in rural areas. This could be a provision of future planning permissions in an area.

Strategic authorities should also look to take a market-making role in 'last mile' delivery. If the aim is to reduce the number of high-emitting vehicles in areas of congestion, places could stipulate that deliveries are pooled and that only low-emitting LGVs can drive into town and city centres. This would necessitate the building of delivery terminals on urban peripheries. In Paris, for instance, logistics hotels are being built on the edge of the city on brownfield sites. One, Chapelle International, is being built along the Gare du Nord rail network and is a joint project between the city government, SNCF and the private sector. The development includes industrial, office and residential space and was enabled by changes to *le plan local d'urbanisme*. Another, opened in 2012 in a former car park in Beaugrenelle, is a joint project between the city government, Chronopost (part of *La Poste*) and the private sector. It receives parcels of up to 30kg and distributes them by hybrid vehicles.

It is unlikely for a strategic authority to deliver new light freight consolidation terminals on their own, but there is clearly a partnership approach they can take with the wider public and private sectors. Strategic authorities could use public land close to road and rail networks. They can also allocate sites within strategic or local spatial plans specifically for distribution centres.

3.6 Reducing ship and vehicle idling at ports

As government's Clean Air Strategy recognises, shipping is a major cause of pollution. When ships pass through UK waters and idle at ports, coastal towns and cities are exposed to high concentrations of their pollutants, typically caused by heavy fuel oil. The national and trans-national nature of shipping demands a respond in kind, and the Clean Air Strategy has provisions to this effect. By 2019 a UK Clean Maritime Plan will be published underpinning a long-term vision of zero emissions shipping. Government is also consulting on how it can regulate pollutant emissions from domestic ships.

The Clean Air Strategy also directs ports to set out plans to reduce emissions across the port estate including ship and shore activities. Given the links with the wider road network, it seems essential port authorities work with local and strategic authorities as their air quality plans are developed – particularly given the greater pressure. Joint action could include the installation of shoreside electricity supplies where ships are able to turn off their engines and plug into an electric grid while at berth. Such a scheme would necessitate investment and planning by the strategic authority with the network provider.

Another option is the adoption of green tariffs. All ports charge for use of their berths, and these could be priced to incentivise the use of lower-emitting ships. In London for instance, the Port of London Authority applies a 5 percent discount

47 Freight Transport Association - Why "I want it now," may be at the root of our congestion problems - by Rob Flello MP

48 For instance it is estimated that up to 25 percent of fashion goods are bought online.

on Vessel Conservancy Charges for ships who meet a certain environmental performance based on factors including emissions of nitrogen oxide, sulphur oxide, and carbon dioxide.

3.7 Changing car journey behaviours

Just as careful and active planning is needed in local infrastructure strategies to take advantage of new technologies, so too does each place's strategy need to consider the role of the citizen too. The changing of driving patterns and behaviour can be as, if not many times more, effective in reducing congestion as a bigger network capacity. A number of institutions have a role to play:

Education is hugely important in this regard, at all ages. For instance to discourage idling of vehicles outside schools, pupils can be encouraged to walk to school when possible. To this end, TfL has a set up the Sustainable Travel: Active, Responsible, Safe (STARs) accreditation scheme where local authorities work with schools and nurseries to create school travel plans. When a person starts driving, there is also the need to ask drivers to turn their engines off when idling. The City of London Corporation, for instance, has employed Civil Enforcement Officers to do this. In port towns and cities, signage and officers could be used to encourage cars and lorries waiting to board passenger ferries.

Changing idling behaviours in the City of London[49]

The City of London Corporation has identified idling vehicle engines as an unnecessary source of NOx and particulates emissions. To redress this, the Corporation has implemented a scheme that combines enforcement, through Civil Enforcement Officers asking drivers to turn off vehicle engines and issuing Fixed Penalty Notices if they do not, with a number of positive behaviour change initiatives (including writing to companies with drivers that leave engines idling).

The Corporation also worked with the charity Global Action Plan to raise awareness of the benefits for drivers, such as saving money on fuel and reducing damage to the vehicle. The City of London's experience is instructive. It demonstrates the potential benefits of a mixed approach; one that combines enforcement with targeted information on the individualised benefits of behavioural change.

There is also a significant role for employers to take. Just over one in every two trips commuting to and from work are made driving a car or van.[49] Working with major local employers, the strategic authority can encourage workers to consolidate their journeys to work by car-pooling schemes. A number of apps already exist to this end and employers could provide incentive schemes.

Finally, there is the role of insurance companies. Since insurance companies already provide discounts for safer driving, the same could be applied for environmentally-friendly driving. In many cases safe driving will also be environmentally-friendly driving. However, drivers could also be rewarded for reduced usage of certain parts of a city or town's road network (for instance its clean air zone). This would for the most part necessitate no new technology – insurers typically collect data via phone apps. However, it could be incentivised by reducing Insurance Tax Premium rates, the standard rate is currently 12 percent, for insurance provided this way.

49 Table NTS0412, Commuter trips by employment status and main mode: England, 2015

3.8 Green waves

Green wave traffic signalling can help avoid saturated traffic situations by reducing variation in road speed and reducing the number of times vehicles stop at traffic lights. Consequently improving traffic light systems to help cars drive through a wave of green lights, hence the term 'green wave', could save money and reduce congestion whilst reducing emissions. This approach uses vehicle flow detection to coordinate lights with other traffic signals to allow for vehicles to pass continuously and smoothly through intersections. Analysis of green wave signalling indicates that waiting longer at one set of traffic lights has more environmental benefits than waiting less time at traffic signals but facing more traffic stops[13]. Green wave systems work with road stretches of up to 1 kilometre in length with multiple intersections and consistently reduce emissions of CO_2 levels, NOx levels, and PM10 levels compared to single traffic controls and roundabouts[14].

Future vehicle technologies such as adaptive cruise control and engine interventions may enhance the role of green waves in reducing vehicle emissions and improving efficiency on the roads. However, the green wave can be disturbed with the variability in cars at each light and an initial speed disturbance, such as a car turning onto a main road – which can cause a queue of vehicles in the green wave to grow in size until vehicles cannot reach the green lights in time, exacerbating saturation and gridlock[15]. Understanding the cause of these disturbances will help improve the green wave technology system, yet ultimately this technology still outweighs any single traffic controller or roundabout for traffic control and emission levels.

Birmingham City Council has entered into a collaborative partnership with Idox Transport, CheckedSafe and Amey as part of the 'Greenwave project' to support traffic and air quality management in urban areas by testing the viability of encouraging lorry drivers to 'ride the green wave'[16]. Large vehicles for commercial use emit a significantly larger amount of fuel when idling at traffic lights. Greenwave changes driving habits and by taking a driver-focussed perspective, reduces the number of traffic light stops, emissions and fuel consumption will reduce. The Greenwave app feeds information to lorry drivers about when the lights are about to change so they can adjust their driving style accordingly, rather than making quick speed changes and reducing waiting time at lights, creating savings of approximate 10-15% on fuel as well as emission reduction[17]. Birmingham City Council hopes in this way to address air quality and improve freight transport in a fairly cost-effective way.

3.9 Selective Vehicle Detection

One type of selective vehicle control is Selective Vehicle Detection (SVD), which is an above ground detection system using radio frequency identification to selectivity detect suitably tagged vehicles[18]. Certain vehicles have a tag mounted in the windscreen with a unique ID and the reader will contain a list of tag IDs that allows it to decide whether the vehicle passing is allowed access or should be granted priority over other traffic. Once a tag has been detected, the reader

13 Marcel Willekens, DTV Consultants (2009) – Green waves and air quality

14 Ibid.

15 Lisa Zyga (2013) – Physics of 'green waves' could make city traffic flow more smoothly

16 Green Wave (2017) – Project Background

17 Ibid.

18 Siemens – Selective Vehicle Detection

outputs a signal to the traffic controller for traffic priority or to release a barrier for access control. A common use for SVD involves providing local bus priority at traffic signals; when a bus passes a reader and the tag ID is recognised, an output is sent to the traffic signal and linked to the traffic controller allowing priority and access at that junction.

This system will help pave the way for future traffic management for local councils and is a highly cost effective way to do this, characterised by low set up and maintenance costs. This makes it an extremely cost effective solution for local authorities seeking more efficient public transport routes and to improve management through priority transport access.

Kent County Council adopted a SVD solution based on radio frequency identification technology to allow over 100 taxis and 60 local buses use an existing gate system, fitted with ID tags which are read by above ground detectors to access a strategic passenger transport route[19]. This prioritises use of local transport and deters individual motorists using the ring road by pre-identifying vehicles with the appropriate ID tags to improve effective and reliable traffic management.

3.10 Urban Traffic Management and Control

The main idea behind Urban Traffic Management and Control (UTMC) is to maximise the road network potential by creating a more robust system that allows for different traffic management tools to communicate and share information with each other. This includes traffic signals, air quality monitoring stations, car p arks and automatic number plate recognition cameras and combining them. Shropshire Council put in a UTMC system in 2013 using the 'SCOOT system' which prioritises public transport, reduces traffic impact on air quality and restrains traffic an d congestion through efficient management[20]. The SCOOT system and other UTMC systems co-ordinate single traffic signals within close proximity (particularly in urban areas) and uses a computer system to calculate optimum signal settings for a signal network[21].

Previously, combating conflicting routes and signals was done by using computer calculations to identify the optimum signal settings by analysing recurring traffic conditions. However, this can be time consuming and expensive. The advantage of UTMC systems is that they were developed to be more demand-responsive, monitoring traffic flows continuously and making small adjustments to reduce delays and improve traffic flow. Arguably UTMC systems are leading the way in efficiently control large and complex road networks.

Leicester has experienced a large growth in traffic since 2000 and discovered in 2008 that local traffic was estimated to contribute up to 90% of NOx emissions at receptor measurements, of which road transport was identified as the dominant local source of emissions[22]. Leicester has responded to this issue by investing in a range of UTMC systems including a network of classified traffic counters, CCTV and number plate recognition cameras, a SCOOT system as mentioned earlier, a common database integrating sub-systems to manage the network in a map (COMET) and a car park guidance system with 25 interactive signs distributed on routes into and within the city centre (SIESPACE). As a result traffic is managed in real-time and can respond to incidents and roadworks that disrupt traffic flow. Optimising traffic management during peak road times and in the long-term will help reduce emissions of NOx, PM and CO2 along with reaping the economic benefits of reducing traffic congestion in urban areas.

19 Siemens (2011) – Kent order first TagMaster system from Siemens

20 Shropshire Council (2013) – Urban Traffic Management Control

21 Department for Transport (1995) - The SCOOT Urban Traffic Control System

22 Department for Environment, Food & Rural Affairs - Local Air Quality Management Case Study – Managing Transport Emissions

3.11 Road pricing

More and more cities are exploring the possibilities of introducing road pricing in their area. This is partly driven by government's threat that places whose air quality action plan they deem insufficient will have charging imposed in their area in the form of a charging clean air zone. And it is partly driven by the necessity of raising more revenue to fund road betterments. As one interviewee put it, "we either have to start looking at recuperating more land value… or users will need to start paying more for roads".

The winner of the 2017 Wolfson Economics Prize proposed a national road pricing scheme, where fuel duty and VED are scrapped.[50] The scheme suggested replacing them with a distance-based charge determined by road and environmental impacts and collected by the insurer. There may be scope to pilot a similar scheme across a city-region, or for alternative green tariffs to be introduced.

In places with high numbers of HGVs, a supplementary local levy could be issued for investing in reducing congestion. In Kent, for instance, the county's motorways are often clogged by heavy-goods traffic entering and exiting Dover. The levy would be collected as HGVs pass through the port and could be invested in services like motorway lorry parks.

For town and city centre locations, the Transport Act 2000 allows local traffic authorities, outside of London, to introduce a Workplace Parking Levy subject to approval of the Secretary of State. The Levy enables local authorities to charge businesses for every employee who parks in the area. It is in effect a licensing scheme that allows office owners to pay for a licence to park up to a maximum number of vehicles.[51] So far the Levy has only been introduced in Nottingham.

3.12 Local fuel duty

A separate option to road pricing that places could introduce, but with similar potential for revenue-raising and for changing behaviours through financial means, is local fuel duties. This would be an increment, set and collected locally, on fuel sold within the area of a strategic authority. It would be paid on-top of the national fuel duty with revenues raised spent on local infrastructure.

Undoubtedly a local fuel duty would bring complications – how it is collected, displacement effects and political difficulties – but there are two examples of local fuel duties across the world which suggest there is potential for implementation in England:

- In Auckland, New Zealand, a Regional Fuel Tax was passed into law in June 2018. From July 2018, an 11.5c/litre tax will be levied on fuel sold within Auckland (around 6p in Pound Sterling). It is to raise NZ$1.5bn over the next ten years and revenues raised will be used to fund improvements to the road network, identified in the council's infrastructure gap. It has been reported that 52 per cent of people from Auckland supported the tax while 43 per cent opposed it.[52]
- In Portland, Oregon, a four-year 10-cent-a-gallon 'gas tax' was approved by public vote in 2016. In its first year, the Bureau of Transportation has said the city collected $19.9 million. The duty was originally forecast to raise $64 million, or $16 million a year before it sunsets at the end of 2020. Meaning 2016/17 revenues were higher than expected. 56 percent of revenues are to be spent on road repairs, with the remainder spent on pedestrian and bicycle safety improvements, particularly near schools.[53]

A local fuel duty in England would necessitate government approval and, as we write above, political endeavour. Yet there are significant revenues to be raised,

50 Policy Exchange (2018) - Wolfson Winner

51 House of Commons Library (2012) - Roads: Workplace Parking Levy (WPL)

52 Stuff NZ (2018) - Regional Fuel Tax bill finally passes

53 The Oregonian (2018) - Portland gas tax brings in more than expected

if implemented. Below we have provided rough estimates of what could be raised across English regions by a local fuel duty of £0.06 per litre (the same as in Auckland).

Region	Total road energy consumption (litres)[54]	Potential revenue (£)
North East	1,336,368,233	80,182,094
North West	4,072,814,846	244,368,891
Yorkshire and the Humber	3,220,838,168	193,250,290
East Midlands	3,109,892,462	186,593,548
West Midlands	3,658,388,625	219,503,317
East of England	4,115,037,057	246,902,223
Greater London	2,410,801,703	144,648,102
South East	5,920,680,142	355,240,808
South West	3,465,678,850	207,940,731

54 BEIS (2018) - Road transport energy consumption at regional and local authority level

4. Financing and funding better infrastructure

Coupled with interventions that make a place's transport system more efficient and cleaner, infrastructure strategies would also necessitate network improvements and expansions. Both in terms of physical infrastructure, like road widenings and new trains carriages, and digital infrastructure, or enhanced connectivity that enables people to work more flexibly. As the National Infrastructure Commission concluded in their interim national infrastructure assessment, "new technology and congestion management are not enough: additional, modern infrastructure is also required".[55]

Strategic authorities can use their expertise, in collaboration with local partners, to identify the places where infrastructure improvements will improve air quality and growth opportunity most significantly. As one interviewee noted, it is essential places have a sense of prioritisation in projects and specific areas. They pointed to London's focus on regeneration via the Olympics as a case study of success.

Yet strategic authorities must also take the lead in arranging necessary funding to close their infrastructure gap too. History suggests vitally-needed infrastructure will continue to go unbuilt without places taking this role: figure 8 shows how public investment in infrastructure has dropped significantly in the past few years.

Figure 8: Public sector net investment (as percentage of GDP).

Data source: OBR public finances databank, April 2018.

55 NIC (2017) - Consultation on a National Infrastructure Assessment

New thinking is therefore required on how infrastructure can be financed at a local level, especially given the financial situation of strategic authorities and associated local transport bodies. Transport for London, for instance, has a £1bn operating deficit as a result of falling public subsidy – reduced by a half this year – and lower fare box revenues.[56] A part of this should result in more fiscal flexibility at the strategic level. However, there is also much a place can do within their existing legal framework. Some measures to tackle air quality discussed in Chapter Three would also generate new revenues, for instance road pricing.

As we argue in the rest of this chapter, a suite of options is available to places to fund better infrastructure in their area. Both in how places use public money, be that government funding streams, their existing assets or local revenue-raising powers and how they attract and work with sources of private capital. And, most importantly, how public and private money is then used together – as one interviewee said; "A clear elucidation of public investment will provide private investors with a lot more confidence that infrastructure/transport projects will actually happen."

Not all mechanisms identified will be possible in each part of the country. As detailed in the first part of this chapter, the capacity of places to lead on funding and financing new infrastructure varies significantly. It is essential the broader national strategy reflects this, providing greater funding where it is needed most.

Yet it is also unlikely many of the concerns raised during research about government's current infrastructure strategy – that it is under-funded, short-term and out of sync with local priorities – will be alleviated anytime soon. This necessitates places taking the lead in arranging funding for their modern infrastructure strategies. Like in the West Midlands with their Funding for Growth Programme (see box below), strategic authorities must take a lead on reviewing all options to fund better infrastructure in their area.

West Midlands Combined Authority Funding for Growth Programme

The West Midlands Combined Authority has set up a Funding for Growth Programme. It is one of four mayoral initiatives, and will look to identify new ways of funding and financing the ambitions of the West Midlands Combined Authority. It has been established with finance experts from the private sector, local government and academia, and has examined the potential alternatives to a precept since May 2017.

4.1 Capacity to lead on infrastructure funding and financing varies from place to place

The capacity of places to lead on the funding and financing of infrastructure in their area varies significantly across the country. In London, for instance, the GLA helped to arrange necessary funding for Crossrail 1. Areas of the country less empowered and with weaker tax bases are not as experienced. This means that, in truth, some places will be much better equipped to write, fund and deliver modern infrastructure strategies than others.

A number of funding and financing ideas are put forward in this chapter but some, like provisions we outline in Chapter Three, necessitate certain economic, organisational and political circumstances. Otherwise they simply will not raise the money. We raise this at the start of this chapter because the options available to a place looking to help fund and/or finance better infrastructure flow from these circumstances:

56 FT (2018) - TfL operating deficit worsens by 26% to £1bn

Capacity to pay

Many of the revenue-raising options available to places for infrastructure depend on the sustainability and projection of the local economy. For those using rises in taxation, places would be asking citizens and/or businesses to pay more. Even when there are clear benefits to the infrastructure it would help to fund, the capacity of families and businesses in poorer areas to pay more in the short-term is less.

The viability of revenue-raising mechanisms reliant on rising land and property values associated with better infrastructure is also smaller in less prosperous parts of the country. Local and strategic authorities are essentially betting their tax bases will grow at a rate that pays off the loan and interest that enabled a piece of infrastructure to be built. For places whose economies are weak and sensitive to shock, this is a huge risk.

Similarly, when places are putting together business cases for public or private investment, expected revenues are based on the economic potential of an area. Investors are speculating on whether a piece of infrastructure will be used enough to make a return. As one interviewee said; "Investment is more clear-cut in London. Fare box revenue is almost guaranteed… the basis is not as evident in places outside of London. As you get further north the ability to make that happen is more challenging."

In short, if relying on their economic growth, places outside London and the big cities face a significant barrier to financing and funding new infrastructure.

Central government say-so

A number of measures to raise new tax revenues necessitate government permission. Although some fiscal powers and flexibilities have been devolved in the past few years – for instance full retention of business rates and 2p supplements to business rates in city-regions – the reality is strategic authorities are under-powered when it comes to raising new funding. This is especially important at a time when rate of investment by central government is relatively low, and means places have a limited number of means readily available to them as they seek to fund their infrastructure gaps.

Devolution deals are one platform by which some places have secured necessary powers and flexibilities, but another way forward could be government pledging to match-fund certain projects. Without losing control of what is funded, they could then, like with Crossrail 2, encourage places to arrange the rest of the project's funding, be that through new freedoms or private capital.

Expertise and mind-set

Moving away from conventional infrastructure funding models demands a level of expertise, mind-set and institutional experience that many places do not currently have. Often projects require the arranging of complex funding packages spanning public and private sources, all while still offering value for money to the taxpayer. This necessitates a willingness to innovate – for instance arranging funding for different stages of a project, like Crossrail 2 – and a willingness to bear risk. As we have said, places are essentially taking a punt on their economy, committing a lot of upfront effort with the hope they get money back in business rates soon. Each project also carries significant operational risks like project overspends and future operating costs.

Like many, strategic authorities are taking a more active and commercial stance in their housing market, so should this mind-set be applied to infrastructure financing? In some places there is often no team ready and waiting to take on this role. This impacts whether a project can get off the ground but also a place's empowerment too. The Institute for Government has written how there are

concerns in government "about devolving further infrastructure decision-making responsibilities to subnational authorities" when there is no team "ready and waiting" to take on those powers.[57]

Politics and public support

Almost any funding measure not dependent on the central government purse is likely to be controversial. For one, the public tends to be wary of new or higher taxes at the local level – and no politician would ideally like to campaign for them. Similarly, the public is often wary of using private capital for infrastructure, given the controversies around private financing - such as the recently scrapped PFI schemes. It therefore seems important new funds, whether public or private, are tied to specific projects.

4.2 Attracting private capital through alternative financing

In the past few decades, government has placed an emphasis on private financing of infrastructure either in partnership with the public sector or solely privately-financed. The 2016-2021 National Infrastructure Delivery Plan called on private investors to fund over half of proposed schemes. It said: "Government seeks to create the right environment to encourage private investment in infrastructure and is supporting this in a number of ways."[58] Pension funds, in particular, have been highlighted as targets for investors in new infrastructure, and reforms were introduced to catalyse this, for instance the creation of the Pensions Infrastructure Platform (PiP) and proposed pooling of Local Government Pension Scheme Fund assets into British Wealth Funds.

However, private financing has not taken off as quickly as government had hoped. As one interviewee noted, government's attitude seemed to assume pension fund investment would be "free money". In reality, the Financial Times have reported how "the coalition's 2010 plan to get pension funds to invest in greenfield projects has so far secured a little over £1bn of the £20bn promised by the then chancellor George Osborne. Nearly all of this has gone on investing in assets that were already built, such as schools and hospitals."[59]

One interviewee noted how not many places have considered in detail attracting pension fund investment. Where places are seeking pension fund investment, there is also a lack of knowledge or experience in how pension funds operate. Although "there is no shortage of money", there is a "shortage of schemes that show decent return working with right people giving people confidence". Strategic authorities "need the skills and to speak more with investors to understand their operating model, not telling them they have got it wrong". The interviewee also acknowledged that pension funds lack experience in working with local authorities too.

The reality is, although it has significant potential, pension fund investment in infrastructure is a relatively immature market. For government and places to create the right environment for investment, it will take time. During our research, a number of factors seem important to this:

1. **Developing a packaged pipeline of projects**. As one interviewee put it: "The success of PFI was the sense that if you don't win the first project, there will be a second, third and fourth project to bid for. It made investment in necessary skills and expertise worth it from the investor's perspective." The Infrastructure and Projections Authority can support this by working with strategic authorities to identify pipelines of schemes, signalling to the private investment market which ones are appropriate for private finance or public-private.

57 Institute for Government - How to transform infrastructure decision making in the UK

58 IPA (2016) - National Infrastructure Delivery Plan 2016–2021

59 FT (2017) - Why the UK is struggling with poor infrastructure

2. **Identifying schemes that match risk portfolios**... Unlike Canadian and Australian pension funds, UK pension funds tend not to invest in schemes that involve construction risk. Instead, they tend to be more active in buying secondary debt of existing projects.
3. **...and schemes that are commercially viable**. To be viable to a pension fund investor, a scheme needs to generate long-term and secure revenue, for instance fare box and toll revenues. This necessitates a simplifying of what it is a strategic authority is seeking financing for. As one interviewee put it; "Pension funds aren't interested in signalling but tunnels. There is no long-term return on wires."
4. **Being comfortable with private ownership**. Given public concerns around PFI, private ownership of infrastructure is a political hot potato. Any scheme involving private financing needs to provide clear direction on why and how it is used, alongside necessary accountability measures.
5. **Investment in a place**. As one interviewee noted, institutional investors in infrastructure are "backing places as well as projects". The stability and maturity of the local administration is therefore important to attracting private capital, as is the credibility that long-term infrastructure strategies offer. In this regard, government endorsement is important too.
6. **Emphasising air quality through social value.** Like many private investment strategies have reoriented towards achieving social value and to take account of climate change, they should also account for air quality. Projects invested in should be environmentally sustainable, delivering social returns as well as capital returns. Places can then partner with investors who operate this way.

To these ends, one option places can explore is the asset recycling model. It is a model being explored in the USA, as the Trump Presidency seeks to fund its $1 trillion infrastructure plan,[60] and involves the state leasing a public asset to a private company, typically a pension fund. The state forgoes the revenues raised in the lease period and the capital generated from leasing the asset is invested in a new piece of infrastructure.

The Australian state of New South Wales's Asset Recycling Initiative is often pointed to as a case study of the model – summarised in the box below – yet there is indirect precedent in the UK too. The HS1 concession to 2040 was sold by the government to two Canadian pension funds in 2010, and has since been resold,[61] while new rolling stock for London's Piccadilly Line is being partly funded by TfL temporarily selling trains for the new Elizabeth Line and then leasing them back (said to raise £875 million).[62]

The scope for places to use asset recycling is limited to those with assets to recycle which can generate a sustainable stream of revenues. In London, for instance, TfL could consider recycling Crossrail 1 to fund Crossrail 2. Learning from the example in New South Wales, it seems essential that funds raised from asset recycling are invested in infrastructure schemes that generate revenues – otherwise the model would not work again. Similarly, given the level of expertise required and the fact this is a relatively new model in the UK, it also seems essential that places set up good governance models, focused on generating the highest price for what are public assets and investing in the most appropriate projects for the local area.

60 The Australian (2017) - Mike Pence backs Australia's asset recycling model

61 FT (2017) - HS1 railway line sold for EV of £3bn, below initial expectations

62 While this sounds odd, the bespoke nature of tube trains means lease payments are expected to be reasonable, making this a deal for TfL that frees up capital to invest in new trains. This is covered in detail by the Reconnections website: London Reconnections (2018) - Leasing Lizzie

Asset recycling in New South Wales

To identify where new infrastructure was most needed in New South Wales, the state government created Infrastructure NSW. It is an independent and advisory body which also managed Restart NSW, a fund aimed at raising and directing capital towards the infrastructure projects it identifies.[63]

Between 2013 and 2015, the state government leased two ports, the Sydney Desalination Plant and the 99-year lease of the Transgrid electricity distribution network.[64] It raised almost AU$15 billion and has enabled significant new spending in the region. Similar schemes and governance models have been introduced in the states of Victoria, Queensland and Tasmania.

4.3 Using government funding creatively for clean air

A myriad of government funds exist for infrastructure. Each is controlled by a specific department, and each has its own schedule with its own set of strings attached. Some of the funds open to places to bid for are summarised below. The table illustrates the piecemeal nature of central government funding for infrastructure. There is little room for what funding arrangement is best for a place. Instead each funding bid necessitates a business case aligning with departmental agenda. Funding is also relatively minor. As one interviewee said of the Transforming Cities fund, noting it would fund one part of a metro extension in their area: "It is nice to have but barely transformational… it felt like baby steps in comparison to where we need to be."

Fund	Controlling department(s)	Purpose
National Productivity Investment Fund	HM Treasury	£31bn capital fund focused on housing, R&D and economic infrastructure (e.g. transport and digital communications). It includes the Housing Infrastructure Fund, a £5bn capital grant funding to unlock otherwise unviable housing developments in areas with the greatest housing demand. And it includes the £1.7bn Transforming Cities Fund, a fund to support inter-city transport connectivity, £840 million of which was allocated to six mayoral combined authorities.
Local Growth Fund	MHCLG, BEIS and DfT	£12bn of funding tied to 'Growth Deals' announced across the country and provided to LEPs. The funding was designed to finance infrastructure and skills schemes that can unlock housing growth and job opportunity.

63 EPOS (2016) - The Financier State as an Alternative to the Developmental State: A Case Study of Infrastructure Asset Recycling in New South Wales, Australia

64 EPOS (2016) - The Financier State as an Alternative to the Developmental State: A Case Study of Infrastructure Asset Recycling in New South Wales, Australia

Large Local Majors Fund	DfT	Scheme intended to support transport schemes too large to be supported by the Local Growth Fund. £603 million has so far been pledged for nine schemes.
National Roads Fund	DfT	Road improvement fund to be created through hypothecating vehicle excise duty (around £5.8bn). It will partly fund improvements to the soon-to-be-announced Major Roads Network.

Using government funding creatively

Given the inflexibilities and limitations of central funding pots available to places for infrastructure, places need to think creatively in how they can multiply existing funding. In Greater Manchester, for instance, a city-region wide transport fund has been developed to support the funding of infrastructure improvements to 2043. After centrally-set ring fences around transport capital funding were removed – enabling a focus on local priorities and criteria for investment – authorities dedicated a top slice of their integrated transport funding and borrowed funding based on the new Metrolink fare box and a thirty-year increment on local council tax.

Similar pooling principles were proposed, albeit not successfully, in the 'Three Southern Counties' devolution bid (East Sussex, Surrey and West Sussex). A revolving investment fund was proposed where government brought forward longer-term funding transport allocations for each county into a single pot. Each county then pooled some existing funding into this pot too, leveraging in borrowing, along with supplementary levies on stamp duty (0.1% value of transactions), council tax and business rates, to build the infrastructure they thought necessary. Part of the proposal included 10 percent of new revenues generated by council tax and business rates from new housing and employment space added to the pot from the fifth year.

Priorities for the 2019 Spending Review

The forthcoming Spending Review provides government the opportunity to gear places' infrastructure spend more towards achieving aims around cleaner air. Just as the 2015 Spending Review grounded infrastructure spend in improving productivity,[65] we believe government should also announce cleaner air as a main objective. This should be both in broad principles of all infrastructure spend and in the form of a dedicated funding pot. This pot should invite bidding from strategic authorities for projects based on the following questions:

1. How would the project achieve cleaner air in the strategic authority area?
2. How would the project shift the local economy towards principles of clean growth, as per government's industrial strategy?
3. How is the strategic authority partnering with private investors to deliver the infrastructure project?

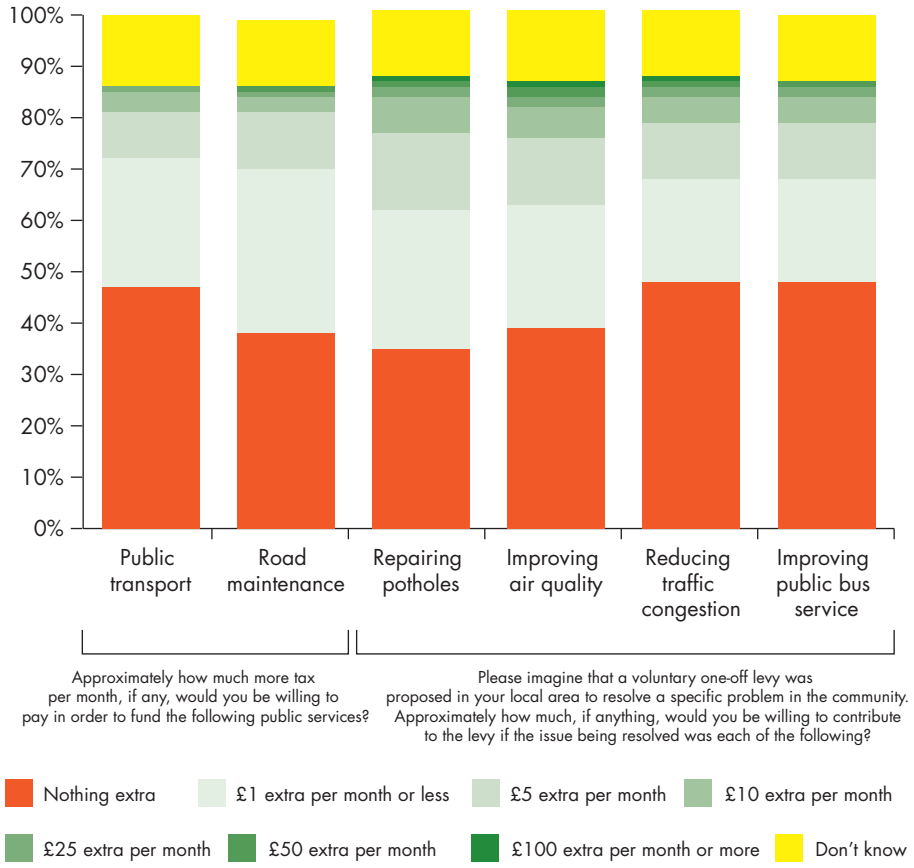
4.4 Using tax powers more actively

As the examples of Greater Manchester and Three Southern Counties show, strategic authorities can make central grant-funding go much further when combined with their own fiscal powers. Along with mechanisms to capture planning gain like the Community Infrastructure Levy, the reality is through council

65 HM Treasury (2015) - Spending Review and Autumn Statement

tax and business rates, strategic authorities have existing legal platforms to raise revenues hypothecated to better infrastructure. Moreover, as shown by public polling conducted as part of the Localis research project *Monetising Goodwill* (shown below), there is widespread support for paying more towards services and issues pertaining to infrastructure.

Figure 9: Willingness to pay extra for infrastructure.



Source: Localis/YouGov public polling.[66]

Business rates supplementary levy

Over £4 billion of Crossrail is being funded by a supplementary levy on business rates in London. The levy, collected by the thirty-two boroughs and City of London Corporation on behalf of the GLA, is paid by less than one in five rateable properties and levied at a rate of 2p (the BRS multiplier) on non-domestic properties in London with a rateable value of over £55,000.

While they will not be able to raise as much funding as London, mayoral combined authorities have been provided the power to introduce supplementary business rates in their area as per the GLA.[67] Most combined authorities appear to be looking at introducing the supplement to fund their infrastructure plans. In the West Midlands, initial financial modelling shows the city-region has a rateable value (properties over £50k) of £1.7bn.[68] A 2 percent increase would

66 All figures, unless otherwise stated, are from YouGov Plc. Total sample size was 1,620 adults. Fieldwork was undertaken between 08th - 09th March 2018. The survey was carried out online. The figures have been weighted and are representative of all GB adults (aged 18+). YouGov is a member of the British Polling Council and abide by their rules.

67 The power was originally to be provided as part of the Local Government Finance Bill 2016-17 however this bill fell following the 2017 general election meaning the necessary powers were not obtained

68 WMCA (2018) - Progress Update on the West Midlands Combined Authority Investment Programme

raise £34m per year and is intended to raise £500m of direct investment.

As one interviewee noted, it is "quite challenging to work out precisely when [the supplement] is right to use in a city-region where returns are relatively low". However the supplement can also raise a significant amount of funding towards a city-region's infrastructure plans. It is a power we believe should also be conferred to county councils too. While the supplement will not raise as much funding as London and other city-regions, when raised collaboratively across counties, it could enable a significant new programme of infrastructure betterment.

Council tax precepts

Similarly to business rates, strategic authorities can levy precepts to fund specific issues or services. In London, for instance, Londoners paid a £20 annual levy between 2006/07 and 2016/17 as part of a £625 million council tax contribution to the Public Sector Funding Package for the 2012 Olympic Games. More commonly, almost all upper-tier authorities have introduced precepts for social care funding in the past few years. Further, all mayors can raise precepts. In the West Midlands, for instance, mayoral powers enable precepts "for the purposes of providing funding for the Investment Programme are limited to those projects which will improve congestion and have a direct impact on car usage and road safety as being functions that are within the mayoral powers".[69]

Although they raise significantly less than business rates supplements and although they are subject to political disagreements – a proposed mayoral precept in the West Midlands would have raised £7.5m per year but was voted down by local leaders – precepts can deliver useful contributions to a place's infrastructure plans. They are also available to all strategic authorities, however the amount places can raised is capped by government. Each year, the Secretary of State sets the thresholds at which council tax rises are deemed 'excessive'. Currently they are set at 3 percent for the GLA and 3 percent (excluding social care) for county councils.

Payroll levy

Business rates and council tax are levied on businesses and people who run and live in properties based within the billing authority. The tax is levied because both benefit from the collective services a local authority provides, be that roads or social care. Yet, if places begin from the principle that groups who derive utility from civic infrastructure should contribute something to its construction and maintenance, there is a strong case for a levying tax on people who *work* in a place but don't live there. This is commonly known as a payroll levy. Payroll levies are taxes imposed on employers or employees, and are usually calculated as a percentage of the salaries that employers pay their staff. Payroll taxes generally fall into two categories: deductions from an employee's wages, and taxes paid by the employer based on the employee's wages. They are common in North American cities. In New York, for instance, it was levied for close to thirty years and it is estimated would raise around $860 million if levied today in the city.

No place in the UK has the power to introduce a payroll levy – though Nottingham's aforementioned Workplace Levy is in effect similar to a payroll levy – though we heard in research that proposals for one were developed in Birmingham. When hypothecated to the delivery infrastructure strategies, we believe government should look positively on future proposals for a payroll levy. Given the pressures commuters place on transport networks, it is right that they be asked to contribute too.

69 WMCA (2018) - Progress Update on the West Midlands Combined Authority Investment Programme

New York's commuter tax

Between 1971 and 1999, a commuter tax was levied in New York on those who worked in the city but lived in the suburbs. All wages and salaries earned in the city were taxed 0.45 percent and proprietors' income was taxed 0.65%. The commuter tax was repealed in 1999 by state legislature, despite objections from the city government. The Fiscal Policy Institute have described this move as 'unjustifiable', saying it "relieved non-resident workers of a portion of the city tax burden, shifting it to others".[70] The Independent Budget Office have estimated that if the tax was restored, the city government would have collected $860 million in the 2016 tax year.

Tourist tax

Similarly to the principles of introducing a payroll levy, tourist taxes are introduced because visitors to a place increase demand pressures on local services and the local transport network. It is right they pay towards the preservation and upkeep of the place.

Tourist taxes are increasingly commonplace across Western Europe. The Balearic island local governments introduced the tax as a way to raise funds for sustainable tourism so they can make efforts to protect the natural beauty of the islands. The tax has largely come about due to shortfalls in local government funding and is charged at a rate of up to €2 per person per night. In Amsterdam and Berlin the tax is levied at 5 percent of a hotel room bill.

While often proposed, no place has yet levied a tourist tax in the UK. They do not have the legislative capacity to do so. However, they could raise a significant sum of money towards better infrastructure. The table below illustrates what it could raise in London following the models outlined above:

Approximate number of hotel stays in London per night	**Average daily rate for hotel room in London[71]**	**Approximate annual revenue raised by tourist tax levied of £2**	**Approximate annual revenue raised by tourist tax levied at 5 percent of hotel room bill (£7.10)**
117,000[72]	£142	£85 million	£300 million

70 Fiscal Policy Institute (2015) - New York City Taxes — Trends, Impact and Priorities for Reform

71 PwC (2017) - Facing the future: UK hotels forecast 2017

72 Calculated by multiplying the number of rooms in London in 2016 (145,930) by forecast occupancy rate in 2017 (80 percent), as reported by PwC PwC (2017) - UK hotel forecast

5. Policy recommendations

Recommendations to central government

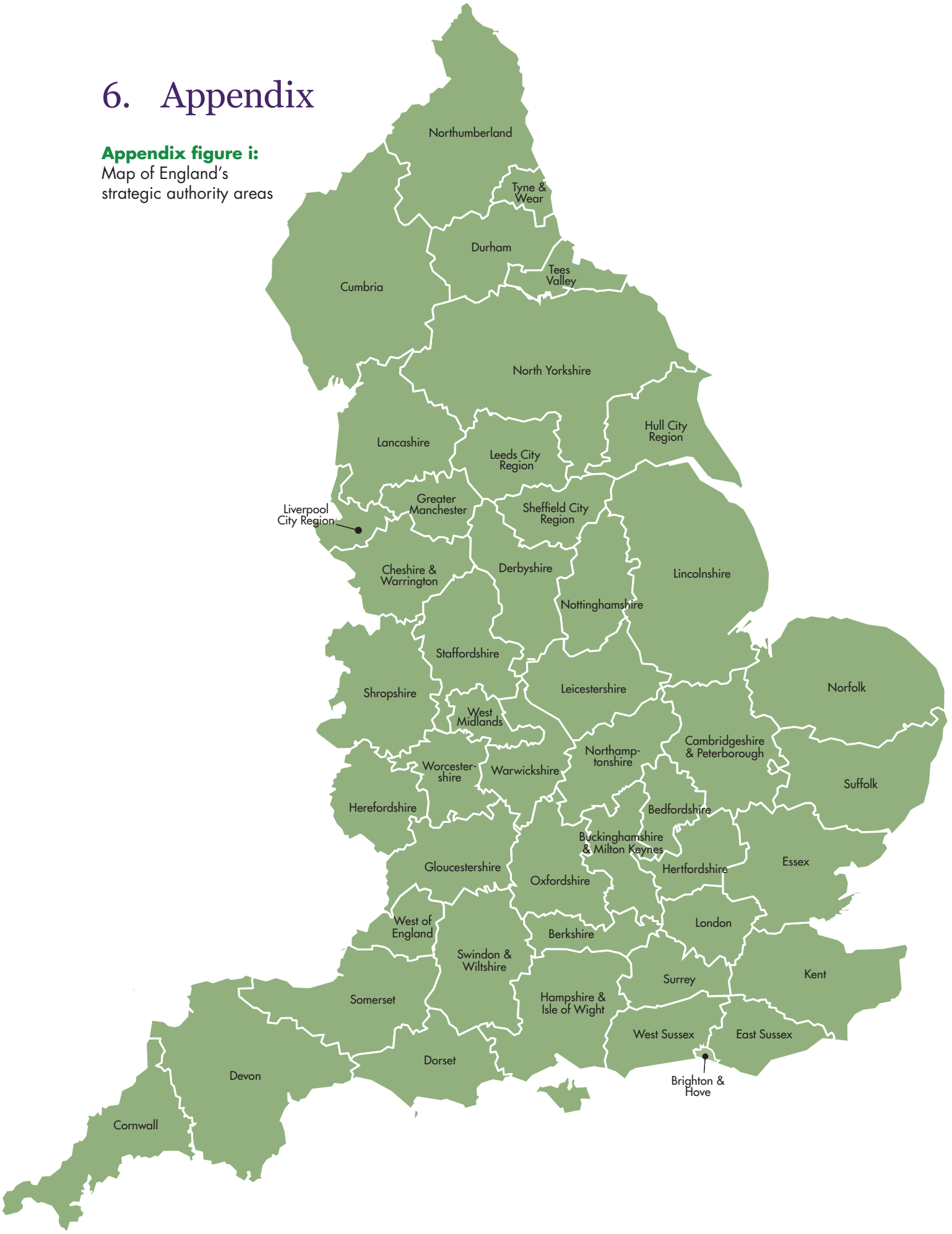
- In the forthcoming Spending Review, government should announce cleaner air as a main objective of infrastructure spend. This should be both in broad principles of all infrastructure spend and in the form of a dedicated funding pot. This pot should invite bidding from strategic authorities for projects based on the following questions:
  1. How would the project achieve cleaner air in the strategic authority area?
  2. How would the project shift the local economy towards principles of clean growth, as per government's industrial strategy?
  3. How is the strategic authority partnering with private investors to deliver the infrastructure project?
- In line with the recently published Clean Air Strategy, government should place greater emphasis on directing strategic authorities to make air quality a more present part of their infrastructure strategies and also encourage them to take a more active role in attracting private capital for infrastructure projects.
- The Infrastructure and Projects Authority should work with strategic authorities to identify pipelines of schemes, signalling to private investors market projects which are appropriate for private finance or public-private.

Recommendations to strategic authorities

- Each strategic authority should make cleaner air a strategic aim of their infrastructure strategy.
- As part of their infrastructure strategy, each strategic authority should identify their local infrastructure gap.
- Each strategic authority should review funding and financing options for the delivery of better infrastructure in their area. This should include private financing, local taxation and government funding.

6. Appendix

Appendix figure i:
Map of England's strategic authority areas



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