

# Integrating Action on Air Quality & Climate Change

A Guide for Local Authorities

Version 1 - September 2024



[the-ies.org](https://the-ies.org)



Environmental Policy  
Implementation  
Community

Part of the IES family

# Contents

3	Acknowledgements
5	Forewords
7	Executive summary
12	Chapter 1 - Introduction
14	Chapter 2 - Air quality, climate change and local authorities
23	Chapter 3 - Developing an integrated approach
29	Chapter 4 - Measures that local authorities can take on air quality and climate change
30	4.1 Transport
76	4.2 Built Environment
98	4.3 Overarching
112	Appendix A
116	Appendix B
120	Appendix C



Part of the IES family

# Acknowledgements

## About the Institution of Environmental Sciences

The Institution of Environmental Sciences (the IES) is at the forefront of uniting the environmental sciences around a shared goal: to work with speed, vision and expertise to solve the world's most pressing environmental challenges, together. As the global professional membership body for environmental scientists, we support a diverse network of professionals all over the world – and at every stage of their education and careers – to connect, develop, progress and inspire.

Registered charity no. 277611

## About EPIC

EPIC is the Institution of Environmental Sciences' Environmental Policy Implementation Community. EPIC was launched in 2024 following the merger of Environmental Protection UK into the larger IES family. EPIC acts as a forum and centre of excellence for local authorities and others delivering environmental protection policy at the front line. As a knowledge hub for disseminating best practice, EPIC builds on the professional expertise of its members, especially those with first-hand knowledge of the practical problems involved.

This guidance was produced by the EPIC Air Quality & Climate Change task group:

- Sarah Legge, Associate Director, ARUP (chair)
- Alaric Lester, technical editor and copywriter, Krastis Consulting (document editor)
- Nick Marks, Pollution Control Officer, London Borough of Newham
- Stephen Moorcroft, Director, Air Quality Consultants – Part of Logika Group
- Oxana Waite, Pollution Control Specialist, Eastleigh Borough Council
- Ruth Calderwood, Chair of EPIC Steering Committee and Air Quality Manager, City of London Corporation
- Dr Donald Payne, Land & Air Quality Technical Officer, Fife Council
- Derek Osborn, sometime Director General for Environmental Protection in the Department of the Environment
- Elizabeth Bates, Local Air Quality Management and Air Quality Planning Specialist, City of Bradford MDC
- Bernard Fisher, air quality modelling expert and previous Chair of IAQM
- Jen Simpson, Technical Director for Air Quality, Sweco
- Noel Nelson, Senior Air Quality Scientist at the Met Office
- Ellie Savage, EPIC Policy Officer (ex-officio)



Part of the IES family

EPIC would like to thank all of those who have contributed or given feedback on the guidance, without whom this report would not have been possible:

- Grace Staines AMIEnvSc, Technical Advisor (Air Quality), Port of London Authority
- Philbert Chan, Air Quality Lead, RSSB
- Ben Warren, Emissions Principal, RSSB
- Rich Fisher, Head of Strategic Planning, Great British Railways Transition Team
- Daniel Marsh, Programme Manager, Centre for Low Emission Construction, Imperial College London
- Tom Parkes, Air Quality Programme Manager, London Borough of Camden
- Davide Pascarella, Lead Officer Air Quality & Contaminated Land, Regulatory Services Partnership (RSP), Serving the London Boroughs of Merton, Richmond upon Thames and Wandsworth
- Professor Enda Hayes, University of the West of England
- Samuel Rouse, MSc, Principal Emissions and Air Quality, City Services – Brighton & Hove City Council
- Andrew Gordon, Project Manager (Cleaner Construction for London), London Borough of Merton
- Robert Green, Senior Climate Change Officer, Kirklees Council
- Natalie Holdsworth, Senior Technical Officer (Air Quality), Kirklees Council
- Chris Shields, Principal Technical Officer (Air Quality), Kirklees Council
- Chris Lowe, Senior Air Quality Advisor at the Environment Agency
- Dr David Elphick, Principal Officer, Waste and Resources at the Environment Agency
- Bill Legassick, Principal Environmental Health Officer, Southwark Council
- Carolina Buner H, Principal City Planner, Transport Strategy & Policy, Transport for London
- Adam Moody, Principal Analyst – Environment, Transport for London
- Kimberley Jassal, Climate Change Consultant, Arup
- James Bellinger, Associate Director, Arup
- Monica Scigliano, Senior Policy Officer, Cycling UK
- Isaac Beevor, Partnerships Director, Climate Emergency UK
- Patrick Utz, Research Manager at CoMoUK
- Luis Bassett, Principal Environmental Health Officer, London Borough of Merton
- Dr Rachel Lee, Policy and Research Manager, Living Streets
- Natasha Feiner, Policy and Influencing Manager, Impact on Urban Health
- Lijana Mitrijevaite, Environmental Protection Officer, London Borough of Newham
- Fiona Coull, Senior Programme Manager at Cross River Partnership
- Dr Asa Thomas, Research Fellow, University of the West of England
- Antoneta Horbury, Director of Policy and Technical Affairs, Chartered Institution of Highways and Transportation
- Nicola Wheeler, Policy and Programme Lead (Climate Change and Sustainability), Richmond and Wandsworth Councils
- Jonathan Atkinson, Technical Director, CL:AIRE
- Alice Roberts, Head of Campaigns, CPRE London
- Professor Rachel Aldred, Active Travel Academy, Westminster University
- The IAQM
- IES Climate Action Community
- All attendees of our local authority focus group

We would also like to thank those local authorities who gave us permission to use their Air Quality Hub case studies, as well as the Air Quality Hub team at Defra.



Part of the IES family

# Forewords

## Adam Donnan, CEO of the IES

Climate change and air pollution are some of the most pressing global challenges of our time. The consequences of these intertwined crises are becoming increasingly severe, affecting communities around the world. Because they impact so widely, climate change and air pollution are a crucial part of our work at the IES and the IAQM.

Despite growing awareness and the alarming frequency of extreme weather events and a growing body of evidence of the multitude of health impacts of poor air quality, the global response remains insufficient. Numerous international reports have underscored the urgency of the situation, providing a detailed account of the emissions driving these crises and the serious outcomes if they go unchecked.

In the UK, air quality is improving and GHG emissions are falling, but more coordinated action between the Government and local authorities is crucial to addressing these challenges effectively. The Government has laid out plans to tackle both air quality and climate change, notably through the UK's Net Zero Strategy and Air Quality Strategy. Local authorities are fundamental to translating these strategies into tangible outcomes.

Many local authorities are already deeply engaged in this work, having developed local strategies and actions tailored to their specific circumstances and the needs of their communities. However, we need more effective integration of these efforts across all local authorities if we are to meet our national and international climate change commitments and

address the burden that poor air quality places on the NHS – including reductions to life expectancy and quality of life.

The challenges of climate change and poor air quality are closely related, and there are substantial benefits to tackling both together. By reducing harmful emissions, local authorities can not only contribute to global efforts to combat climate change but also deliver immediate local benefits, including improved air quality and public health. This dual approach presents a unique opportunity for local authorities to maximise the impact of their actions, making our communities more resilient, healthy, and sustainable.

It is vital that more local authorities become actively involved in this mission, with a focus on integrating and enhancing their work on air quality and climate change. In recognising the critical importance of delivering environmental policy and the limited resources local authorities have to tackle the environmental crises, in 2024 the IES launched a permanent programme of work to support local authorities through EPIC, our Environmental Policy Implementation Community. Together we can address these key challenges head on, and ensure that the strategies set out by the Government translate into real-world improvements for people and communities across the UK.



Part of the IES family

**Ruth Calderwood, Chair of EPIC Steering Committee and Air Quality Manager, City of London Corporation**

As Chair of the EPIC Steering Committee, I am very pleased to present this guidance for local authorities on integrating action on air quality and climate change.

The guidance has been compiled by expert EPIC members, many of whom play a leading role in formulating and implementing air quality and climate change policy locally. We are also grateful to the numerous external experts who have contributed to and reviewed the guidance, including those who commented on our exposure draft and attended our local authority focus group. This expertise has enabled us to collate practical, on-the-ground experience with recommendations on how best to tackle both of these important issues together.

This guidance is designed for local authorities. The main part of the guidance contains various measures that local authorities can adopt. It gives broad assessments of how effective measures are likely to be in improving air quality

whilst at the same time delivering action to deal with climate change. Quantifying any impact precisely is difficult, so a traffic light system helps the reader evaluate different options.

As with many environmental policies, there may be some trade-offs. Some measures will benefit air quality over climate policy and vice versa. Many measures will have other environmental, social and economic impacts. Potential areas of conflict need to be carefully considered, taking into account local priorities.

There is a pressing need to reach net zero and deliver clean air. There is a need to get communities involved. Being closely connected to their communities, local authorities are best placed to drive local engagement and participation. We hope this guidance will help to improve the development and implementation of policy that works for communities and delivers for air quality and climate change.

# Executive Summary

EPIC is the Institution of Environmental Sciences' Environmental Policy Implementation Community. EPIC members produced this guidance with invaluable support from the Institution. The guidance is a comprehensive update of previous work that Environmental Protection UK first published in 2013, before merging with the Institution of Environmental Sciences to form EPIC.

In this guidance document we look at how and where local authorities can combine local measures on air quality and climate change, to get the best overall results for their areas. We map out a wide range of possible measures. We give indicative impacts for measures. We identify wider impacts and support mechanisms. We identify what local authorities might do to deliver improvements in specific areas.

In **Chapter 2** we set the context: how air quality and climate change are worldwide challenges to human health and to nature; how local authorities have duties to manage air quality and improve their residents' health; how many local authorities have declared a climate emergency. We explain how air quality and climate change overlap: how air pollution contributes to climate change; how climate change might make air quality problems worse; how integrating actions can help with managing trade-offs, with funding and with justifying measures.

In **Chapter 3** we cover how to develop an integrated approach to air quality and climate change. Elected members play a key role in local government: it is critical to have key members who can act as champions for

integrated air quality and climate change policy. How officers work together is fundamental. Finding where air quality and climate change policy overlap, identifying links with other environmental issues, developing good working relationships between air quality staff, climate change staff and public health staff: these all enable local authority officers to understand the wider picture, to come up with effective policy for their local circumstances.

In **Chapter 4** we identify potential measures. This chapter forms the core part of the guidance. We give qualitative rankings of potential impacts on air pollutant emissions, air pollution hotspots and greenhouse gas emissions. For each set of measures, we consider other impacts – on health, safety and the economy, for instance. We list various support mechanisms that local authorities can lean on. We also look at specific actions that local authorities can take.

The measures in **Chapter 4** cover three areas: transport, built environment and overarching measures. Transport is the sector with the largest greenhouse gas emissions in the UK. It is a major source of air pollution. Transport measures include public transport, control measures for vehicles, and ways to reduce emissions from different vehicle types. The built environment is also a critical sector. Built environment measures include strategic planning, construction, energy efficiency and energy and heat generation. The Overarching section covers sustainable

procurement and waste, which affect both transport and the built environment.

The guidance does not just include a long list of options. It includes case studies and success stories from local authorities. It is aimed primarily at local authority officers and elected officials working on air quality, climate, transport or built environment issues, but will be of interest to anyone interested in how to go about improving air quality and climate impacts locally.





## Summary table

	Measure	Likely impact			
		Air pollution hotspots	Air pollution emissions	Climate emissions	Other impacts
4.1 Transport	T1 Active travel	Positive	Positive	Positive	<ul style="list-style-type: none"> <li>Positive impacts on health</li> <li>Minor positive impacts on local economy and social value</li> </ul>
	T2 Buses	Minor positive	Positive	Positive	<ul style="list-style-type: none"> <li>Positive impacts on vulnerable communities and local economy</li> <li>Minor positive impacts on health</li> <li>Typically high cost</li> </ul>
	T3 Water vessels	Positive	Minor positive	Minor positive	<ul style="list-style-type: none"> <li>Positive impacts on local economy</li> <li>Minor positive impacts on health</li> <li>Risk for minor negative impacts on vulnerable communities</li> </ul>
	T4 Shared transport	Positive	Positive	Positive	<ul style="list-style-type: none"> <li>Positive impacts on vulnerable communities and minor positive impacts on social value</li> <li>Typically low cost</li> </ul>
	T5 Integrated transport modes	Minor positive	Positive	Positive	<ul style="list-style-type: none"> <li>Positive impacts on health</li> <li>Minor positive impacts on noise pollution</li> <li>Risk of negative impacts on vulnerable communities and community backlash</li> </ul>
	T6 Emission control zones	Positive	Positive	Minor positive	<ul style="list-style-type: none"> <li>Positive impacts on health, local economy, social value and noise pollution</li> <li>Typically low cost</li> </ul>
	T7 Parking controls	Positive	Positive	Positive	<ul style="list-style-type: none"> <li>Positive impacts on health, local economy, social value and noise pollution</li> <li>Typically low cost</li> </ul>
	T8 Other vehicle access controls	Positive	Positive	Positive	<ul style="list-style-type: none"> <li>Positive impacts on health and noise pollution</li> <li>Minor positive impacts on local economy</li> <li>Risk of community backlash</li> </ul>
	T9 Anti-idling	Positive	Minor positive	Minor positive	<ul style="list-style-type: none"> <li>Positive impacts on health</li> <li>Typically low cost</li> </ul>
	T10 Electric vehicles	Positive	Positive	Positive	<ul style="list-style-type: none"> <li>Minor positive impacts on health</li> <li>Minor positive impacts on noise</li> <li>High risk of impact on vulnerable communities</li> <li>Typically high cost</li> </ul>

	Measure	Likely impact			
		Air pollution hotspots	Air pollution emissions	Climate emissions	Other impacts
4.1 Transport	T11 Alternative fuels	Positive	Positive	Positive	<ul style="list-style-type: none"> <li>Positive impacts on health</li> <li>Minor negative impacts on local economy</li> <li>Negative impacts on natural environment</li> </ul>
	T12 Retrofitting vehicles	Positive	Minor positive	Neutral	<ul style="list-style-type: none"> <li>Positive impacts on health</li> <li>Minor positive impacts on local economy and social value</li> </ul>
	T13 Fleet management	Positive	Positive	Positive	<ul style="list-style-type: none"> <li>Positive impacts on health</li> <li>Minor positive impacts on local economy, indirect emissions improvements, safety, noise and congestion</li> </ul>
	T14 Freight management	Positive	Minor positive	Minor positive	<ul style="list-style-type: none"> <li>Positive impacts on health and congestion</li> <li>Minor positive impacts on local economy and noise</li> </ul>
4.2 Built environment	B1 Construction	Positive	Minor positive	Minor positive	<ul style="list-style-type: none"> <li>Minor positive impacts on health, noise and congestion</li> <li>Typically low cost</li> </ul>
	B2 Strategic planning and development control	Positive	Positive	Positive	<ul style="list-style-type: none"> <li>Positive impacts on health, sustainable transport and safety</li> <li>Typically low cost</li> </ul>
	B3 Improving the public realm	Positive	Positive	Positive	<ul style="list-style-type: none"> <li>Positive impacts on health, local economy, quality of life, climate resilience, circular economy and biodiversity</li> </ul>
	B4 Green infrastructure	Positive	Neutral	Minor positive	<ul style="list-style-type: none"> <li>Positive impacts on health and adaption</li> <li>Minor positive impacts on natural environment and community</li> <li>Typically high cost</li> </ul>
	B5 Energy efficiency	Minor positive	Positive	Positive	<ul style="list-style-type: none"> <li>Positive impacts on vulnerable communities</li> <li>Minor positive impacts on health and local economy</li> <li>Minor negative impacts on indoor air quality</li> </ul>

	Measure	Likely impact			
		Air pollution hotspots	Air pollution emissions	Climate emissions	Other impacts
4.2 Built environment	B6 Non-combustion renewables	Minor positive	Positive	Positive	<ul style="list-style-type: none"> <li>Positive impacts on local economy</li> <li>Minor negative impacts on natural environment</li> <li>Negative impacts on equity, noise and back up generators</li> </ul>
	B7 Reducing emissions from wood burning and other solid fuels	Positive	Minor positive	Minor positive	<ul style="list-style-type: none"> <li>Positive impacts on health and natural environment</li> <li>Risk of minor negative impacts on vulnerable communities</li> <li>Typically low cost</li> </ul>
4.3 Overarching	O1 Waste	Minor positive	Minor positive	Minor positive	<ul style="list-style-type: none"> <li>Minor positive impacts on vulnerable communities</li> <li>Minor negative impacts on odour pollution, pests and scavengers</li> </ul>
	O2 Sustainable procurement	Positive	Positive	Positive	<ul style="list-style-type: none"> <li>Positive impacts on local economy and community</li> </ul>



Part of the IES family

# 1. Introduction

## Background to this guidance

Environmental Protection UK first published guidance in 2013 on [managing air quality and climate change impacts locally](#). By 2022 it was clear that this guidance needed updating.

Environmental Protection UK's air quality working group started the update of this guidance. EPIC completed the update, steered by an EPIC task force which includes several of the former Environmental Protection UK working group members.

## How to use this guidance

This guidance has been written primarily for local authorities. It sets out the benefits of an integrated approach on air quality and climate change. It lists measures by sector, giving background information and potential impacts. Most importantly, it suggests what local authorities can do and identifies some potential support mechanisms.

Local authority officers will find this guidance most useful if they know the major sources of air pollutants and greenhouse gases in their areas. Understanding where the largest problems are helps in identifying priority areas

for improvement, and ultimately in making the biggest impact.

## Getting the right mix of measures

The right mix of measures depends on local needs and potential emissions savings that could be delivered. As well as the measure ratings (the impact of that measure of the emissions of the specified sector), the importance of that sector locally and local needs will need to be taken into account.

This section provides suggested top measures for different local authority circumstances.

## Key sector analysis: knowing which sectors are important locally

Understanding which local emission sources are most important is essential. We need emissions data for the local area, for priority pollutants such as carbon dioxide, particulate matter and nitrogen oxides. If we can identify common sources for these pollutants, we can make our priorities for action.

The **National Atmospheric Emissions Inventory** is a good starting point, although local data within it is often national data scaled to the local area. Improving on this scaled-down national data with locally-sourced data makes for more robust estimates. The better the emissions data, the better it can inform local interventions.

Key category analysis is a basic tool used in constructing emissions inventories. It helps in understanding the most important sources and in directing efforts to improve the inventory. Key category analysis involves identifying the largest five to ten emissions sources for each pollutant and ensuring that emissions estimates for these are the most rigorous.

### Box 1. Top measures

Most impactful win-win measures:

- Strategic planning and development management
- Walking & cycling
- Non-combustion renewables

Most impactful air quality measures:

- Strategic planning and development management
- Low emission zones
- Reducing emissions from wood burning

Most impactful climate measures:

- Strategic planning and development management
- Energy efficiency
- Electric vehicles

Measures with highest benefits for low-income residents:

- Walking & cycling
- Buses
- Energy efficiency

Measures with highest benefits for the local economy:

- Integrated transport management
- Sustainable procurement
- Buses

### Box 2. Spotlight on:

Low-cost measures:

- Anti-idling
- Shared transport
- Construction
- Wood burning
- Sustainable procurement

Measures for schools:

- Other vehicle access controls (school streets)
- Walking & cycling
- Anti-idling



Part of the IES family

## 2. Air quality, climate change and local authorities

### Key points

- Air quality and climate change are vital issues for people and the planet.
- Local authorities have statutory duties on air quality and public health.
- Local authorities play an important role in reducing greenhouse gas emissions.
- Air quality and climate change pollutants, impacts and measures often overlap.
- It is potentially more cost-effective for local authorities to integrate air quality and climate change policy. Integrating policy helps to manage any trade-off and to justify measures.

### Air quality and climate change matter to humanity and nature

Air pollution and climate change threaten human health and nature worldwide. We must take these threats seriously.

Air pollution is the single greatest environmental risk to public health. Poor air quality can increase the risk of developing health conditions such as heart diseases, cancers, dementia and

chronic respiratory diseases, and can make existing health conditions worse. Poor air quality kills people: in the UK, an estimated 28,000–36,000 deaths each year come from human-caused air pollution.<sup>1</sup>

Poor air quality can damage sensitive ecosystems, reducing biodiversity and degrading terrestrial and aquatic environments. We have a duty to manage air quality and improve it, particularly where pollution levels are too high.

Climate change means shifts in weather patterns and warmer temperatures across the globe. The science is unequivocal: human influence has warmed the atmosphere, ocean and land, disrupting human and natural systems. Climate change means more droughts, scarce water, wildfires, melting polar ice, rising sea levels, flooding, extreme weather, catastrophic storms and declining biodiversity.

Climate change also presents significant threats to human health. It makes issues such as water access, poor water quality, food insecurity and extreme heat worse, and amplifies disease outbreaks and zoonotic spillovers.<sup>2</sup> For example, scientists have been exploring the role that climate change played in the emergence and transmission of the COVID-19 pandemic.<sup>3</sup>

The Intergovernmental Panel on Climate Change's 2023 *Climate Change Synthesis Report* predicts that we will hit a global average temperature increase of 1.5°C by 2030–2035.<sup>4</sup> Individuals, companies, local authorities and governments must all play a part if we are to reduce greenhouse gas emissions and limit global warming.

## Why local authorities focus on air quality

Air pollution impacts tend to occur close to emissions sources. Pollution levels are generally highest close to busy roads and other major sources of emissions.

### Box 3. Key Air Pollutants

- **Nitrogen dioxide.** This pollutant gas is created during combustion, from vehicle engines and domestic boilers, for example. It is a respiratory irritant and also helps to form ground-level ozone.
- **Particulate matter (PM<sub>10</sub> and PM<sub>2.5</sub>).** Particulate matter is released in combustion, from, for example, diesel engines, solid fuel burning, and from friction and abrasion, such as tyre and brake wear on road vehicles. It is also created in the atmosphere from chemical reactions between some pollutants. Long-term exposure to particulate matter is associated with premature death, especially from heart and lung conditions. Studies have also suggested that high levels of PM<sub>2.5</sub> in childhood can permanently impair lung function.
- **Ozone.** Ground-level ozone is formed through the reaction of other pollutant gases in strong sunlight. Unlike ozone high up in the atmosphere, ground-level ozone is damaging, causing inflammation and narrowing of the airways after only relatively short exposure.

### Box 4. Air Quality in the City of London

The City of London is a geographically small area at the heart of London. The land use there is mainly financial and commercial, with some small residential areas. Historically, air quality in this area has been poor, but levels of pollution have been coming down.

The City of London Corporation has an air quality strategy with a large focus on collaboration and leadership. This recognises that it cannot solve the issue of poor air quality alone. The Corporation has been pressing for new powers for local authorities to control non-transport sources of air pollution.

With levels of nitrogen dioxide reducing year on year, attention is turning to locally-generated PM<sub>2.5</sub>, particularly black carbon, which can have a marked impact on health, as well as being a potent climate-forcing agent.

Local authorities have a range of statutory responsibilities for air quality, including environmental permitting, smoke control and local air quality management. These statutory responsibilities enable authorities to control and manage some emissions in their areas.

The local air quality management process builds a more comprehensive picture of air quality and requires local authorities to act where national objectives are not being met. These actions are set out in air quality action plans, which are the mainstay of local air quality policy. The Government also expects local authorities without air quality action plans to produce air quality strategies. The Department for Environment, Food and Rural Affairs' (Defra's) 2023 *Air Quality Strategy* sets out the actions that Defra expects local authorities to take in support of long-term air quality goals.

## Box 5. Support from Defra and the devolved administrations to deliver air quality action plans

Defra's *Air Quality Strategy: Framework for Local Authority Delivery* sets out the approach that government expects local authorities in England to follow in order to deliver for their communities and contribute to long-term air quality goals.

The Scottish Government's *Local Air Quality Management: Policy Guidance* sets out the local air quality management regime in Scotland.

The *Environment (Air Quality and Soundscapes) (Wales) Act 2024* includes specific requirements for local air quality management in Wales. The Welsh Government has *policy guidance on local air quality management in Wales*.

In Northern Ireland, the Department of Agriculture, Environment and Rural Affairs maintains web pages with current *air quality policy and guidance for local air quality management in Northern Ireland*.

Defra has a *grant scheme* to fund eligible local authorities in England improve air quality, though at the time of writing this report the future of the scheme is unclear.

Actions often rely on land-use planning and transport planning, as well as work with highways authorities, industry and other environmental regulators. In some cases, local authorities have been mandated by the Government to take further measures to improve air quality, such as to introduce Clean Air Zones.

Since 2013, local authorities have also had statutory responsibilities for improving the health of their local populations. Air quality

improvement measures go hand in hand with public health measures.

Defra and the devolved administrations support local authorities in delivering their air quality action plans.

Air pollution is no respecter of boundaries, and Defra and the devolved administrations also have their own statutory responsibilities for air quality.<sup>5,6</sup> Action at the national level is essential and fundamental to addressing air quality issues that are common and widespread and those that cannot be solved just with local action.

See [Appendix A](#) for further background information on air quality.

## Why local authorities focus on climate change

Climate change is a global crisis. The climate is changing at an unprecedented and alarming rate across the world.

Climate impacts are also felt locally. In towns and cities, for instance, observed climate change has impacted human health, livelihoods and key infrastructure. Climate change effects are evident in many communities, most notably in extreme weather conditions. We are seeing more and more extreme weather events. For instance, in July 2022, a temperature of over 40°C was recorded in Lincolnshire and other stations across England for the first time since monitoring began.

The UK has a legal and moral obligation to act on climate change. Local authorities play an important part in reducing greenhouse gas emissions and adapting communities to climate change. The UK Government's 2021 *Net Zero Strategy: Build Back Greener* recognises that more than 30% of emissions reductions needed to deliver the sixth carbon budget will involve local authorities.<sup>7</sup> The Mission Zero Coalition's 2023 report *The Future is Local* highlights the critical role local authorities need to play in tackling climate change. It recommends the establishment



of a Net Zero Charter to agree responsibilities between the Government, devolved administrations and local authorities.<sup>8</sup>

Local authorities have direct control over their greenhouse gas emissions and indirect control over some other sectors' emissions. They decide how best to serve their communities and how to ensure that action on climate change also delivers wider benefits. They have a critical role to play in reducing greenhouse gas emissions and improving climate resilience in numerous sectors, including:

- local energy provision
- the housing and building stock
- local transport networks
- local green infrastructure.

At the time of writing this report, more than 300 local authorities have declared a climate emergency.<sup>9</sup> Declaring a climate emergency acknowledges that a local authority needs to act on the causes and impacts of climate change.

See [Appendix B](#) for further background information on climate change.

## Interactions between air quality and climate change

### Greenhouse gases and air pollutants often come from the same source

Many sources of air pollution are also sources of greenhouse gas emissions. Combustion, especially, creates carbon dioxide and air pollutants. Emissions from road transport, energy and heat generation and domestic solid fuel burning are some of the most common sources that contribute to both climate change and air pollution.

## Box 6. UK Government and Devolved Administrations: Climate Change Legislation and Policies

- The *Climate Change Act 2008*, as amended, commits the Secretary of State to a target of net zero for the UK in 2050.<sup>10</sup>
- The *Climate Change (Scotland) Act 2009*, as amended, commits Scotland to a net zero target of 2045, including a 75% reduction by 2030 and 90% by 2040 against the baseline.<sup>11</sup>
- The *Environment (Wales) Act 2016* introduces a duty for Wales to reduce emissions by at least 80% by 2050, and to develop carbon budgets.<sup>12</sup>
- The 2021 Northern Ireland Energy Strategy *Path to Net Zero Energy* sets the policy framework for the Northern Ireland Executive to work towards net-zero energy.<sup>13</sup>

### Some local pollutants are climate-active

Carbon dioxide is the most abundant greenhouse gas from human activity. It is the greatest driver of climate change and remains in the atmosphere far longer than other heat-trapping gases.

Some local air pollutants, such as black carbon, ozone and methane, can substantially impact the climate. These are part of a group of short-lived climate pollutants. Their global warming potential is far greater than carbon dioxide despite remaining in the atmosphere for a much shorter time. Fortunately, acting quickly to reduce short-lived climate pollutants tends to have immediate effects for the climate and for human health.

## Climate change may make air quality problems worse

Because of climate change, hotter, drier summers are predicted in the future. These will lead to more heatwaves and wildfires, creating more pollution events with high ozone and high levels of particles. Ozone concentrations have already been rising steadily for some years, particularly due to repeated summer heatwaves. Hotter, drier summers can also increase the physiological stress on our bodies, which may make us more susceptible to health impacts from air pollution.

Appendix C describes further how net-zero strategies can impact air quality.

## Air pollution contributes to climate change

Air pollution can affect the climate in many ways. Many air pollutants are climate active. Air pollution can also affect atmospheric processes such as cloud formation. It can travel long distances, landing in some of the most remote places on our planet, including the polar regions, and reducing how much sunlight is reflected.<sup>14</sup> Air pollution can also harm terrestrial and aquatic ecosystems, impacting their capacity to absorb carbon dioxide from the atmosphere.<sup>15</sup>

Air pollution has negative impacts on clean water, biodiversity and crop yields, which can then contribute to other issues such as food insecurity and soil health.

## Possible trade-offs in policy decisions

We need to manage emissions from combustion. We need policies that give appropriate weight to air quality and climate change. Some policies may impact both areas; others may have trade-offs. Policy decisions may include which technologies to encourage or discourage and, for air quality, where to locate combustion sources.

## Box 7. Short-Lived Climate Pollutants

- **Black carbon.** Black carbon is the component of particulate matter that comes from fossil fuel and biomass combustion. In the atmosphere it absorbs solar radiation and converts it to heat. Once settled on the ground it can decrease the amount of reflected sunlight, leading to more heating of the Earth's surface and warming of the atmosphere. Warming from black carbon is particularly strong in above reflective surfaces such as clouds or snow and ice.
- **Ozone.** Ground-level ozone is a powerful greenhouse gas. Ozone also stunts vegetation growth, which then reduces the capacity for vegetation to act as a carbon sink. This effect is important: a study across nine countries found that reducing ground-level ozone increased wheat yields by an average of 9%.<sup>16</sup>
- **Methane.** Methane is a potent greenhouse gas that contributes to about 20% of global warming. About 60% of methane in the atmosphere is presumed to come from human-caused sources. Methane also contributes to the formation of ground-level ozone.
- **Hydrofluorocarbons.** These are a group of entirely human-made gases primarily used for cooling and refrigeration. They currently represent around 2% of total warming from greenhouse gases.<sup>17</sup>
- **Other pollutants.** Various other air pollutants have complex climatic effects, scattering or absorbing radiation or affecting cloud formation. Some have both warming and cooling impacts.<sup>18</sup>

## Benefits of integrating local air quality and climate change policy

### Integrated action benefits people and planet

Policies to reduce air pollution often provide win-win strategies for both health and the climate. For example, addressing short-lived climate pollutants not only improves air quality and human health, but is also a quick and effective way to mitigate some of the effects of climate change, lowering the risk of breaching irreversible climate tipping points at a global scale.

Tackling air quality and climate change reduces health inequalities and social injustice. Air pollution affects vulnerable groups and communities disproportionately. At the same time, these communities are often more likely to experience worse health outcomes from climate change effects. For example, flooding and extreme heat are more acute risks to lower-income households and older people, who may be less mobile and susceptible to the effects of heat. These same groups are also more vulnerable to air pollution.

### Integrated action manages trade-offs and makes action more cost-effective

Negative impacts felt in air quality might outweigh the benefits that a policy was designed to bring for greenhouse gases, and vice versa. This can lead to costs and delays in fixing unintended consequences. Integrated policy aims to prioritise actions that benefit both areas and to ensure that, where there are trade-offs, disadvantages are properly assessed and managed. Integrated policy manages trade-offs, making action to reduce greenhouse gases and manage air quality more cost-effective.

### Integrated action helps with funding and delivery

Integrated action may help with securing funding. For example, where resources for air

quality may be lacking, taking an integrated approach with climate may unlock access to alternative funding pots. In general, identifying clear climate and air quality co-benefits will strengthen the case for delivering projects in any case.

### Integrated action helps to justify many of the measures taken to reduce greenhouse gases by improving air quality at the same time

Improvements in local air quality can be felt almost immediately and almost entirely in the area where they are introduced. The impacts are measurable: the effects on people's health and quality of life can be directly linked back to the policy decision; and these impacts will ultimately be felt by individuals.

In contrast, the benefits of local measures to reduce greenhouse gas emissions are not tangible immediately and locally. They form a very small, but essential, part of a global effort to reduce these emissions and mitigate or avoid the potentially catastrophic consequences of continued warming.

## Box 8. Integrated Air Quality & Climate Change Resources

UK100's *Yes we Canz!* report was published in June 2022. The report is aimed at local leaders and decision-makers. It highlights clean air and net zero win-wins in four areas:

- transport modal shift
- heat demand reduction and decarbonisation
- managing nitrogen better in agricultural systems
- empowering local communities with data

The UK's Expert Air Quality Group have long considered the interactions between air quality and climate change, most recently in their 2020 report *Impacts of Net Zero pathways on future air quality in the UK*. They also produced a report in 2007, *Air Quality and Climate Change: a UK Perspective*. Many of the report's recommendations remain relevant.

Measures that address both air quality and climate change have immediate local and long-term global benefits. The immediate and long-term benefits of integrated measures make the actions easier to justify. This is one of the most powerful arguments for an integrated approach to policy.

Integrated action can also encourage personal behaviour change and community engagement. For example, people who may not have engaged with climate initiatives may be interested in the initiative when certain air quality benefits are communicated. This may then help to bring home other aspects of the issue, such as the link between air quality and climate change.

## Box 9. Unintended consequences

From 2002 vehicle excise duty was based on exhaust carbon dioxide emissions. This change favoured diesel vehicles over petrol, which had slightly lower carbon dioxide emissions compared to petrol vehicles. Diesel vehicles also had far higher air pollution emissions at the time. Later changes in political priorities led to measures which penalised older diesel vehicles. These led to backlash from people who felt they had been misled when trying to make more sustainable choices, and a rejection of measures which aimed to reduce air pollution from transport.

Some organisations still promote wood burning at home as a green and sustainable measure. This is despite the substantial air pollution and health impacts on both indoor and outdoor air, especially in urban areas, and despite cleaner alternatives being available. Domestic wood burning is one of the largest sources of particulate matter in urban areas.

Encouraging renewable energy in domestic and commercial buildings can be very positive for both climate change and air quality. However, many local authorities are seeing planning applications with multiple diesel generators proposed to back up electric power and on-site renewable energy generation. These diesel generators are often not addressed in energy statements or assessments, leading to tensions between climate and air quality.

Making housing more airtight can also create tensions. Airtightness systems improve energy efficiency. They can be managed appropriately to balance ventilation with adequate dispersion of indoor air pollution. However, when managed poorly, this can lead to high levels of air pollution within homes.

## Chapter 2 references

<sup>1</sup> **Office for Health Improvement & Disparities (2002)** *Air pollution: applying All Our Health* <https://www.gov.uk/government/publications/air-pollution-applying-all-our-health/air-pollution-applying-all-our-health> (Accessed: 12 December 2023).

<sup>2</sup> **CEPI (2023)** *How climate change increases pandemic risk*. [https://cepi.net/news\\_cepi/how-climate-change-increases-pandemic-risk/](https://cepi.net/news_cepi/how-climate-change-increases-pandemic-risk/) (Accessed: 12 December 2023).

<sup>3</sup> **CORDIS (2021)** *Climate change the culprit in the COVID-19 pandemic*. <https://cordis.europa.eu/article/id/430229-climate-change-the-culprit-in-the-covid-19-pandemic> (Accessed: 12 December 2023).

<sup>4</sup> **IPCC (2023)** *AR6 Synthesis Report: Climate Change 2023*. <https://www.ipcc.ch/report/sixth-assessment-report-cycle/> (Accessed: 12 December 2023).

<sup>5</sup> **UK Government (2010)** *The Air Quality Standards Regulations 2010*. <https://www.legislation.gov.uk/uksi/2010/1001/contents> (Accessed: 13 December 2023).

<sup>6</sup> **UK Government (2018)**. *The National Emission Ceilings Regulations 2018*. <https://www.legislation.gov.uk/uksi/2018/129/part/1/made> (Accessed: 13 December 2023).

<sup>7</sup> **UK Government (2018)**. *The National Emission Ceilings Regulations 2018*. Project code SI 2018/129. <https://www.legislation.gov.uk/uksi/2018/129/part/1/made> (Accessed: 13 December 2023).

<sup>8</sup> <https://www.uk100.org/sites/default/files/publications/Mission%20Zero%20Network%20Report%20%28Print%29-compressed.pdf>

<sup>9</sup> [https://climateemergency.uk/wp-content/uploads/2024/03/Scorecards\\_Successes\\_report\\_CEUK\\_DIGITAL.pdf](https://climateemergency.uk/wp-content/uploads/2024/03/Scorecards_Successes_report_CEUK_DIGITAL.pdf)

<sup>10</sup> **UK Government (2008)** *Climate Change Act 2008*, c. 27. <https://www.legislation.gov.uk/ukpga/2008/27/contents> (Accessed 13 December 2023).

<sup>11</sup> **UK Government (2009)** *Climate Change (Scotland) Act 2009*, asp. 12. <https://www.legislation.gov.uk/asp/2009/12/contents> (Accessed 13 December 2023).

<sup>12</sup> **UK Government (2016)** *Environment (Wales) Act 2016*, anaw. 3. <https://www.legislation.gov.uk/anaw/2016/3/contents/enacted> (Accessed 13 December 2023).

<sup>13</sup> [https://climateemergency.uk/wp-content/uploads/2024/03/Scorecards\\_Successes\\_report\\_CEUK\\_DIGITAL.pdf](https://climateemergency.uk/wp-content/uploads/2024/03/Scorecards_Successes_report_CEUK_DIGITAL.pdf)

<sup>14</sup> **UN Environment Programme (2019)** *Air pollution and climate change: two sides of the same coin*. <https://www.unep.org/news-and-stories/story/air-pollution-and-climate-change-two-sides-same-coin> (Accessed: 15 December 2023).

<sup>15</sup> <https://www.eea.europa.eu/publications/air-quality-in-europe-2022/impacts-of-air-pollution-on-ecosystems>

<sup>16</sup> **UK Centre for Ecology and Hydrology (2023)** *Global Challenge Network on Tropospheric Ozone: Agricultural and crop-effects of ozone*. [https://www.ceh.ac.uk/sites/default/files/files/GNC\\_OzoneFactSheets\\_AgriCropEffects.pdf](https://www.ceh.ac.uk/sites/default/files/files/GNC_OzoneFactSheets_AgriCropEffects.pdf) (Accessed 15 December 2023).



Part of the IES family

<sup>17</sup> **Climate and Clean Air Coalition (2023)**

Hydrofluorocarbons (HFCS). <https://www.ccacoalition.org/short-lived-climate-pollutants/hydrofluorocarbons-hfcs> (Accessed: 15 December 2023).

---

<sup>18</sup> **Air Quality Expert Group (2007)** Air Quality and Climate Change: A UK Perspective <https://uk-air.defra.gov.uk/assets/documents/reports/aqeg/fullreport.pdf>

---

# 3. Developing an integrated approach

## Key points

- Elected members decide the policy direction of a local authority. Having key members to act as champions for integrated policy is critical.
- For an integrated approach to work, local authority officers working on air quality and climate change need to engage regularly and understand each other's work.
- Air quality action plans and climate change strategies need to influence each other.
- Vulnerable communities need to be considered to avoid unfair impacts.
- Officers should look to link air quality and climate change policy with other areas.

## The importance of elected members

Elected members play a key role in local government, representing their local areas, providing community leadership and controlling

policy direction. Getting their support is crucial, in particular securing the support of elected members who can provide a leadership role and act as champions for integrated air quality and climate policy.

Many local authorities make decisions using an executive system, where a leader elected by the council appoints a cabinet and each cabinet member has a portfolio for a particular area. In this system, responsibility is concentrated in the hands of a relatively small number of individuals. Key cabinet members to engage are those with environment, transport, built environment or health portfolios, as well as the leader of the council.

Other local authorities use a committee system, where decisions are made by various committees, each with a different area of responsibility. In this system a larger number of councillors from multiple political parties are involved in decision making. For authorities with committee systems, it is important to engage with members of the committees that have air quality and climate change responsibilities; these are likely to be the environment, transport, built environment, health and planning committees.

Whether cabinet or committee system, having an elected member in a position of authority to



Part of the IES family

champion integrated policy and work with other elected members is critical.

Almost all local authorities also have overview and scrutiny committees. These committees examine policies and decisions made by the cabinet and senior management. They can be a useful place for flagging the need for integrated climate change and air quality policy, so members on overview and scrutiny committees can be another important group to engage.

Senior local authority officers can also use their influence to help champion integrated policy. Directors and senior managers tend to work more closely with elected members and across departments, so getting them on-side can be highly valuable.

## Developing air quality and climate change officer relationships

Local authority officers provide expertise and implement policy measures. Officers working on air quality and climate change need to have a good understanding of each other's work and communicate freely and regularly. This is the cornerstone of integrated policy. Without good mutual understanding, air quality and climate change officers risk feeding contradicting advice into the policy process, splitting the environmental voice and leading to unsatisfactory policy.

Public health officers are often well-placed to influence both areas. They can be strong allies for air quality and climate change officers. We recommend that officers working on air quality and climate change also work with their public health counterparts.

When staff are based in different departments, and often separate buildings, developing a strong working relationship can be challenging. This can be especially difficult when these responsibilities are held by multiple tiers of local authority. Air quality staff are usually based in environmental health/protection departments; staff working on climate change

## Box 10. How to engage with elected members

Before engaging members, it is a good idea to take the time to understand their backgrounds, views and priorities. Consider which areas of air quality and climate policy particular members may be most interested in. For instance, if a member has a medical background, you could focus on the public health issues that come with poor air quality. If they represent a ward with high levels of deprivation, you may want to focus on the social justice issues connected with air quality and climate change. Members who do not naturally see a policy area as a priority may be more convinced by economic arguments.

For information on how to communicate evidence to policy-makers, the IES have produced a briefing on [evidence-informed policy](#).<sup>1</sup>

are often based elsewhere, such as in private sector housing or policy teams. We recommend investing time in building strong face-to-face relationships and consulting and working with members from other departments early on policies and plans. One way to do this is by having air quality champions in climate teams and vice versa.

## Find where climate change and air quality policy overlap

Air quality and climate change have very different policy frameworks.

Local air quality management is driven by well-defined processes: it operates to fixed timescales and is based on detailed guidance from Defra, the devolved administrations and the Mayor of London. Local authorities have a



statutory duty to regularly review and assess local ambient air quality, and to take action if standards are not being met.<sup>2</sup>

In contrast, local climate policy operates largely outside central government timescales and guidance: local authorities have no statutory duties or targets for action on climate change. Policy is instead driven by internal local authority processes. Climate strategy and assessment are often developed using voluntary guidance from bodies such as the Local Government Association, think tanks and non-governmental organisations. At the end of 2023, over 80% of local authorities had published a climate action plan.<sup>3</sup>

For an integrated approach to work, climate change and air quality strategies and plans need to influence each other (as shown in [Table 1](#) below).

### Environmental justice

Environmental justice is about making sure that all people are treated fairly on environmental issues. It means ensuring that environmental laws, regulations and policies are developed, implemented and enforced in ways that treat all people fairly and allow them meaningful involvement.

**Table 1 – How climate change and air quality policy might influence each other in practice**

Climate change action plan or strategy	Air quality action plan or strategy
<ul style="list-style-type: none"> <li>• Reference to air quality action plan where measures common to both areas are planned</li> <li>• Measures that show strong win/win benefits are prioritised</li> <li>• Air quality benefits or dis-benefits of strategy measures are assessed</li> <li>• Measures that have a negative impact on air quality are de-prioritised, or targeted towards locations where impacts will be low (e.g. rural areas with good air quality)</li> <li>• Climate measures that show strong air quality benefits are targeted, where possible, at areas of poor air quality</li> </ul>	<ul style="list-style-type: none"> <li>• Reference to climate change strategy where measures common to both areas are planned</li> <li>• Measures that show strong win/win benefits are prioritised</li> <li>• Climate benefits or dis-benefits of action plan measures are assessed and, where possible, quantified</li> <li>• Measures with strong carbon dis-benefits are de-prioritised or redesigned to make them more energy efficient</li> </ul>

## Box 11. Environmental justice resources

- [Climate Just](#)
- [Involve: How can local authorities engage the public on climate decision-making?](#)
- [Knowledge Network on Climate Assemblies](#)
- [Just Transition Commission](#)
- [Just Transition Taskforce: Just transition resources](#)

### Case Studies:

- [LGA: Newham Council's Just Transition Plan: LGA Case Study](#)
- [Involve: Kingston Citizens' Assembly on Air Quality](#)
- [Climate Group: A just and equitable response to COVID-19 in California](#)
- [Alberta Just Transition Taskforce](#)
- [Involve: Local deliberative democracy case studies](#)

Serious action on air quality and the climate requires foundational change, including in the jobs we do, the houses we live in and the way we travel. A just transition looks to make those changes in a way that is fair to everyone, especially to underrepresented and vulnerable communities.

The impacts of climate change and air quality affect us all, but they affect some people and communities more than others. We need to remedy any unfairness by centring the needs and concerns of vulnerable communities in the environmental action we take.

People who are vulnerable to climate impacts and air quality impacts overlap strongly. They include children, the elderly and those with health conditions. Those on low incomes or living in poorly suited environments, such as poor-quality housing or areas with nearby pollution hotspots or little green space, will also be more at risk. People with multiple vulnerabilities need to be especially considered. Certain communities, including ethnic minorities and people with disabilities, will be more likely to have high levels of some or multiple vulnerabilities.

Some of the measures in this guidance could have significant impacts on vulnerable communities that need to be considered and addressed. These have been flagged in the 'other impacts' section of the measure. These vulnerable communities should be brought into and considered in decisions about climate and air quality. See [Box 11](#) opposite for some helpful resources for how to do this, including through citizens' assemblies and other deliberative approaches.

## Looking to link air quality and climate change policy with other environmental areas

Local authorities are also active and have responsibilities in other areas of environmental policy. While this guide focuses on integrating air quality and climate change policy, it is valuable to ensure that they are considered and that they influence other environmental policy areas.

## Natural environment

Climate change and air pollution both directly impact the natural environment and biodiversity. Air pollution can cause acidification and nutrient (nitrogen) deposition; ozone pollution attacks vegetation directly, leading to leaf damage and stunted growth. Climate change presents a significant challenge

to vulnerable ecosystems, which may be unable to adapt to warmer conditions and other climate change impacts.

Managing nature sustainably can bring direct benefits for climate change and air quality. For example, green open spaces in urban areas can benefit air quality and climate change; urban trees can be an important carbon sink; open spaces themselves can act as a buffer between sources of noise and air pollution and the places where people live and work. Providing better quality green open space in urban areas also helps with adapting to climate change, for example by reducing rainwater run-off, increasing urban humidity and reducing urban temperatures.

## Environmental noise

Environmental noise is the unwanted sound we are exposed to in our everyday environment, from sources such as road vehicles, trains and aircraft. Noise causes annoyance. High levels of noise are associated with poor health, including stress and sleep disturbance.

Some measures taken to improve air quality and climate change also reduce noise, such as reducing the number of vehicles on the road and using cleaner, quieter technologies such as electric or hybrid vehicles. Areas of noise pollution often overlap with areas with poor air quality, so effective action may improve both.

Some measures to improve air quality and climate change may increase noise and disturbance. For example, if not thoughtfully sited, wind turbines have the potential to affect health, due to acoustic impacts and flicker. Air source heat pumps can potentially cause noise nuisance, leading to the Chartered Institute of Environmental Health and Institute of Acoustics publishing joint guidance on the issue.<sup>4</sup>

## Climate adaptation

The impacts of climate change are already being felt by communities across the UK, and more

extreme impacts are unavoidable. Local authorities are therefore considering how to adapt and improve resilience to current and future climate impacts. Several have developed and implemented climate change risk and adaptation strategies alongside their climate action plans.

While this guidance focuses on air quality and climate mitigation, climate adaptation is also considered where pertinent. Adaptations to improve climate resilience can themselves affect air quality, both directly and indirectly.



## Chapter 3 references

<sup>1</sup> **Institution of Environmental Sciences (2023)**

Evidence-informed policy: an introduction to environmental policy. <https://www.the-ies.org/document/evidence-informed-policy> (Accessed 15 December 2023).

---

<sup>2</sup> **UK Government (2023)** Air quality strategy: framework for local authority delivery. <https://www.gov.uk/government/publications/the-air-quality-strategy-for-england/air-quality-strategy-framework-for-local-authority-delivery> (Accessed 15 December 2023).

---

<sup>3</sup> **CAPE: Informing local action on climate change (2023)**. Tracking the UK's journey towards carbon zero. <https://cape.mysociety.org/> (Accessed 15 December 2023).

---

<sup>4</sup> **Institute of Acoustics (2023)**. Heat Pump Briefing Notes & Calculation Sheet by IOA and CIEH. <https://www.ioa.org.uk/heat-pump-briefing-notes-calculation-sheet-ioa-cieh> (Accessed 15 December 2023).

---

# 4. Measures that local authorities can take on air quality and climate change

## Measures and ratings

Each set of measures is a group of actions that local authorities can take which will impact on air quality and greenhouse gas (GHG) emissions in varying ways.

For each measure we have included a rating for its impact on a) overall emissions of air pollutants b) air pollutant hotspots and c) overall emissions of greenhouse gases.

The ratings take place on a five-point scale:

- Negative
- Minor negative
- Neutral
- Minor positive
- Positive

Key sectors and main sources of climate and air pollutant emissions vary across local authorities. For example, water vessels may be a significant source of emissions for coastal and river-based local authorities and a negligible source for others; the layout and location of transport hubs, workplaces and homes will make integrated transport more effective in some local authorities. Thus the impact ratings are indicative only, and we have not attempted to quantify a magnitude of change for each rating.

Positive impact ratings assume that a local authority successfully delivers an ambitious version of the measure, considering constraints such as funding and powers. Negative impact ratings assume that a local authority successfully delivers an ambitious version of the measure, considering constraints, but without any mitigating action taken. Ambition refers to geographical scale of a measure and/or the depth of a focused measure. Both positive and negative impact ratings assume that the emissions source the measure addresses is a significant contributor to the local authority's emissions. For example, a 'positive' air pollutant emissions rating for the 'walking & cycling' measure means that if a local authority successfully delivered the most ambitious version of the walking and cycling measure, it would have a positive impact (significant decrease) on the local authority's air pollutant emissions from transport.

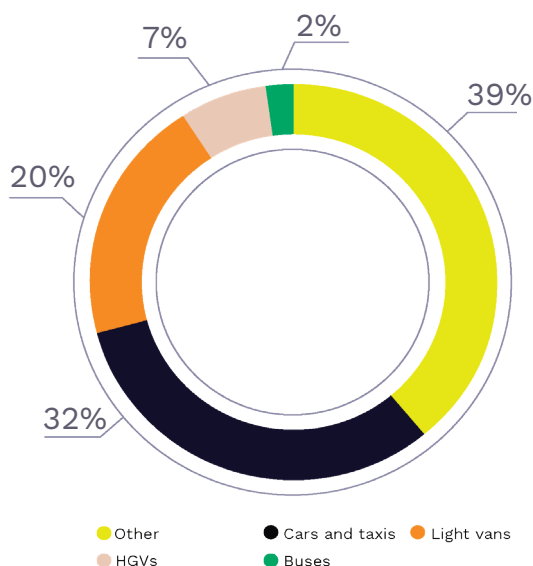
For example, a 'minor negative' climate emissions rating for the 'walking & cycling' measure means that if a local authority successfully delivered the most ambitious version of the walking and cycling measure without any mitigating action taken then it would have a minor negative impact (slight increase) on the local authority's climate emissions from transport.

## 4.1 Transport

Transport is the sector with the largest GHG emissions in the UK. In 2021 it produced 26% of the UK’s GHG emissions.<sup>1</sup> It was also the largest source of GHG emissions in the majority of local authorities.<sup>2</sup> Progress on decarbonisation has been slow. Between 1990 and 2021, emissions from transport reduced by just 15%, compared to a 69% reduction in emissions from energy supply.<sup>3</sup> Cars and taxis are the largest contributor to domestic GHG emissions from transport (52%), followed by heavy goods vehicles (HGVs) (20%) and vans (17%). While all other sources of domestic transport emissions have seen their emissions reduce from 1990 to 2021, vans have seen their emissions increase by 62% as their use has grown over the same period.<sup>4</sup>

Transport is also a major source of air pollutants in the UK, especially for nitrogen oxides (NO<sub>x</sub>). In 2021, 32% of NO<sub>x</sub>, 14% of PM<sub>2.5</sub> and 12% of PM<sub>10</sub> emissions came from transport.<sup>5</sup>

**Chart 1. Breakdown of total transport NO<sub>x</sub> emissions (2021)\***



The majority of road transport particulate emissions from new vehicles come from road abrasion and tyre and brake wear.<sup>6</sup> Older vehicles also have relatively high exhaust emissions.

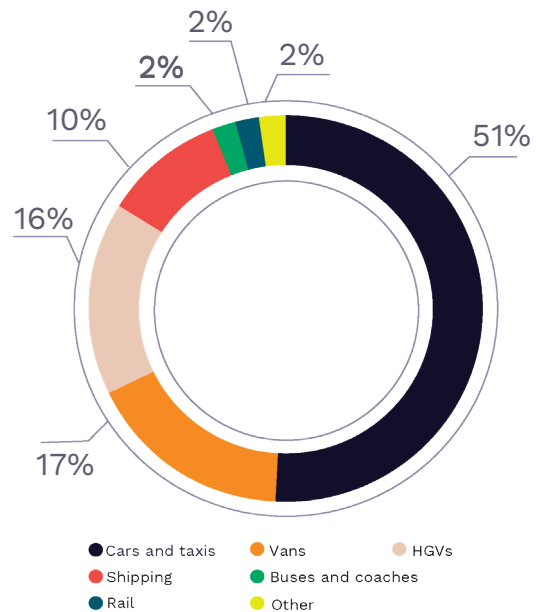
We have split transport into three sections:

### Public transport, shared transport and active travel measures

Measures to help modal shift needed from private cars to more sustainable and less polluting forms of transport:

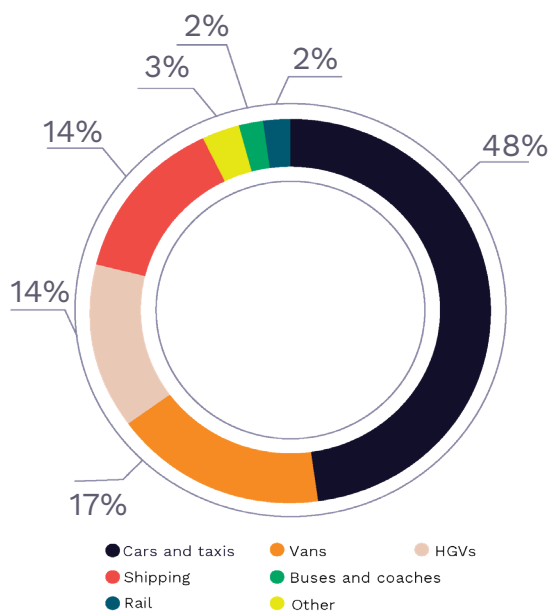
- T1: Active travel
- T2: Buses
- T3: Water vessels
- T4: Shared transport
- T5: Integrated transport management

**Chart 2. Breakdown of total transport PM<sub>10</sub> emissions (2021)**



\* Source data for Charts 1-3 is from official Transport and environment statistics: 2023 Table ENVO301 and is available via [the gov.uk website](https://www.gov.uk).

**Chart 3. Breakdown of total transport PM<sub>2.5</sub> emissions (2021)**



### Vehicle control measures

Measures to reduce the use of vehicles with higher emissions (and to reduce specific activities such as idling):

- T6: Emission control zones
- T7: Parking controls
- T8: Other vehicle access controls
- T9: Anti-idling

### Vehicles

Measures for reducing emissions from different vehicle types:

- T10: Electric vehicles
- T11: Alternative fuels
- T12: Retrofitting vehicles
- T13: Fleet management
- T14: Freight management

### Box 9. Local Authority Transport Powers & Responsibilities

In England, local transport authorities (LTAs) have responsibility for transport planning, public transport, active travel and highways. In single-tier areas, unitary authorities have responsibility for all services in the area, including transport as the LTA. In two-tier areas, county councils are the LTA, while district councils have responsibility for parking and for many relevant town-planning issues. Combined authorities' responsibilities depend on their specific devolution deals, but transport is often a key area. In London, [Transport for London](#) has control over almost every element of transport.

In Scotland, [Transport Scotland](#) has significant transport responsibilities and sets national policy for active travel, roads, rail, freight, shipping and transport planning and integration. All 32 Scottish local authorities are LTAs and have similar powers to England (though they have greater powers over buses).<sup>7,8</sup>

In Wales, [Transport for Wales](#) has significant rail responsibilities and some responsibilities for delivering bus and active travel schemes. The 22 Welsh local authorities have similar transport powers to LTAs in England and Scotland.

## Box 10. Changes in the way we move

As a society, how we move and what we want from our transport systems has been changing.

Changes triggered by Covid and improved technologies have led to more remote working, with webinars and virtual meetings replacing many traditional meetings and events. The scale and emergence of this new way of working has reduced travel, especially for commuting.<sup>9</sup>

For many there has been a transition from thinking about transport – something we do to transport goods or people – to thinking about mobility – being able to access the places and services we need. Some people are now choosing to not buy a car but to use one occasionally through a car club or other arrangement. This transition has also reduced emissions from car use for commuting, but has been at least partially offset by increased home deliveries and energy use at home. The UK is also seeing a significant increase in micromobility (shared electric bikes and scooters), especially in London and other major cities.

How people want their local areas and communities to look is also influencing strategic planning, with ‘place-making’ or ‘15 minute City’ initiatives creating more services in local communities, which can reduce the need to travel for services.





## Public transport, shared transport and active travel measures

### T1: Increasing active travel

People walking, wheeling and cycling instead of using motor vehicles reduces emissions and brings health benefits from physical activity. Active travel is particularly feasible for short journeys.

#### Air quality impacts

#### Climate impacts

##### on hotspots

##### on emissions

##### on emissions

Positive

Positive

Positive

Many shorter journeys that could be walking, wheeling or cycling are made in more polluted urban areas. Fewer short journeys in cars and taxis means reduced emissions.

Fewer short journeys in fossil-fuelled vehicles means reduced GHG emissions.

### Other impacts

**Health:** Physical inactivity was calculated in 2019 to cost the UK £7.4 billion per year and be responsible for one in six deaths.<sup>10</sup> If more people walk or cycle more, health benefits follow.<sup>11,12</sup>

The physical benefits of active travel have also been shown to outweigh the health impacts of people inhaling pollution more deeply when they are physically active cycling and walking. Pedestrians and cyclists are likely to have the highest uptake of pollutants compared to those travelling by other means in polluted areas, due to increased inhalation rates and journey time.<sup>13</sup> Local authorities can help to mitigate these negative health impacts by increasing the number of walking and cycling routes away from traffic, for example through parks and green areas.<sup>14</sup> Other actions to reduce air pollution (such as clean air zones) can further help to mitigate against greater inhalation.

Positive

**Local economy:** There is evidence that measures to favour active travel benefit local businesses.<sup>15,16,17</sup> This is due to positive impacts on staff wellbeing, productivity and retention, as well as the positive impact of walking and cycling in increasing retail spend and retail rental values.

Minor positive

**Safety:** Encouraging cycling and walking without improving infrastructure could increase collisions involving cyclists and pedestrians. Health benefits from active travel still outweigh the increased risk of collision. Road collision risks can be mitigated by lower speed limits, driver education and enforcement. Supporting behaviour change through safe cycling training or information campaigns could also mitigate this risk, especially with electric bikes and e-scooters which can reach higher speeds.<sup>18,19</sup>

Negative

**Social value:** Having more people of all ages on the streets helps make public spaces more welcoming and allows more social interaction. It helps people to enjoy the outdoor environment.<sup>20</sup>

Minor positive

### Support mechanisms

The UK Government set up [Active Travel England](#) in 2020 to deliver better investment and outcomes in active travel.

In Scotland, Transport Scotland is responsible for the Scottish Government’s active travel policy and has published an *Active Travel Framework*.<sup>21</sup>

In Wales, Transport for Wales is responsible for administering the Active Travel Fund programme, which supports the delivery of active travel programs across Wales.<sup>22</sup> Local authorities in Wales have a duty to promote active travel as a way of reducing air pollution, set out in *The Environment (Air Quality and Soundscapes) Act 2024*.<sup>23</sup>

### What can local authorities do?

Local authorities can develop local cycling and walking infrastructure plans incorporating the below measures. The Department for Transport has produced [technical guidance](#) on developing local cycling and walking infrastructure plans.

Local authorities can support increased active travel in various ways:

- Ensuring active travel measures are incorporated into new developments, and considering rejecting new developments that could force people into car dependence if key services were too far away.
- Providing [high-quality walking and wheeling infrastructure](#), including wider pavements, pedestrian phases on all arms of signalled junctions, good wayfinding, sufficient crossing times and speed limits of 20mph or lower in densely populated areas.
- Providing high-quality cycle infrastructure, including protected bike lanes and accessible cycle parking. Cycle parking also needs to be secure, for instance using bike hangars, shelters or stands from providers such as [Cyclehoop](#). This is especially important near train stations and in high-density neighbourhoods where people do not have space to store bikes at home: theft can be a significant deterrent from cycling. See guidance from the [Department for Transport, Cycling UK](#) and [Making Space for Cycling](#).

- Offering try-before-you-bike schemes, [bike-share schemes](#), cycle hire schemes and cycle training. For example, see [Newham Council's Try Before You Bike scheme](#) run by Peddle My Wheels. Best-practice try-before-you-buy schemes include e-cycles, since they are more expensive, and adapted cycles for people with disabilities. [Cycling UK](#) works in some areas to offer e-cycle loans.
- Implementing play streets, school streets and liveable neighbourhood schemes.
- Promoting walking, including walking school buses, especially on routes with lower pollution levels.
- Supporting schemes such as Living Streets' National Walking Month, Sustrans's [Big Walk & Wheel](#) and using Global Action Plan's [Clean Air Day](#) to help residents make the link between air pollution and sustainable travel.
- Raising awareness of the importance of air pollution and active travel with key stakeholder groups, including [schools](#) and [hospitals](#) using Clean Air Frameworks.
- Linking with Business Improvement Districts on consultations linked to active travel schemes.

### Other issues

Local authorities can support increased active travel in the long-term by ensuring walking and wheeling infrastructure is designed to withstand extreme weather, such as by mitigating urban heating effects (e.g. considering tree canopy cover) and flooding (e.g. SUDS).

### Further information

- TfL: [Healthy streets](#)

## T2: Increasing modal shift to buses and improving the bus fleet

The UK's bus system has been in long-term decline, with passenger journeys dropping by well over a third from 2011/12 to 2021/22, and drastic cuts to bus services across the country.<sup>24</sup> In many parts of the UK, bus services have been drastically reduced,<sup>25</sup> and buses are often perceived as unreliable, slow and inconvenient.<sup>26</sup>

Buses are more fuel-efficient than cars per passenger and are one of the lowest carbon-emitting forms of road transport per passenger kilometre.<sup>27</sup> New buses also have stringent controls on exhaust air pollutant emissions, although tyre and brake wear emissions are still significant. Supporting high-quality bus services will encourage people to travel by bus rather than by car. To be a viable alternative, bus services need to be reliable, safe, convenient and get passengers from A to B in reasonable time.<sup>28</sup> This shift from cars to buses, as well as decarbonising bus fleets, will reduce air pollution and GHG emissions. Compared to other forms of public transport such as rail, bus service improvements are far quicker, easier and cheaper to deliver.<sup>29</sup>

### Air quality impacts

### Climate impacts

#### on hotspots

#### on emissions

#### on emissions

Minor positive

Positive

Positive

Moving away from car travel to bus travel reduces air pollutant emissions. Fewer cars on the road, particularly at peak times, can also reduce congestion.

Moving from car travel to bus travel reduces GHG emissions, both from reduced vehicle numbers and from any reduced congestion.

### Other impacts

**Health:** Travelling by bus is likely to include periods of walking, which have a positive health impact. Bus passengers typically have lower levels of pollutant exposure than car passengers, especially when travelling in separate bus lanes. The connectivity that buses provide, especially for isolated areas or communities, can also provide mental health benefits for users.

Minor positive

**Vulnerable communities:** Lower-income households, elderly people and people with disabilities are more likely not to own or to have access to a car. They therefore rely more on buses and other public transport to commute to work and access essential services. Buses are often more accessible than other public transport options due to relatively low fares and good disability access.

Positive

**Local economy:** A reliable, affordable and accessible bus network can encourage people to travel to town centres and high streets, supporting local shops, bars and restaurants. Especially when travelling in separate bus lanes, travelling by bus can improve journey times.

Positive

**Safety:** The reduced congestion and car use from modal shift to buses will reduce collisions and improve road safety. Buses also provide a sustainable alternative to active travel during wet or icy weather, when it can be dangerous to cycle or walk. However, personal safety is more at risk when travelling by bus, so steps should be taken to ensure buses are safe, secure and inclusive environments.

Minor  
positive

### Support mechanisms

The Government’s *2021 National Bus Strategy for England: Bus Back Better* had significant ambition for improving local bus services, but a small and competitive funding pot meant that 60% of the LTAs that applied received no funding to deliver their bus service improvement plans.<sup>30</sup>

In England, most local authorities are prohibited from running bus services. Services are run by private bus operators, the largest of which are Arriva, GoAhead, Stagecoach, FirstGroup and National Express. For local authorities to increase bus use it is clear they need increased powers and funding. The Local Government Association has been calling for all local authorities to have the franchising power currently only available to mayoral combined authorities, and for the franchising process to be made quicker and easier.<sup>31</sup>

### What can local authorities do?

Local transport authorities can do the following:

- Enter statutory ‘Enhanced Partnerships’ with local bus operators to improve local services. This allows LTAs to register bus services and specify timetables and multi-operator ticketing. The Government has also signalled that funding will only be available for LTAs in or committed to ‘Enhanced Partnerships’. See guidance from the [Department for Transport](#).
- Fund concessionary fares and ‘supported’ services that are not deemed commercially viable by bus operators.
- Improve the quality and accessibility of bus stops. See [guidance on accessible bus stop design](#) from Transport for London.
- Support the transition to zero- or low-emission buses. Local authorities can set targets for decarbonising fleets in their areas, which may help with funding bids. They can consider the requirements of zero-emission buses when making decisions about local charging infrastructure. While LTAs are unlikely to directly purchase low-emission buses, they can support bus operators in purchasing and accessing funding. See the Department for Transport’s [Zero Emissions Buses: Local Authority Toolkit](#).

- Create bus lanes and bus-only roads which give priority to buses, reducing journey time, congestion and associated emissions and pollution. Research has shown that 89% of members of the public surveyed support bus priority measures.<sup>32</sup>
- Ensure junctions are designed so that buses can make left and right turns without impeding other traffic or having to mount the pavement.
- Introduce bus cages (the marked boxes where buses stop) and ensure that parking and loading and unloading activities do not hamper buses' entry to or exit from the stop. If parking restrictions already exist, they should be regularly enforced.

### Franchising and Mayoral Combined Authorities

Since 2017 mayoral combined authorities have had the power to franchise bus services, giving them control over routes, services and fares (without running the buses). London buses were never deregulated. Greater Manchester Combined Authority is the first combined authority to have successfully undertaken the complex and lengthy franchise process, with the first wave of franchised services appearing on the streets in September 2023. Franchising allows authorities more control over the bus network, enabling them to introduce a single, simplified ticketing system and to integrate services better.

### Further information

- [Bus Centre of Excellence](#)
- House of Commons Library: [Buses and Taxis FAQ](#)
- House of Commons Library: [The National Bus Strategy: Bus Policy in England Outside London](#)
- Campaign for Better Transport: [Funding Local Bus Services in England](#)
- TfL: [Bus Action Plan](#)
- Smart Transport: [The carbon footprint of different travel options is a misleading guide to action](#)

### T3: Reducing emissions from water vessels

#### International shipping

Shipping vessels typically use marine diesel oil, marine gas oil or low-sulphur fuel oil for combustion. Local air quality impacts come from vessels moving in and out of port and hotelling (running auxiliary engines in port for electricity and heating). There are international regulations for controlling emissions. Vessels must comply with any sulphur and/or NO<sub>x</sub> emission control areas that they pass through. For instance, a North Sea emission control area for nitrogen oxides was introduced in 2021.<sup>33</sup>

#### Domestic river transport

Domestic vessel types range from tugboats to houseboats to ferries. They tend to use low-sulphur diesel, but biofuel is increasingly used.<sup>34</sup> Many houseboats use solid fuel (often wood) for heating, so river boats in densely populated areas can cause local pollution hotspots. Various emissions reduction technologies are being used to address these hotspots, such as solar panels for electricity. Some local authorities have looked at providing mooring with electric connections or creating low emission or eco-mooring zones.<sup>35</sup> The *Environment Act 2021* also allows local authorities to bring houseboats under the scope of smoke control area legislation.<sup>36</sup>

#### Air quality impacts

#### Climate impacts

##### on hotspots

##### on emissions

##### on emissions

Positive

Minor positive

Minor positive

Reducing emissions in ports improves local hotspots.

Reducing emissions from river boats can be effective where the emissions contribute to a pollution hotspot.

Shipping creates carbon dioxide (CO<sub>2</sub>) and black carbon emissions at every stage of operation. Improving efficiency and reducing emissions in ports can reduce emissions.

There are relatively few river boats in the UK, compared to road transport, but as other emission sources decarbonise, river transport will become more significant.

#### Other impacts

**Health:** River transport has a moderately positive health impact: transporting large quantities of cargo by river instead of by road reduces local air quality impacts from HGVs and other vehicles.

Minor positive

<p><b>Local economy:</b> River transport presents opportunities for trade and leisure activities that can have positive impacts for the economy.</p>	<p>Positive</p>
<p><b>Access to ports and moorings:</b> Vessels may not meet the legal standards/rules from one port or mooring to the next, and therefore may be excluded from some areas.</p>	<p>Minor negative</p>
<p><b>Congestion:</b> Moving from private to public inland river passenger transport helps to reduce local traffic and roadside pollution.</p>	<p>Minor positive</p>

### Support mechanisms

The [Clean Maritime Plan](#) is the Government’s strategy for reducing shipping emissions. It was due to be updated in 2022, but had not been at the time of writing. Alternative methods of propulsion, such as electrification, hydrogen, methanol and ammonia, are breaking into the marine sector. However, without clear direction from the Government, ports and operators lack a clear business case for investing in costly fleet transitions. In the absence of government guidance, ports, partnership organisations and local authorities can work collaboratively to build viable cases for suitable emission reduction measures that have collateral community benefits.<sup>37</sup> National and international organisations like the [British Ports Association](#) and [International Maritime Organisation](#) may be able to help with lobbying and guidance.

### What can local authorities do?

- Work with their port authorities to reduce emissions from auxiliary engines and on-board generators. For instance, providing shore-connected electricity supply means that ships do not need to rely on combustion when docked (although ships may not use the system if operational costs are higher).
- Those with pollution hotspots from river boats can encourage lower emissions during mooring, such as providing electricity connections instead of solid fuel or by restricting boats with higher emissions from mooring in high-pollution areas.
- Enforce smoke control rules along waterways (this power was introduced in 2021) and apply for grants to upgrade select houseboat stoves.

### Canal boat communities

Canal-boat communities typically have a higher prevalence of vulnerable people, for instance with long-term health conditions. They may also be distrustful of local authority schemes. Engaging with these communities to understand their needs is important, as is prioritising infrastructure and support that will help boaters reduce emissions without excluding them from an area.



### Other issues

Local authorities have very little influence over the emissions from international and inland shipping, despite any air pollution impacts.

Although the river boat measures highlighted above can be effective with permanent moorings, many boats are transitory and operators may not be aware of or able to meet the standards, or to engage with other local authority initiatives.

Retrofitting any kind of vessel to reduce emissions is costly. For many operators this would rely on securing funding from the UK Government or other organisations.

### Further information

- Port of London Authority: [Emissions Reduction](#)
- Canal & River Trust: [Active Travel & Low Carbon Transport](#)
- Department for Transport: [Clean Maritime Plan](#)
- Transport & Environment: [The UK's most polluted ports, ranked](#)



## T4: Increasing shared transport

Shared transport, such as car clubs and lift sharing schemes, can reduce costs for car owners and create a convenient and low-cost alternative to car ownership or leasing. Shared transport also increases vehicle occupancy, which can reduce GHG emissions and air pollution whilst tackling congestion. Car clubs and lift-sharing schemes are growing in popularity across the UK, with the number of car club members more than doubling between 2019 and 2023.<sup>38</sup>

**Car clubs** allow members to use a car when they need, without having to own one. Members typically pay by the hour and cars are then returned.<sup>39</sup> There are also one-way trip car club operators, but local authorities need to consider whether licensing these operators might incentivise more car use and pose issues for managing parking. Car clubs may be run by commercial organisations (for example Co-wheels or Enterprise) or community organisations. Individuals can also rent out their private car on a car-sharing platform (for example Turo).

**Lift-sharing** or ride-sharing schemes allow individuals to give lifts in their car to other individuals who share a common or similar route. Lifts can be arranged informally or through a platform such as Liftshare or BlaBlaCar. Liftshare also offers Liftshare for Work, which helps workplaces reduce their employees' commuter emissions through lift sharing and travel planning.<sup>40</sup>

Air quality impacts		Climate impacts
---------------------	--	-----------------

on hotspots	on emissions	on emissions
Positive	Positive	Positive

Car clubs improve air quality by having cleaner vehicles and by reducing vehicle ownership and use. Deploying them in urban areas with poor air quality will help to maximise air quality benefits.

Car club vehicles are usually newer than privately-owned vehicles and so more likely to meet the latest emissions standards or to be electric vehicles. The average UK car club car produces 89% less NO<sub>x</sub> and 72% less PM<sub>2.5</sub> per kilometre than the average UK car.<sup>41</sup>

Collaborative Mobility UK estimates that each car club vehicle in the UK replaces 22 private cars, since car club members travel by car much less than car owners.<sup>42</sup>

Lift sharing can marginally reduce emissions by reducing total vehicle-passenger kilometres.

Car clubs reduce GHG emissions by having more efficient vehicles and reducing vehicle ownership and use.

Car club vehicles are usually newer than privately-owned ones, so are more likely to be more fuel-efficient or to be electric vehicles. The average UK car club car is estimated to produce 27% less CO<sub>2</sub> per kilometre than the average UK car.<sup>43</sup>

Collaborative Mobility UK estimates that each car club vehicle in the UK replaces 22 private cars.<sup>44</sup>

Lift sharing can marginally reduce emissions by reducing total vehicle-passenger kilometres.

### Other impacts

**Vulnerable communities:** Car clubs can provide mobility access to households which may be unable to afford to run a car (this includes more access to electric cars too, which can be prohibitively expensive for some). Collaborative Mobility’s *2022 Car Club Report* found that 73% of car club members surveyed agreed that car club membership saves them money compared to owning a car.<sup>45</sup>

Positive

**Social value:** There can be social benefits from lift sharing, particularly where employees lift-share for commuting. Encouraging social and community events, such as coffee mornings at work, in tandem with these measures, can help overcome psychological barriers to lift sharing.

Minor positive

**Safety:** Car club vehicles are newer and more likely to have the latest safety features.

Minor positive

**Reduced demand for parking spaces:** Surplus residential and development parking spaces can be redeveloped, for example into parklets or shared amenity spaces.

Minor positive

### Support mechanisms

The Department for Transport’s *Transport Decarbonisation Plan* committed to increasing average vehicle occupancy by 2030.<sup>46</sup> There is no central government funding for supporting shared transport in England and Wales.

The Government could help local authorities to support shared transport by introducing legislation allowing them to create public parking spaces for car sharing only. This type of legislation was passed in Germany in 2017 and has helped Germany develop the largest car sharing market in Europe.<sup>47</sup>

### What can local authorities do?

The Department for Transport’s *Car clubs: local authority toolkit* has a list of actions for how local authorities can support car clubs in their local area. This includes:

- procuring a car club for local authority staff travel
- procuring a car club operator for the local area: see CoMoUK’s *Guidance on Car Club Procurement*
- using planning conditions on major developments to require developers to commit to a car club on site
- supporting car club operators by making bays available, making traffic regulation orders and assisting with installing electric vehicle charging infrastructure

- engaging with relevant internal teams, communities and businesses to support car clubs

The Department for Transport's *Lift sharing: local authority toolkit* has a list of actions for how local authorities can support lift sharing in their local area. These include:

- setting up or procuring a lift-sharing service and incorporating lift-sharing into new developments
- using their influencing role to educate and promote lift sharing
- gathering data to make the case for, evaluate and improve lift sharing schemes

### Further information

- [CoMoUK](#)
- [CoMoUK: Car Clubs and Councils](#)
- [Local Government Association: New Mobility Options: Car Clubs](#)
- [Lift sharing: Local Authority Toolkit explained \(webinar\)](#)



### T5: Integrating transport modes

Integrating transport means combining different transport modes, including active travel, buses, park and ride, trams, metros and rail, in ways that make travel easier and more efficient for users.<sup>48</sup> A successful integrated transport system leads to more demand for public transport, increases active travel and can reduce car use, congestion and air pollution.

In most circumstances local authorities will not be able to deliver rail or light rail schemes, but by integrating rail with other forms of transport they can encourage their use.

#### Air quality impacts

#### Climate impacts

on hotspots	on emissions	on emissions
Minor positive	Positive	Positive
<p>Modal shift from personal motor transport to public transport and active travel will reduce pollutant emissions per journey.</p> <p>Some transport hubs, such as railway stations or bus stations, can be air pollution hotspots. These hotspots will likely reduce as cleaner buses and more electric and hybrid diesel-battery trains come into use, though the impact on hotspots will depend on the types of vehicle that provide integrated transport.</p>	<p>Public transport is generally more fuel efficient than private transport, meaning less fossil fuel use per journey. Active travel produces no emissions.</p>	

#### Other impacts

<p><b>Health:</b> Public transport journeys generally involve some active travel. This brings individual health benefits.<sup>49</sup> Passengers are exposed to high pollution levels when travelling to and waiting at railway, bus and coach stations, but the health benefits of active stages of the trip (e.g. walking to and from the station) usually outweigh this.<sup>50</sup></p>	Positive
<p><b>Local economy:</b> An integrated transport management system can benefit the local economy as it allows for more effective travel and mobility.</p>	Positive
<p><b>Safety:</b> Travelling by bus or train is safer than travelling by car.<sup>51</sup></p>	Minor positive
<p><b>Congestion:</b> Moving from private to public transport leads to reduced road traffic, allowing more consistent journey times and more reliable public transport journeys.</p>	Positive

## Support mechanisms

The Government has made various commitments to support integrated ticketing across bus and rail networks, including in the 2021 *William and Shapps Plan for Rail* and in the 2021 *National Bus Strategy: Bus Back Better*, but no detailed plan or timetable was produced alongside these commitments.

Local authorities can work with rail operators on the industry's air quality improvement plans to help improve air quality at and around national train stations and depots, managing emissions from rail infrastructure and property assets. They can support appropriate station development (new stations or on-site development) through the planning system.

Local authorities can also work with rail operators to promote investment in new rolling stock technologies that address or mitigate air pollution and GHG emissions. Options available include the hybridisation of trains, exhaust treatment and reducing idling.

Local authorities can look to promote local light-rail schemes where these are feasible.

Local authorities can also lobby central government for continued railway electrification, to decarbonise the railway alongside grid decarbonisation, and to reduce/eliminate the use of diesel locomotives in the network and their areas.

## What can local authorities do?

Local authorities can work with relevant organisations, such as the highways authority, bus operators, train operating companies and Network Rail to integrate their local rail network, bus network, cycling and walking routes, shared transport hubs, park and ride, and electric vehicle charging infrastructure. They can do this by:

- supporting park and ride schemes
- creating mobility hubs at key locations: [see CoMoUK's website](#) for information and guidance
- offering integrated ticketing
- providing Mobility as a Service platforms: see the Department for Transport's [2023 Code of practice](#), which outlines recommendations for local authorities, platform providers and transport operators
- improving how [rail and bus timetables co-ordinate](#)
- improving access to train stations
- choosing appropriate car-parking pricing to support modal shift
- supporting car club operators by making bays available, making traffic regulation orders and assisting with installing electric vehicle charging infrastructure

## Further information

- Department for Transport: [Mobility as a Service](#)
- Government Office for Science: [Mobility as a Service \(MaaS\) in the UK: change and its implications](#)
- LAQM: [Guidance on air quality assessment of rail](#) (Technical Guidance Section 7.21)



## Vehicle control measures

### T6: Emission control zones

Emission control zones have been a feature of air quality policy since the mid-2000s. They include:

- clean air zones (CAZs)
- low emission zones (LEZs)
- ultra low emission zones (ULEZs)
- zero emission zones (ZEZs)

These zones can range from a few streets or the town centre to entire cities, and cover all vehicles or just one type, such as buses. Some zones allow vehicles not meeting specified emissions criteria to drive there on payment of a daily charge; others deny access completely. Some zones take a non-charging or 'carrot' approach, for example providing priority or exclusive use of parking or loading bays for electric vehicles, though this approach has not been implemented in the UK at the time of writing.<sup>52</sup>

Defra has defined four classes of CAZ.<sup>53</sup> The different classes apply to different types of vehicle and set minimum emissions standards. Classes A to D apply to increasing types of vehicle category:

- Class A: buses, coaches, taxis, private hire vehicles
- Class B: buses, coaches, taxis, private hire vehicles, heavy goods vehicles
- Class C: Buses, coaches, taxis, private hire vehicles, heavy goods vehicles, vans, minibuses
- Class D: Buses, coaches, taxis, private hire vehicles, heavy goods vehicles, vans, minibuses, cars, motorcycles (optional)

More stringent than these would be a ZEZ, where only vehicles with zero tailpipe emissions are allowed. A CAZ could have multiple classes: for example Class D in the city centre and a less restrictive class in the outer city area where there are more HGV movements.

There are also some emission control zones for non-road mobile machinery. This differentiation of classes and hence impact is represented in **Figure 1**.

**Figure 1.**

	Several streets, village centre		Town/city centre, whole village		Whole town/city	
	Air quality	Climate	Air quality	Climate	Air quality	Climate
Class A			+		+	
Class B	+		++		+++	
Class C	++		++		++++	+
Class D	++		++++	+	+++++	++
ZEZ	+++	+	+++++	++	+++++	+++



Air quality impacts		Climate impacts
on hotspots	on emissions	on emissions
Positive	Positive	Minor positive
<p>Impacts can vary hugely, depending on their extent and specific restrictions. For instance, the London Low Emission Zone and London Ultra Low Emission Zone influence emissions far more than a localised low emission zone.</p> <p>Older diesel vehicles tend to have the highest emissions. At the time of writing this report, many emission control zones in the UK require diesel vehicles to meet Euro VI/6 standards. Emission control zones with less stringent requirements will reduce emissions less. ZEZs will reduce NO<sub>x</sub> emissions substantially but will have less impact on PM because of brake and tyre wear.</p> <p>Reduced emissions in a zone could potentially be offset by others making longer trips to avoid the zone. This was not seen in the London ULEZ.<sup>54</sup> The ULEZ expansion across inner London saw reduced traffic inside and outside its area a year after expansion, compared to the pre-ULEZ expansion period.<sup>55</sup></p>		<p>Emission control zones in the UK tend to be focused on air quality. GHG impacts will depend on the nature of restrictions.</p> <p>Zones which encourage more electric vehicles, or reduced numbers of vehicles, will have climate benefits. There are some concerns that emissions reductions in the zone could be offset by others making longer trips to avoid the zone, but this was not seen in the London ULEZ.<sup>56</sup> The ULEZ expansion across inner London saw traffic reduction inside and outside the zone a year after expansion, compared to the pre-ULEZ expansion period.<sup>57</sup></p>
<p><b>Health (especially for vulnerable communities):</b> Reducing levels of air pollution will reduce health impacts associated with pollution. Vulnerable and deprived communities are more likely to live near air pollution hotspots, such as busy roads. Ambitious emission control zones can reduce concentrations at hotspots, especially near busy roads. This helps address environmental inequality.</p>		Positive
Other impacts		
<p><b>Vulnerable communities:</b> Residents and local businesses may not have ready access to vehicles that meet zone requirements. People on low incomes are less able to buy compliant vehicles. The scale of any inequality impact will depend on how stringent the controls are and what support is made available. For example, in Bradford there was additional support for taxi drivers to help them comply with the Bradford CAZ, and some exemptions for Bradford residents and businesses with non-compliant vehicles to address inequality concerns.<sup>58</sup></p>		Minor negative

<p><b>Noise:</b> There may be a reduction in vehicle noise if older, noisier vehicles are discouraged.</p>	<p>Minor positive</p>
<p><b>Fleet composition:</b> Larger-scale or multiple emission control zones can change the composition of bus, freight, coach and other fleets to be less polluting, instead of reallocating more polluting vehicles across the country. This can bring air quality benefits to surrounding areas and more widely.</p>	<p>Minor positive</p>
<p><b>Backlash:</b> Low emission zones can be controversial measures, as was seen in the launch of the London ULEZ expansion in 2023 and protests about proposed CAZs in other UK cities in 2022 and 2023. Controversy may be avoided or reduced with meaningful public engagement from an early stage.<sup>59</sup> C40 Cities has a useful guide <a href="#">How to build public and political support for Clean Air Zones</a>.</p>	<p>Negative</p>

### Support mechanisms

Local authorities may be eligible for Defra funding where CAZs are necessary for the UK to meet its air quality obligations. Defra has created a central CAZ service to support local authorities implementing clean air zones.<sup>60</sup> It lists all CAZs in the UK and their required emissions standards. The service also allows drivers to check if their vehicles comply with particular CAZs and to pay to drive there if not.

### What can local authorities do?

Local authorities can:

- use highways powers to bring in emission control zones: see guidance from [C40 Cities](#) and [Clean Cities campaign](#)
- use national campaigns like [Clean Air Day](#) to raise public awareness and help galvanise support for CAZs

### Other issues

Camera enforcement for all vehicles across a zone is huge challenge and will need significant investment and support from the DVLA to operate effectively. For non-mandated authorities, a CAZ that applies to buses and taxis is likely to be the only realistic option, as they can be controlled through licensing and checked manually or through limited cameras.

### Further information

- Defra: [Guide to Clean Air Zones](#)
- House of Commons Library: [Research Briefing on CAZs, LEZs and the London ULEZ](#)



## T7: Parking controls

Local authorities have significant controls over parking. This makes parking controls one of the most cost-effective means for them to promote a shift to active, shared and sustainable travel. There is strong evidence that making parking less convenient can reduce car ownership when there are suitable travel alternatives.<sup>61, 62</sup> Former parking spaces can be reused to promote sustainable travel and for wider community benefit.

Air quality impacts	Climate impacts
---------------------	-----------------

on hotspots	on emissions	on emissions
Positive	Positive	Positive
<p>Moving away from car travel to public transport, active travel and shared transport reduces air pollutant emissions. Having fewer cars on the road can reduce congestion, especially at peak times.</p>		<p>Moving away from car travel to public transport, active travel and shared transport reduces GHG emissions, both from reduced vehicle numbers and from any reduced congestion.</p>

## Other impacts

<p><b>Health:</b> Reducing levels of air pollution reduces health impacts from air pollution. People switching from using cars to active travel will gain individual health benefits.</p>	Positive
<p><b>Local economy:</b> Repurposing parking spaces to improve the public realm can support local business.<sup>63</sup> For instance, cycle parking spaces have been found to generate five times the retail spend per square metre compared to car parking.<sup>64</sup> Despite local businesses often being concerned that cheap on street parking is vital for their business, there is little evidence to support this.<sup>65</sup></p>	Positive
<p><b>Social value:</b> Streets with parklets (former parking spaces turned into small areas for people to enjoy), street trees or other sustainable parking space uses are often more attractive and can bring residents together.</p>	Positive
<p><b>Noise:</b> Reducing traffic, particularly from drivers looking for on-street parking, reduces noise pollution.</p>	Positive

<p><b>Accessibility:</b> Parking policy should always protect the need for accessible parking for people with disabilities. Cars parked on kerbs can reduce street space and make access difficult for some pedestrians, for instance those with wheelchairs, pushchairs or guide dogs.</p>	<p>Positive</p>
<p><b>Safety:</b> Parked cars can make seeing oncoming traffic difficult and can reduce access for emergency vehicles.</p>	<p>Positive</p>

**Support mechanisms**

Local authorities can join the [Park4SUMP](#) network which provides advice on sustainable parking measures in cities.

The UK Government’s [Local Electric Vehicle Infrastructure fund](#) provides grants to local authorities to increase local charging infrastructure.

**How can local authorities support implementation?**

**None of these restrictions or charges should be applied to blue badge holders:**

CPRE London’s [Parking: Why it needs to change](#) document provides clear guidance and case studies on actions local authorities can take on parking policy. This includes the following:

- Ensure that housing developments are built in areas with, or in conjunction with, good and sustainable transport links.
- Ensure that new housing developments do not have excessive parking, and that where possible parking spaces have to be purchased separately.
- Control parking in council workplaces and in council-managed housing estates.
- Implement workplace parking levy schemes and work with employers to promote workplace travel plans or parking cash-out schemes.
- Remove short-stay parking where possible in busy urban centres, potentially in combination with park and ride schemes. Short stays should cost more than a return bus trip.
- Implement [controlled parking zones](#), with appropriate costs for parking permits and surcharges on additional household permits and on diesel vehicles.
- Set targets to reduce kerbside parking.
- Repurpose parking space for sustainable use, such as [parklets](#), sustainable urban drainage systems, street trees, crossing points, cycle parking and storage, e-scooter bays, car club spaces and [EV charging points](#). In general, authorities should look to implement these measures in areas where there are [low levels of car ownership](#). Waltham Forest Council has a [parklet process](#) through which residents can apply to create and maintain parklets on their street.

## Further information

- *Climate Smart Parking Policies*: LGA
- *Parking Action Tool: Useful Guidance*: Possible, CPRE London & Living Streets



**T8: Other vehicle access controls, including low traffic neighbourhoods (LTNs), healthy school streets and car-free zones**

LTNs restrict vehicle access through a local area.

School streets include restricted access to streets immediately outside a school at opening and closing times only. They are not viable for schools accessed directly from a main road.

Car-free zones can include pedestrianised zones and various areas that exclude cars some or all of the time. These may start with car-free days or weekends in small shopping or residential areas, and then expand by time and geography if successful. They can be linked to other initiatives, such as Play Streets, where a road is closed off regularly to traffic for a few hours. They may also include zero-emission-vehicle zones, which exclude only combustion vehicles.

Air quality impacts		Climate impacts
on hotspots	on emissions	on emissions
Positive	Positive	Positive
<p>LTN schemes reduce traffic within scheme areas. Despite concerns that LTNs displace traffic outside their areas, they do not appear to systematically change traffic levels at LTN boundaries.<sup>66</sup> LTNs can reduce car ownership,<sup>67</sup> and residents have been found to drive less on average once their areas became LTNs.<sup>68</sup> This accounts for the apparent evaporation of traffic when LTNs are implemented. LTNs are therefore highly likely to reduce air pollution emissions and improve air quality within their areas.</p> <p>There is some evidence that healthy school streets can substantially reduce pollution levels at peak times.<sup>69</sup> However, this is likely to depend on the location and size of the school, as well as the number of vehicle trips to the school.</p> <p>Car-free zones can be highly effective in reducing air pollutant emissions if car use is reduced rather than just pushed to other routes. There is a risk of increasing congestion elsewhere.</p>		<p>LTN schemes reduce traffic within scheme areas, and are highly likely to reduce GHG emissions.</p> <p>There is a lack of published evidence on the impact of school streets on GHG emissions associated with travel to and from school.</p> <p>Car-free zones can be highly effective in reducing GHG emissions if car use is reduced rather than just pushed to other routes. There is a risk of increasing congestion elsewhere.</p>

### Other impacts

**Health:** Reducing levels of air pollution will reduce health impacts associated with pollution. Studies in London’s ‘mini-Holland’ scheme show an increase in active travel. A 2024 paper on the ‘mini-Holland’ areas in outer London found that the 20-year health benefits of the LTNs were worth at least 40 times their cost.<sup>70</sup> Healthy school streets discourage the school run in a motor vehicle in favour of more sustainable travel such as walking or scooting; children are particularly impacted by air pollution as their bodies and lungs are still developing and they breathe closer to vehicle exhausts. The London Borough of Newham has seen measurable decreases in air pollution during the operation times of the school streets. A study carried out by GLA found benefits to school streets, with nitrogen dioxide (NO<sub>2</sub>) concentrations reduced by up to 23% during the morning drop off.<sup>71</sup>

Positive

**Local economy:** There is anecdotal evidence that measures to favour active travel benefit local businesses.<sup>72</sup> There are potential impacts on local businesses if appropriate measures are not taken to ensure that people can access them. Car-free zones can help local businesses by allowing the development of liveable streets which support active travel and better use of the kerbside.

Minor positive

**Noise:** There may be a reduction in vehicle noise if traffic flows are reduced.

Positive

**Backlash:** Vehicle access controls, especially low traffic neighbourhoods and school streets can be controversial measures. However, LTNs are generally supported by residents.<sup>73</sup>

Negative

### What can local authorities do?

Local authorities can:

- use highways powers to bring in low traffic neighbourhoods: see guidance from [Transport for London](#)
- use highways powers to bring in [school streets](#) and engage with schools using [GAP’s Clean Air for Schools Framework](#)
- apply to the Department for Transport to enforce school streets using moving traffic offence powers
- use highways powers to bring in car-free zones
- implement a workplace parking levy: see the [Friends of the Earth case study](#) of Nottingham City Council’s hugely successful workplace parking levy



### Other issues

Successfully enforcing and delivering vehicle access controls can be challenging for local authorities. For example, enforcing school streets means installing cameras or relying on volunteers.

Measures may be politicised and face loud opposition. Local authorities can increase the likelihood of successful delivery by engaging with and educating the public.

School streets and LTNs are often perceived as restrictions. They also need to be seen as interventions that enable active travel by changing the character of streets and providing new safe routes. Local authorities that frame these interventions as active travel schemes may get an improved reception from policy-makers and communities, as well as access to some active travel funding pots.

### Further information

- DfT-commissioned [IPSOS 2024 research report on LTNs](#)
- Waltham Forest: [Waltham Forest Mini-Holland Design Guide](#)
- School Streets: [Healthy School Streets](#)
- GLA: [School Streets Study](#)

## T9: Anti-idling

Idling is when drivers leave their engines running while stationary. This typically happens when drivers are stuck in a queue or waiting for passengers: waiting for traffic lights, outside the school gates, by hospitals and by coach and taxi ranks. When many vehicles idle in one area, harmful emissions increase, including GHGs and pollutants.

Local authorities can use anti-idling enforcement powers and focused campaigns to encourage people to turn vehicle engines off when stationary.

Air quality impacts		Climate impacts
on hotspots	on emissions	on emissions
Positive	Minor positive	Minor positive
Potential moderate positive impacts in areas where idling vehicles are perceived to be a problem. Unlikely to have a wider impact.		Cars emit CO <sub>2</sub> when their engines are running. Reducing idling reduces emissions.

## Other impacts

**Health:** Reducing idling in key locations will positively impact public health. Idling is a particular problem outside schools, where children can be exposed to high pollutant concentrations. Children are particularly impacted by air pollution as their bodies and lungs are still developing. Their lower height also means that they breathe closer to car exhausts. Idling outside hospitals may also have increased negative health impacts as a high proportion of vulnerable people will be exposed to the pollution.

Positive

## Support mechanisms

Defra’s Local Air Quality Management Helpdesk can help local authorities in managing air pollution in their areas.<sup>74</sup> Charities and non-governmental organisations, such as Friends of the Earth, Living Streets and Mums for Lungs, may be able to help local authorities run anti-idling campaigns.

## What can local authorities do?

Unnecessary idling is illegal. Police can issue a fixed penalty notice to idling drivers in appropriate circumstances, although enforcement is almost non-existent. To tackle idling local authorities can do the following:

- Apply for powers to fine idling drivers under the *Road Traffic Regulations 2002*. This enables local authorities to issue fixed penalty notices in some circumstances of illegal idling. Only a few authorities have done this.
- Create a traffic management order, under the powers of the Road Traffic Regulation Act 1984. This will enable local authority traffic enforcement officers to issue penalty charge notices in some circumstances of illegal idling.
- Install anti-idling signs at hot spots, such as school gates. Many local authorities have done this. A 2019 study in Canterbury found that anti-idling signs significantly reduced the number of idling vehicles, with a positive message about social norms being the most effective, increasing the number of people who turned off their engines by over 40%.<sup>75</sup>
- To reduce the idling that occurs when vehicles are waiting for traffic lights, make sure traffic signals are programmed correctly and use smart technology to prevent vehicles being stopped by red lights unnecessarily.
- Train civil enforcement officers to talk to car drivers about anti-idling. [Merton Council](#) did this and found that in almost all cases fines were unnecessary, as drivers either switch off their engine or move on.
- Run public education campaigns to educate the public on the dangers of idling, for example [Idling Action London](#). Surveys suggest that one of the main reasons people idle is because it is the norm – they do not think to turn off their engines.<sup>76</sup>
- Support local schools to run their own campaigns, by providing toolkits for an example see Birmingham City Council's [Switch Off campaign toolkit](#), or training school teachers about air pollution, for an example see Birmingham City Council's [Clean Air Cops](#).

## Kick the habit campaign — City of York Council

## Case Study 1

City of York Council (CYC) launched its “kick the habit” anti-idling campaign in June 2019. This a decision to use discretionary powers under the Road Traffic Regulations 2002 to issue fixed penalty notices to drivers who refuse to switch off their engines while stationary.

The campaign launch coincided with Clean Air Day, and used high-impact visual awareness materials (both physical and online) as well as local radio and newspaper coverage.

Following the launch, anti-idling signs were installed and public protection support officers made direct approaches to drivers who were idling to advise them of the new legislation. At the time of writing, the scheme has been promoted annually since its launch.

### Cost

- The scheme has cost an estimated £10k-£50k, with some grant-funding received from Defra.

### Implementation

- CYC worked particularly closely with the various bus operators to ensure drivers were briefed to be aware of the legislation and their new obligations whilst in the area of effect (inside York’s inner ring road).
- At the time of writing the CYC has not had to serve any fixed penalty notices for idling.

### Impact

- CYC’s *2024 Air Quality Annual Status Report* rates the measure as having a medium impact on air quality. At the five busiest service bus locations, the campaign has produced estimated savings per year of 1,526kg NO<sub>x</sub>, 36kg PM<sub>10</sub> and 46,555kg CO<sub>2</sub>.

### Next Steps

- At the time of writing, the campaign continues to be promoted annually, with permanent signage in all council owned car parks across the city, city centre bus stops, taxi ranks and other key locations.

You can find more information about this case study, and many others, on the [Air Quality Hub](#)

### T10: Electric vehicles

Electric power is increasingly used in road transport. This topic covers zero (exhaust) emissions vehicle technologies, including full battery electric vehicles (EVs) and hydrogen fuel cell EVs. It also includes hybrid vehicles, which do have tailpipe emissions.

Full battery electric vehicles use electricity stored in batteries, which can be charged from the national grid or renewable sources. Hydrogen fuel cell electric vehicles use electricity from hydrogen fuel cells, which only emit water as a byproduct.

Solar-powered EVs convert solar energy into electric power; they are still in early development.

Hybrid EVs have both electric motors and conventional engines. Standard hybrids (also known as self-charging hybrids) do not require charging by mains electricity; ‘plug-in’ hybrids can accept both fuel and electricity and have a longer all-electric range.

#### Air quality impacts

#### Climate impacts

on hotspots	on emissions	on emissions
Positive	Positive	Positive
<p>Battery EVs and hydrogen fuel cell EVs are zero-exhaust emission at the point of use. These vehicles will still have PM emissions from tyre and brake wear, and these can be higher as electric vehicles are heavier than the equivalent conventional vehicle due to the vehicle technology. They have no NO<sub>x</sub> emissions and total PM emissions are likely to be slightly lower than conventional fuels.</p> <p>Hybrid vehicles are usually more efficient than equivalent conventional vehicles. Some specialist vehicles can also use geofencing to operate in electric mode in certain areas.</p>		<p>The climate impacts of electric and hybrid vehicles are associated with the lifetime emissions and the source and production, e.g. the method of electricity generation, and green (renewable), grey (from natural gas) or blue (grey with carbon capture) hydrogen.</p> <p>Hybrid vehicles also produce GHG emissions when not running on electricity. Standard hybrids also burn fuel to charge the vehicle’s electric battery.</p>

#### Other impacts

<p><b>Health:</b> Reducing exhaust emissions will reduce health impacts associated with pollution, though PM<sub>2.5</sub> emissions from tyre and brake wear will give negative health impacts.</p>	Minor positive
<p><b>Vulnerable communities:</b> Electric vehicles are less accessible to deprived communities, due to high set-up costs and more limited access to off road charging.</p>	Negative

<b>Noise:</b> Electric and hybrid vehicles are quieter than conventional vehicles.	Minor positive
<b>Energy security:</b> Widespread use of alternative fuels would reduce the risk to energy security. Hydrogen in particular could add flexibility to the energy production and storage system, using excess renewable energy from wind, solar or tidal, to produce hydrogen instead of electricity.	Minor positive
<b>Vehicle efficiency:</b> The enhanced efficiency of fuel cell vehicles, for example through regenerative braking, means lower overall emissions.	Minor positive
<b>Accessibility:</b> Placing EV charging infrastructure (e.g. cables, boxes and posts) on footway space can create obstacles and reduce the useable width of pavements for pedestrians.	Negative

### Support mechanisms

Various packages of support are available for the many low-emission technologies, both for the public and for private organisations. These are summarised by the Government’s Office for Zero Emission Vehicles.

- The [Local Electric Vehicle Infrastructure \(LEVI\) scheme](#) aims to further support the roll-out of electric vehicle charging infrastructure across England.
- [Electric Vehicle Homecharge Scheme: guidance for customers](#)
- UK Government: [Electric vehicle chargepoint and infrastructure grant guidance for installers](#)

### What can local authorities do?

Local authorities can:

- lead by example by introducing electric and hybrid vehicles into their own fleets
- use their influence (through direct contacts or via licensing requirements) over private fleets to encourage other fleet operators to switch to EVs
- improve their local electric vehicle infrastructure: [see guidance from the Department for Transport](#)
- implement preferential access, preferential parking, differential parking charges and emissions-related car parking charges

## Other issues

There have been criticisms of ‘green-washing’ when using hydrogen produced from non-sustainable sources or processes, which can lead to increased emissions during production. These can be problematic and the issues need to be carefully managed. The ultimate aim is to use sustainably produced green hydrogen. However, this is not yet commercially or industrially feasible for many applications, and less sustainably produced hydrogen is generally seen as an intermediate step towards this.

## Further information

- [Office for Zero Emissions Vehicles](#)
- [Global Witness: The problem with hydrogen](#)



## Low Emission Taxi Incentive Scheme – Southampton City Council

## Case Study 2

Southampton City Council (SCC) launched its Low Emission Taxi Incentive Scheme in 2018. The scheme, which ran until 2021, provided grants to drivers in the city’s SCC-licensed taxi fleet for switching to electric and hybrid vehicles. The scheme was extended in 2020 to include upgrades to cleaner wheelchair-accessible vehicles

### Cost

- SCC received over £250,000 of Defra Air Quality Grant funding in 2017 to implement the scheme.
- Additional funding was received through the Clean Air Fund in 2020, which supported the extension of the scheme of cleaner wheelchair and accessible vehicles

### Implementation

- The scheme was launched at a taxi and private hire drivers’ event.
- Colleagues across the air quality and taxi licensing departments worked together to ensure continuity in the process of applicants.

### Impact

- Over 60% of SCC’s fleet are now hybrid or electric vehicles, up from less than 5% when the scheme first started.
- The fleet now is estimated to save 7.53 tonnes of NO<sub>x</sub> per year.

### Lessons Learnt

- More stringent rules were perhaps needed to mitigate dishonest applicant behaviour. For example, despite stating that the vehicle to be replaced cannot be ‘recycled’ within the SCC taxi fleet, the council still received applications for older vehicles from previous applicants.
- More oversight was required from the licensing department to ensure that the applicant’s new vehicle matched what was declared in their application and that this vehicle was kept in ownership for a minimum of three years.

### Next Steps

- SCC is continuing to encourage uptake of electric and hybrid vehicles through a “try before you buy” scheme for electric taxis and light commercial vehicles.

You can find more information about this case study, and many others, on the [Air Quality Hub](#)



## T11: Alternative fuels

Alternative fuels encompass various renewable and/or low-emission energy sources used as alternatives to conventional fossil fuels such as petrol or diesel. Using alternative instead of conventional fuels can reduce GHG emissions and help decarbonise the transport system. Alternative fuels can also have air quality benefits, but their overall air quality and GHG impacts vary hugely, depending on the fuel, technology and fuel production. They can be used in road vehicles, non-road mobile machinery (NRMM) and generators. To further reduce emissions, they can of course be used hand in hand with energy efficiency measures, or with newer vehicles or equipment which meet more stringent emission standards.

There are several categories of alternative fuels.

### Fuels to replace conventional fuels in unmodified internal combustion engines

- Biofuels such as: *bioethanol* derived from crops like corn, soya or sugar cane; *biodiesel* made directly from vegetable oils or animal fats; *biomass-based diesel* produced through hydrotreating or hydrocracking, such as hydrotreated vegetable oil (HVO) and *renewable diesel* produced through the hydrogenation of vegetable oils, animal fats, or used cooking oil.
- *Pyrolysis oil*, created through heating biomass in the absence of oxygen, can be used as a feedstock to produce transport fuels.
- Electrofuels (*e-fuels*) including e-methane, e-kerosene and e-methanol, produced from captured CO<sub>2</sub> or carbon monoxide, together with hydrogen from water. The processes use sustainable electricity.

### Fuels to be used in modified internal combustion engines

- *Natural gas fuels* such as compressed natural gas (CNG), liquefied natural gas (LNG) and liquefied petroleum gas (LPG).
- *Biogas* produced from anaerobic digestion of organic waste such as agricultural residues, manure, and sewage sludge.
- *Hydrogen and biohydrogen*.<sup>77</sup>

Alternative fuels can also be used in off-road vehicles (such as airside vehicles) and NRMM. Using them could become important, as the emissions from NRMM could potentially overtake emissions from on-road transport in the foreseeable future. London has a low emission zone for NRMM, which currently requires all plant to meet Euro emission standards and to be zero emission from 2040.

Air quality impacts		Climate impacts
on hotspots	on emissions	on emissions
Positive*	Positive*	Positive*

\*General indication of impact. Actual impact will depend on the fuel used.

Replacement fuels in internal combustion engines usually have similar air pollution exhaust emissions to the equivalent conventional fuels.

Most fuels used in modified internal combustion engines emit fewer air pollution emissions than conventional fuels. There will still be emissions, even from low-carbon fuels, due to NO<sub>x</sub> released from combustion and PM emissions from the exhaust and tyre and brake wear.

Most alternative fuels will reduce emissions of CO<sub>2</sub>, but the climate impacts of alternative fuels depend on the source and method of production and transportation of the fuel.

This can vary significantly for replacement fuels, such as biofuels. Some biofuels, especially those from waste feedstocks, can have substantial climate benefits. However, while the feedstock can be renewable and/or low carbon, some vehicle fuels have significant well-to-wheel GHG emissions. E-fuels can have a lower carbon footprint than biofuels.

Fuels used in modified internal combustion engines can be renewable or low carbon compared to petrol and diesel, but this varies between fuels. For example, the overall climate impacts from fuels derived from natural gas are lower because of methane leaks and gas flares during extraction. Biogas produced from organic waste can have a net positive impact on climate change if it avoids methane being released into the atmosphere.

**Other impacts**

<p><b>Health:</b> Reducing levels of air pollution will reduce health impacts associated with pollution.</p>	<p>Positive</p>
<p><b>Local economy:</b> Most alternative fuels are more expensive and need alterations to fuelling stations.</p>	<p>Minor negative</p>
<p><b>Natural environment:</b> We need to consider well-to-wheel impacts of alternative fuels and their use, including biodiversity, habitat loss, water, rare minerals and sustainability.<sup>78, 79</sup></p>	<p>Negative</p>
<p><b>Availability of vehicles and fuels:</b> Transport is not the only sector we need to decarbonise. Demand from many sectors has put pressure on the availability and suitability of fuels. For example, the demand for green hydrogen and HVO far outstrips supply. Many argue that these fuels should be used where they have the most benefit, which may not be road transport. There has also historically been a longer wait time for alternative-fuelled vehicles.</p>	<p>Negative</p>
<p><b>Energy security:</b> Widespread use of alternative fuels would reduce the risk to energy security.</p>	<p>Minor positive</p>

## Support mechanisms

Various packages of support are available for the many low-emission technologies, for both the public and private organisations. These are summarised by the Government's [Office for Zero Emission Vehicles](#) and include the Energy Saving Trust's [Low Emission Zone Retrofit Fund](#).

## What can local authorities do?

Local authorities can:

- lead by example by introducing alternative-fuelled vehicles into their own fleets, where they have direct ownership of suitable vehicles
- use their influence (through direct contacts or via licensing requirements) over private fleets such as buses and refuse collection vehicles which may be suitable for alternative fuels

For example, when deciding on new vehicles for their fleet, the City of London Corporation adopts a fuel hierarchy which takes into account that a zero-tailpipe-emission vehicle may not be available to perform the duty required by that vehicle. The fuel hierarchy, in order of most preferred fuel, is:

- full electric
- plug-in-hybrid
- petrol hybrid (with regenerative braking)
- petrol
- Euro 6/VI diesel

Local authorities can also:

- provide alternative fuel refuelling infrastructure
- encourage the use of 'cleaner' fuels for road transport and NRMM: see guidance from the [British Ports Association](#) and the [City of London](#)
- implement preferential access, preferential parking, differential parking charges, emissions-related car parking charges
- use strategic planning and development control to require and/or encourage the use of cleaner alternative fuels for transport and NRMM and the development of supporting infrastructure.

## Further information

- [Zemo Partnership](#)
- [Renewable Transport Fuel Association](#)
- [Engie: E-fuels](#)

## T12: Retrofitting vehicles

Retrofitting emissions-abatement technologies is usually done on older, larger diesel vehicles, such as buses, heavy goods vehicles, refuse vehicles and construction machinery. NO<sub>x</sub> retrofits are also available for certain models of light commercial vehicle and minibus, generally only Euro-5 models. It is not usually cost-effective for smaller vehicles. Some newer models have emission abatement technologies fitted as standard.

Popular technologies include particulate filters, which reduce emissions of PM<sub>10</sub> and PM<sub>2.5</sub>, and selective catalytic reduction, which reduces emissions of NO<sub>x</sub>. Vehicles can also be retrofitted with new engines or powertrains. Any retrofit equipment needs to be fit for purpose and effective. Equipment that increases emissions of other pollutants, such as primary (directly-emitted) NO<sub>2</sub>, is not suitable.

Retrofit is usually carried out as part of an overall plan to reduce emissions from fleets (such as bus fleets) or to comply with policies such as low emission zones.

Air quality impacts		Climate impacts
---------------------	--	-----------------

on hotspots	on emissions	on emissions
Positive	Minor positive	Neutral
Retrofit can be a cost-effective way of reducing emissions from older vehicles. It is particularly effective where an area's air quality problems come primarily from larger or older diesel vehicles, or engines which meet less stringent standards.		Retrofit abatement equipment usually adds a small fuel economy penalty, which can mean higher emissions of CO <sub>2</sub> . This can often be reduced with engine retuning.  Black carbon, which has a substantial warming effect on the climate, is reduced by particulate filters.

### Other impacts

**Health:** Measures which reduce the emissions from road vehicles can reduce health impacts, especially at busy roads and junctions. Positive

### Support mechanisms

The Government's [Clean Vehicle Retrofit Accreditation Scheme \(CVRAS\)](#), hosted by Zemo and the Energy Saving Trust, supports the operation of clean air zones and addresses air pollution emissions from buses, coaches, heavy goods vehicles, mini-buses, taxis and vans. Only CVRAS-approved retrofits are accepted as being compliant with clean air zones, the London LEZ and the London ULEZ. CVRAS-approved manufacturers are good sources of advice on whether retrofit will work for specific applications.

## What can local authorities do?

Local authorities can:

- Lead by example by retrofitting their own fleets, where they have direct ownership.
- Use their influence (through direct contacts or via licensing requirements) over private fleets such as buses, taxis, refuse collection vehicles and NRMM.
- Set up bus or freight voluntary partnerships with local operators to encourage them to install retrofit equipment. For example, a local authority might agree to install a bus lane if the bus company can provide retrofitted or new low-emission buses on the route.

## Other issues

There is a risk of compromised emissions abatement equipment, including filter tampering and defeat devices, which are illegal but widespread, and can lead to higher emissions than if the abatement equipment were not fitted at all.

Vehicles have to be well maintained for emission abatement equipment to work effectively. In particular, AdBlue reductant levels must be topped up regularly.

NRMM certification is carried out by the Energy Saving Trust. This certifies the emissions reduction systems that can be retrofitted to NRMM and construction machinery to allow them to be used in areas which have emissions restrictions.

## Further information

- Energy Saving Trust: [Clean Vehicle Retrofit Accreditation Scheme](#)
- Energy Saving Trust: [Non-road mobile machinery certification](#)
- Zemo: [The Clean Vehicle Retrofit Technology Guide](#)

### T13: Fleet management (incl. driver training)

Large organisations (including local authorities) often have large vehicle fleets, as well as many drivers using their own vehicles for business.

Buying vehicles with best-in-class emissions can reduce air pollutant and GHG emissions. Alternatively-fuelled or smaller vehicles can be worth considering, as long as they are appropriate for intended payloads.

Sticking to manufacturers’ service schedules helps ensure that emissions performance is maintained. Best-in-class consumables such as low rolling resistance tyres can even reduce emissions over an ‘as new’ vehicle. Simple measures such as regular checking of tyre pressure and condition and periodic checking of wheel alignment can bring about lower CO<sub>2</sub> and tyre-wear emissions, as well as substantial cost savings in fuel and replacement tyres.

Using telematics (systems to monitor vehicles using GPS and onboard diagnostics) can help with effective fleet operations. Driver training in ‘eco’ or ‘smarter’ driving can reduce fuel consumption and emissions. Driver training can be one of the quickest and cheapest ways to reduce emissions from fleets. It can also reduce accidents and general wear and tear.

Active travel alternatives, such as pool bikes for short work journeys, can also help.

Air quality impacts		Climate impacts
---------------------	--	-----------------

on hotspots	on emissions	on emissions
Positive	Positive	Positive
<p>Well-maintained fleets and well-trained drivers will help to reduce emissions of air pollutants.</p> <p>Good fleet management can improve the efficiency of fleet operations by reducing mileage, encouraging smoother and more efficient driving, encouraging car-sharing and reducing idling. These all reduce air pollution emissions.</p>		<p>Well-maintained and efficiently-operated fleets help to ensure fuel efficiency and reduced GHG emissions.</p> <p>Good fleet management can improve the efficiency of the fleet by reducing mileage, encouraging car-sharing and reducing idling. These all reduce GHG emissions.</p>

#### Other impacts

<p><b>Health:</b> Measures which reduce the emissions from road vehicles can reduce health impacts, especially at busy roads and junctions.</p>	Positive
<p><b>Local economy:</b> Good fleet management can reduce costs to local businesses, through reduced fuel and fleet maintenance costs.</p>	Minor positive

<b>Indirect emissions improvements:</b> Driver training should deliver emission improvements outside work too.	Minor positive
<b>Safety:</b> Driver training should also result in safer driving.	Minor positive
<b>Noise:</b> The reduction in traffic, through better route planning, car sharing, logistics, smoother driving styles and use of electric and hybrid vehicles should reduce noise.	Minor positive
<b>Reduced congestion:</b> Through route planning, car sharing and logistics.	Minor positive

### What can local authorities do?

Local authorities can:

- Lead by example by ensuring their fleets are managed in line with best practice and that drivers, including staff using their own vehicles, receive training in smarter driving techniques:
  - The **Fleet Operator Recognition Scheme (FORS)** is a voluntary accreditation scheme for fleet operators, which provides training and support for freight and fleet operators to improve efficiency, safety and environmental impact.
  - The **ECO Stars scheme** is a “fuel management and operational efficiency support programme, designed as a measure for local authorities to improve local air quality by reducing emissions from heavy duty vehicles including bus and HGV fleets”. It started in South Yorkshire, and in 2023 there are over 28 ECO Stars schemes around the UK, with over 500 members.
  - Logistics UK have a **Van Excellence Scheme** that local authorities can join.
- Use their procurement processes or tender specifications to encourage or require contractors and service providers to use best practice in fleet management. For example, Camden Council uses a ‘Green Fleet Vehicle Standard for Contractors and Service Providers’. This sets out how contractors should: avoid, reduce and rationalise vehicle use; use the most efficient and least polluting vehicles; keep vehicles well maintained; and ensure staff are trained about environmental impacts and health.
- Work with other local fleet managers such as local businesses (through business associations) to promote more sustainable fleet management and schemes.

### Other issues

The importance of tyres is often overlooked. They form the contact between the car and the road, so their performance is crucial to the safety and fuel efficiency of the vehicle. Tyre rolling resistance varies hugely between models. Using low-rolling-resistance tyres can significantly improve a vehicle’s fuel efficiency. Tyres are also the main source of vehicle noise at high speed, so quieter tyres can reduce road noise, a major problem in many parts of the UK. Industry publications can help fleet managers identify best-in-class quieter, lower-rolling-resistance tyres.

### Further information

- Energy Saving Trust: [Efficient driving training and advice](#)





### T14: Freight management

Effective freight management can reduce total miles travelled, through better route planning, logistics planning and timing, to reduce waiting and idling at delivery. Effective freight management is already used extensively, as this reduces operators' costs. The Government has emphasised freight as key to meeting carbon zero and air quality targets in its 2022 *Future of Freight* plan.<sup>80</sup>

Deliveries can also be made to consolidation or logistics centres, which then combine the last stage of delivery to urban areas, industrial areas or construction sites. Consolidation centres usually use vehicles that meet stringent emissions standards. These tend to be single-operator, but can be combined for specific sites such as airports.

HGVs carry the majority of freight in the UK. Smaller vehicles, including electric cars, vans and cargo bikes, supplement them, especially for urban and 'last-mile' deliveries.

There has been a marked increase in the number of home deliveries in recent years.<sup>81</sup> Deliveries to people's homes frequently involve short distances and frequent stops, both of which are poor for air pollution and inefficient for fuel consumption and GHG emissions. The Government's *Future of Freight* plan identifies innovative delivery solutions including e-cargo bikes. The last mile is being decarbonised and will create greener, cleaner, more liveable places'.

Rail and water freight can also be used but they are not usually under the control of local authorities. Measures on rail (integrated transport management) and water can be found above.

Air quality impacts		Climate impacts
on hotspots	on emissions	on emissions
Positive	Minor positive	Minor positive
<p>Reducing the number of heavy vehicles and/or the distance travelled will reduce air pollution emissions. This could have a larger impact when measures focus on hotspots.</p> <p>Good freight management can reduce the number of empty miles, reduce waiting times at delivery points and reduce idling, which will reduce air pollution emissions.</p>		<p>Reducing the number of heavy vehicles and/or the distance travelled will reduce GHG emissions.</p>
Other impacts		
<p><b>Health:</b> Through reduced air pollution, especially when focused on hotspots.</p>		Positive
<p><b>Local economy:</b> More effective freight measures can lead to fewer empty miles, reduced congestion and reduced delivery waiting times. These should benefit the local economy.</p>		Minor positive

<b>Noise:</b> Noise is reduced by the reductions in traffic from good freight management.	Minor positive
<b>Congestion:</b> Route planning, logistics, reduced empty miles and consolidation all help to reduce congestion.	Positive

### Support mechanisms

For lighter freight, the Department for Transport’s 2022 *Future of Freight* plan includes a commitment to create at least one ‘Zero Emission Transport City’. This will look at last-mile deliveries being done by cargo bike or electric van, with funding for an e-cargo bike pilot. The Government has also set up the freight innovation fund to boost innovation in decarbonising freight.<sup>82</sup>

### What can local authorities do?

Local authorities can:

- Develop and implement freight strategies for their areas. Good freight strategies will reduce emissions and empty miles. They will also promote more sustainable freight options.
- Encourage consolidation and logistics centres and cleaner last-mile deliveries through the planning process. For example, ensuring that secure parcel drop-off and collection points are incorporated into new residential developments can reduce the number of delivery trips.
- Undertake to improve their fleet of freight vehicles, as well as promoting to other local freight operators:
  - The **Fleet Operator Recognition Scheme** (FORS) is a voluntary accreditation scheme for fleet operators which provides training and support for freight and fleet operators.
  - The **ECO Stars scheme** is a “fuel management and operational efficiency support programme, designed as a measure for local authorities to improve local air quality by reducing emissions from heavy duty vehicles including bus and HGV fleets”. It started in South Yorkshire, and in 2023 there are over 28 ECO Stars schemes around the UK, with over 500 members.
  - Logistics UK have a **Van Excellence Scheme** that local authorities can join.

### Other issues

The choice of tyres can also affect the safety and fuel efficiency of the vehicle. Tyres are also the main source of vehicle noise at high speed.

Alternative fuels can be used for freight vehicles. Electric cars and vans are now common. For heavier vehicles, the weight and cost of alternative technology is a factor. CNG-fuelled, hybrid and electric HGVs are available, although they have limited penetration into the fleet. Development has been slower for electric HGVs than for lighter vehicles, due to battery weight and cost. Vehicles using other fuels, such as hydrogen, are being developed.

### Further information

- Transport for London: [Cargo Bike Action Plan](#)
- [Care4Air: South Yorkshire Clean Air Campaign](#) (developers of the ECO Stars scheme)

## Delivery and Servicing Plans– Southampton City Council

## Case Study 3

From 2019 to 2021 Southampton City Council (SCC) developed delivery and servicing plans (DSPs) with organisations located across the city to help reduce the negative impacts of their delivery and servicing activities.

- SCC also offered businesses the opportunity to apply for a subsidy (which SCC would match fund) to limit delivery and service plan set-up costs, such as transferring existing supplies to Southampton’s sustainable distribution centre.

### Implementation

- The [Sustainable Distribution Centre](#) is operated by a global logistics company in partnership with SCC.
- To apply for the scheme, organisations had to support SCC’s [Green City Charter](#). Applications that could demonstrate improvement in the supply of goods through the city’s Air Quality Management Areas were favoured.

### Impact

- [Nine DSPs implemented](#) including those with the City’s universities, Carnival UK and commercial hubs across the city.
- Outcomes being evaluated through the [Future Transport Zones programme](#)

You can find more information about this case study, and many others, on the [Air Quality Hub](#)

## 4.2 Built environment

The built environment is a major source of GHG and air pollutant emissions. Built environment emissions come from a) construction (and demolition) and b) the use of buildings and infrastructure.

On GHGs, the UK Green Building Council has estimated that the built environment was responsible for 25% of UK greenhouse gas emissions in 2018.<sup>83</sup> Approximately two-thirds of built-environment emissions came from operational carbon emissions from buildings. The other significant contributors were embodied carbon from construction activities and building materials. Since the 2010s, the sector has struggled to significantly reduce GHG emissions, and new homes and other buildings continue to be built to unsustainable standards and methods, locking in future emissions.

On air pollutant emissions, the Impact on Urban Health and Centre for Low Emissions Construction have reported that construction activities were responsible for approximately 18% of PM<sub>10</sub> emissions and 11% of NO<sub>x</sub> emissions in London in 2018.<sup>84</sup> Across the UK domestic combustion is a huge source of particulate emissions, in 2021 accounting for 16% of PM<sub>10</sub> and 27% of PM<sub>2.5</sub> emissions. A large contributor to this is burning wood to heat homes, emissions from which increased by 124% from 2011 to 2021.<sup>85</sup>

For local authorities with urban centres, commercial kitchens are often a substantial source of air pollution.

We report built environment measures in three sections:

### Buildings

Measures local authorities can take on town planning and the way buildings are constructed:

- Construction

- Strategic planning and development management

### Public realm

Measures local authorities can take to improve public spaces:

- Public realm
- Green infrastructure

### Energy and heat

Measures for improving the energy infrastructure in buildings:

- Energy efficiency
- Non-combustion renewables
- Addressing wood burning and other solid fuels

## Box 11. Built-environment powers and responsibilities for local authorities

Local authorities have significant control over the built environment, especially through planning policy, powers and enforcement. In the devolved administrations, all local authorities are local planning authorities. In England, unitary authorities and district authorities act as local planning authorities.

# Buildings

## B1: Construction

Non-road mobile machinery (NRMM) and construction plant usually run on diesel and contribute to local air pollution and GHG emissions. There are opportunities to ensure that the plant used on construction sites have lower emissions. For example, the Mayor of London has set minimum air pollutant emission standards; there are no equivalent standards for GHG emissions at the time of writing this report. There may also be electric alternatives for some NRMM.

Construction traffic can also contribute to pollution. Many of the measures set out in the freight section apply to construction.

Construction dust comes from demolition, construction and resuspension. It can cause localised nuisance or loss of amenity. Good-practice measures, such as in Institute of Air Quality Management guidance, can be used to minimise impacts. Construction dust has negligible climate impacts.

Air quality impacts		Climate impacts
on hotspots	on emissions	on emissions
Positive	Minor positive	Minor positive
<p>Construction plant and generators are often diesel fuelled, with relatively high NO<sub>x</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> emissions. Measures to reduce emissions will benefit local air quality, particularly if there are hotspots around construction sites. The impact on wider emissions is probably minor due to the transitory and dispersed nature of construction sites.</p>		<p>Construction plant emit GHGs and black carbon. Plant with better emissions technology have lower black carbon and may have lower GHG emissions, if optimised for GHG and air pollutant emissions.</p>

## Other impacts

<p><b>Health:</b> There may be some localised positive health impacts through reduced pollution around construction sites.</p>	Minor positive
<p><b>Noise:</b> Good environmental management of construction site can have benefits for noise and other environmental issues.</p>	Minor positive
<p><b>Congestion:</b> Effective management of construction traffic can reduce congestion and idling around the site.</p>	Minor positive

## What can local authorities do?

Local authorities can:

- Use clear and effective planning conditions and planning policy to require minimum emissions standards for construction plant which fall under the relevant legislation for NRMM. This is often a requirement in London and has been applied elsewhere. These emissions standards apply to air pollution emissions rather than climate. Any planning policies or conditions will ideally reference online standards (e.g. Stage V diesel NRMM standards) so that they continually require the cleanest technologies.
- Ensure that construction sites minimise the use of generators with temporary electrical supply, where feasible.
- Where not already required under planning guidance, require a construction dust risk assessment and management plan to be provided with planning applications or to be set as a pre-commencement condition. These cover a range of construction emission issues such as damping down, fencing/screening, stockpile management and waste disposal.
- Get developers to focus on embodied emissions through a whole life-cycle carbon assessment for new developments. For examples of local authorities that have done this, see [Climate Emergency UK's Scorecards](#).
- Work with developers, during the planning process and/or with planning conditions, to require stringent minimum emission standards for construction plant and NRMM, and to ensure that plant air pollution and climate emissions are assessed and optimised.
- Encourage travel plans for staff working on large construction sites.

For these mechanisms to work, local authorities need to pay attention to enforcing and monitoring any requirements. Developers need to be clear on what is required of them and any consequences of not fulfilling requirements.

Impact on Urban Health and Arup have developed a [construction emissions toolkit](#) and models can be assessed for air pollution and climate emissions. This has been used at sites in Lambeth and Southwark and on the HS2 project. It is freely available to local authorities and others to help manage emissions from construction sites. The toolkit allows plant requirements for a construction site to be entered, and scenarios with different types and models can be assessed for air pollution and climate emissions.

Merton Council published a [Construction Code of Practice](#) in 2022. This can be adapted for other local authorities to use. Referencing Codes of Practice in decision notices as a condition is an easy and concise way for local authorities to detail comprehensive requirements.

## Further information

- Institute of Air Quality Management: [Guidance on Construction Dust](#)
- GLA: [Non-Road Mobile Machinery \(NRMM\)](#)
- Merton: [Construction Code of Practice](#)
- Cleaner Construction for London: [NRMM Practical Guide](#)

## Clean Air Gas Engines – Centre for Low Emission Construction

## Case Study 4

The construction industry needs off-grid energy to power accommodation blocks, drying rooms, security cameras and site lighting – and increasingly to charge electric machinery. Traditionally this energy comes from diesel generators. These are often sized large enough to provide peak power demand, which also means that they are left idling or at very low load for much of the working day.

Clean Air Gas Engines (CAGE) technology runs on fuels such as LPG, hydrogen and natural gas. It has been developed as an alternative to more-polluting diesel generators. The fuels it runs on also have lower carbon emissions than diesel.

CAGE technology was trialled on a HS2 worksite in Euston, for 12 months during 2020 to 2021. It was installed in a welfare cabin for construction contractors. The CAGE installation was also integrated into a battery energy storage system.

Imperial College's Centre for Low Emission Construction monitored emissions during the project, comparing against European NRMM standards. HS2 Ltd also collaborated with local authorities on the project.

### Impact

Emissions measurements on the CAGE technology showed:

- NO<sub>x</sub> 97% lower than Stage III-A and Stage V NRMM diesel emission standards
- NO<sub>x</sub> 94% lower than NRMM spark-ignition standards
- PM 99% lower than Stage III-A NRMM diesel emission standards
- PM 65% lower than Stage V NRMM diesel emission standards
- Particle number higher than Stage V NRMM diesel emission standards

79% of power consumption during the project came from solar energy, with 21% from the CAGE. This gave substantial carbon savings.

The welfare cabin housing the CAGE system was also shown to improve welfare conditions and air pollution exposure for construction site workers.

### Further Applications

CAGE technology is not solely for construction. It can be adopted in other areas where off-grid power is routinely required, such as road and utilities work, as well as festivals and events.

*For more information on this case study, please see this [HS2 learning legacy article](#)*

## B2: Strategic planning and development control

Strategic planning and development control can have fundamental and long-term impacts on air quality and climate change. They are also important for other environmental issues, such as ecology and noise. Good strategic planning policy can help ensure that land is allocated in ways that reduce air pollution and GHG emissions, and that developments with more sustainable designs and lower emissions are encouraged, including re-purposing and re-using buildings. For instance, turning sections of road into public realm spaces (accessible outdoor public areas) can reduce air pollution exposure and lead to lower emissions. Development management can ensure that individual developments operate in line with their permissions, meet all strategic policy requirements for improved air quality and GHG emissions, and incorporate elements of better design from an early stage of the process.

### Air quality impacts

### Climate impacts

#### on hotspots

#### on emissions

#### on emissions

Positive

Positive

Positive

Where measures are included to minimise emissions from transport (e.g. reducing private car use) and buildings (e.g. use of heat pumps, photovoltaics etc) there will be a positive benefit to improving local air quality. The benefits delivered will depend on the package of measures implemented.

Measures that reduce emissions from transport and building sectors will have a positive effect on reducing GHG emissions if the transition is away from energy sources that rely on fossil fuel combustion.

### Other impacts

**Health:** Beneficial through reduced emissions and exposure. Embedding sustainable travel, such as walking or cycling, into developments brings associated health benefits.

Positive

**Sustainable transport:** Embedding active travel initiatives, such as walking or cycling, into developments helps deliver wider sustainable transport aims.

Positive

**Safety:** Successful urban design and development control can reduce the need to travel over the longer term, leading to safer transport.

Positive



## Support mechanisms

EPIC and IAQM's 2017 *Land-Use Planning and Development Control: Planning for Air Quality* guidance provides a framework for assessing air quality as a material consideration in planning. At the time of writing this report, it is the *de facto* national guidance on how to assess air quality for planning applications. It also includes a section on 'Better by design' which highlights how development proposals can adopt good design principles that reduce emissions and contribute to better air quality management).<sup>86</sup>

Examples set out in the London Plan and SPGs published by local authorities provide examples that can be replicated.

The *National Planning Policy Framework* (NPPF),<sup>87</sup> *Planning Policy Wales* (PPW) and *National Planning Framework 4 (Scotland)* documents place a general presumption in favour of sustainable development, stressing that the planning system should perform an environmental role to minimise pollution. These documents all support local planning policy. The NPPF refers to mitigating and adapting to climate change throughout. On air quality, paragraph 186 states the need to improve air quality or mitigate impacts, and that this needs to be done in local authority development plans as far as possible.

At the time of writing this report, Defra is developing guidance on how to show that PM<sub>2.5</sub> targets have been appropriately considered in the planning process.

## What can local authorities do?

Local authority policies on GHG emissions from developments are playing an increasingly important part in reducing GHG emissions over the longer term. Strategic planning can only be effective in improving air quality and climate change when strong local planning policies are in place.

Local authorities can:

- Take every opportunity to ensure that local plans and SPG documents include strong, robust and effective policies. Strong local policies are fundamental to achieving good development and to blocking development that would undermine air quality and climate change aims. Implementing measures into the development management process is best delivered through local planning policies or SPGs.
- Take every opportunity to ensure that local plans and SPG documents comprehensively and holistically consider building emissions. Local plans can enable tighter standards for new builds and refurbishments through the planning process, but only if all relevant aspects of building emissions are captured. They should take into account and address emissions from commercial kitchens, wood and solid fuel stoves, standby diesel generators, and appliances and flues in domestic and commercial properties.
- Introduce policies, often supported by supplementary planning guidance (SPG), that require developers to prepare Low Emission Strategies. These are packages of measures applied to reduce emissions of air pollutants and GHGs from new (or significantly altered) developments. They are secured via the planning system, using a combination of planning conditions and obligations (e.g. Section 106 agreements in England and Wales, Section 75 in Scotland). Low Emission Strategies usually apply technical measures (e.g. support for alternative fuels, public transport improvements, low emission zones in the development phase, etc), with non-technical measures such as travel plans, often attached as planning conditions separately.

## The London Plan

*The London Plan*<sup>90</sup> requires that new developments meet benchmarks for both transport and building (heat and hot water) emissions in the GLA's *Air Quality Neutral* policy, and larger developments (subject to environmental impact assessment) must demonstrate they are *Air Quality Positive*, showing how the development maximises the benefits to local air quality and describing what measures were taken during the design stages to achieve the best outcomes for air quality. Better design to avoid air pollution issues is more effective than post-design mitigation. The Mayor of London has published guidance on both policies.<sup>89, 90</sup>

## Other issues

Many Low Emission Strategies are funded through developer contribution, secured by Section 106 agreements or through the Community Infrastructure Levy. The planning process can be an effective way of funding Low Emission Strategies and other initiatives to reduce air pollution and GHG emissions.

At the time of writing, various planning reforms under the [Levelling Up and Regeneration Act 2023](#) have been paused. If delivered, these reforms may include updating the NPPF and discontinuing SPGs. Local authorities should check the latest planning information on the [gov.uk website](#).

# Public Realm

## B3: Improving the Public Realm

The public realm encompasses spaces and places that are open and freely accessible to the public, such as streets, pathways, squares and green spaces. It can be seen as a series of connected spaces that help to define the character of a place. How we use the public realm is changing, with a shift towards high streets and public spaces focused on leisure, rather than traditional shopping.<sup>91</sup>

The public realm can be a source of high-emitting activities, especially in urban areas or tourist hotspots. Pop-up events, festivals, utility works and filming, for instance, all create emissions. How public spaces are designed, built and used can have an impact on local air quality, exposure to air pollution and GHG emissions.

See also the measure on [green infrastructure](#).

### Air quality impacts

### Climate impacts

#### on hotspots

#### on emissions

#### on emissions

Positive

Positive

Positive

The public realm can be designed to ensure that people there are not exposed to high levels of air pollution. A well-designed public realm can also support and encourage active travel.

Licensing powers can be used to ensure that low-emitting plant and equipment are used. Electric hook-up points can be provided to avoid the need for on-site diesel generators for events.

Repurposing streets to disallow motorised vehicle access and encouraging vehicles with zero tailpipe emissions can help reduce emissions.

When improving the public realm, re-using materials and using materials with low embodied carbon can reduce carbon impacts.

### Other impacts

**Health:** Reduced emissions and public exposure to air pollution benefit health. A well-designed public realm encourages people to spend time outdoors, which is good for wellbeing and can offer cool spaces during hot weather. Good public realm can encourage and facilitate active travel.

Positive

**Quality of life:** Improved public realm spaces can improve people’s sense of place and security.

Positive

**Climate resilience:** The correct use of materials, greening and water features can lower temperatures. Designs should include sustainable urban drainage systems to reduce localised flooding.

Positive

<b>Circular economy:</b> Reusing materials can support the circular economy.	Positive
<b>Biodiversity:</b> Good planting schemes can support biodiversity.	Positive
<b>Economy:</b> Improved public realm spaces can improve footfall and spend in local areas.	Positive

### Support mechanisms

Improving the public realm is one of five key priorities in the Government’s 2021 [Build Back Better High Streets strategy](#). Many areas of public realm are funded through developer contribution secured by Section 106 agreements and Community Infrastructure Levy charges.

### How can local authorities support implementation?

Local authorities can improve the design and construction of the public realm in many ways, for instance:

- Develop a local toolkit for public realm design. For example, see The Mayor of London’s [Expanding London’s Public Realm Design Guide](#) and the City of London Corporation’s [City Public Realm Toolkit](#).
- Provide electric hook-up points to avoid the need for on-site diesel generators for events.
- Consider the location of furniture so it is away from pollution sources.
- Provide good wayfinding to encourage active travel.
- Ensure ethical and low-carbon sourcing of materials.
- Ensure low-emission construction techniques.
- Choose materials to reduce heat storage and make paved surfaces permeable where possible, to reduce local flooding. Avoid materials which become too hot to touch in higher temperatures (the colour and potential for heat absorption of paved surfaces can impact on the local microclimate).
- Ensure that low-emission equipment and vehicles are used by any contractors during and construction and installation of public realm.

Design measures to green the public realm are often integral (see also green infrastructure measures).

Local authorities can also take action to reduce emissions and exposure from the use of the public realm:

- Issue licences that require the use of generators which meet stringent emission standards and gas for cooking food instead of charcoal. For example, Liverpool City Council only licenses festivals, concerts and other events where organisers agree to reduce emissions by 50%.



Part of the IES family

- Engage with hospitality businesses to encourage behaviour-change interventions, to ensure that staff use and maintain ventilation systems properly, and cook in a way that produces less smoke, burnt grease and oils.
- Undertake routine road sweeping as a matter of course, with enhanced sweeping where locations and concentrations dictate. Zero-tailpipe-emission road sweeping vehicles, using water suppression, can be usefully used during days of high particulate pollution.

## B4: Green Infrastructure

Green infrastructure absorbs carbon. It can be used to help protect people from air pollution in urban areas. It also has the potential to promote healthier living, lessen the impacts of climate change, improve water quality and improve biodiversity and ecological resistance.

The main benefit of green infrastructure to urban air quality is that it can control the flow and distribution of pollutant emissions (it can increase dispersion and maximise distances between people and emissions sources), **not** that it can remove pollution by absorption or deposition.

See also the section on improving the public realm.

Air quality impacts		Climate impacts
---------------------	--	-----------------

on hotspots	on emissions	on emissions
Minor positive	Neutral	Minor positive

Green infrastructure in streets can be used to increase the distance between road traffic and pedestrians by creating a buffer between the pavement and the kerbside. No single solution always works best (for example, narrow street canyons have to be considered differently from open roads). The **correct type of infrastructure** can reliably reduce exposure to air pollution in most situations. Studies have shown that a vegetation barrier can reduce pollutant concentrations behind the barrier, by as much as 50% in some scenarios.

Green infrastructure can also potentially reduce traffic emissions by providing environments that encourage a modal shift to forms of active travel.

Biogenic volatile organic compound (BVOC) emissions from green infrastructure can lead to more ozone. However, at the scale of urban street planting this is likely to be minor. BVOC can be substantially reduced by using low-BVOC-emitting species such as larch, maple, silver birch and Austrian pine.

Green infrastructure removes GHGs from the atmosphere, helps minimise the risk of severe weather events and provides sustainable urban drainage to minimise flooding.

## Other impacts

**Health:** Green infrastructure promotes healthier living, introduces attractive spaces to encourage walking, cycling and outdoor recreation, and provides shade.

Positive

<p><b>Natural environment:</b> Improves biodiversity and ecological resistance, with appropriate range of plant species. Protects and links habitats in urban areas.</p>	<p>Minor positive</p>
<p><b>Adaptation:</b> Green infrastructure can give shade for buildings and people, to help mitigate the impact of rising temperatures in urban environments. Planting beds can be an integral part of a sustainable urban drainage system. Using resilient species can minimise maintenance costs.</p>	<p>Positive</p>
<p><b>Community:</b> Green infrastructure can improve the public realm and promote wellbeing and a sense of place amongst residents.</p>	<p>Minor positive</p>

### Support mechanisms

The [Green Infrastructure Partnership](#) has a guide to funding sources for green infrastructure for local authorities across the UK. In 2024 the [EFRA Committee](#) called on the UK government to provide a consistent funding programme for green infrastructure, as well as other support mechanisms.

### What can local authorities do?

Local authorities can ensure that air quality is considered at all stages of urban design and planning. Green infrastructure can be implemented as new developments are brought forward (potentially secured by planning conditions) or during the normal course of infrastructure maintenance or upgrade. Natural England’s [Green Infrastructure Framework](#) provides principles and standards that planning authorities and others can use to achieve best practice when considering green infrastructure during the planning process and other decision making processes.

It is important to consider the correct type of green infrastructure for the local environment. In particular, street canyons need to be treated differently from open roads. [Guidance published by the Greater London Authority](#) provides a useful step-wise approach that can be followed. In summary:

- For street canyons with **low levels of traffic**, a dense avenue of trees can provide protection from the ingress of polluted air from above and create a “green corridor” to encourage active travel. However, in a heavily-trafficked street canyon, a dense tree canyon may trap traffic emissions at ground level and is unlikely to improve air quality.
- For street canyons with moderate or high levels of traffic, adding a green open space to one side of the street will always be beneficial; where the canyon height is less than twice its width, a hedge or green wall between the pavement and kerbside can reduce people’s exposure.
- For open roads, a hedge or green wall between the pavement and kerbside can substantially reduce local exposure. Where the aim is to reduce exposure further back from the road (such as within an adjacent school playground) a combination of hedges and dense lines of trees provides a taller vegetation barrier to increase dispersion.



Part of the IES family

- Green infrastructure can have significant implementation and on-going maintenance costs. Long-term commitments such as control of leaf debris, trimming of branches and pest control need to be factored into the design and cost of any scheme. Operations to maintain vegetation often require diesel-based vehicles / tools and can require temporary road closures. Green waste also needs to be disposed of.

### Further information

- [Using Green Infrastructure to Protect People from Air Pollution](#), GLA
- [Impacts of Vegetation on Urban Air Pollution](#), Air Quality Expert Group
- [First Steps in Urban Air Quality](#), Trees and Design Action Group
- [Air pollution: outdoor air pollution and health](#), National Institute for Health and Care Excellence
- [Green Infrastructure Partnership](#)



# Energy and Heat

## B5: Energy efficiency

Using energy more efficiently mean less needs to be generated. Energy efficiency can be improved by upgrading elements such as wall and loft insulation, installing higher efficiency appliances (boilers, lighting and white goods) and encouraging minor changes in behaviour.

Domestic energy efficiency can be one of the most cost-effective means of reducing GHG emissions. Improved domestic heat efficiency can reduce gas boiler use and associated NO<sub>x</sub> emissions. It also helps ensure that people can affordably heat their homes.

Energy efficiency in offices, shops and other commercial premises is another cost-effective way of reducing GHG emissions, including insulation and lighting measures, and using more efficient appliances, such as computers, printers, photocopiers and refrigerators.

### Air quality impacts

### Climate impacts

#### on hotspots

#### on emissions

#### on emissions

Minor positive

Positive

Positive

Many homes and commercial premises are heated using combustion appliances (gas, coal or oil boilers). Improving energy and heat efficiency means less fuel needs to be burnt and fewer air pollutant emissions are produced.

Upgrading boilers to modern high efficiency models or to non-combustion renewables also improves NO<sub>x</sub> emissions directly, as modern boilers are manufactured to meet higher NO<sub>x</sub> standards than older models and non-combustion renewables produce no direct emissions. Reducing electricity use in a home and commercial premises also reduces emissions of air pollutants from power stations.

Improved energy efficiency means lower emissions of GHGs, either directly from boilers or indirectly from power stations.

### Other impacts

**Health:** Improved energy efficiency helps people afford to heat their homes.

Minor positive

**Local economy:** Measures which improve efficiency will lead to lower energy costs or more comfortable buildings. Some measures are free and others have a payback period (through reduced energy costs) of only a few years.

Minor positive

<p><b>Indoor air quality:</b> There can be a tension between the need for relatively airtight buildings to improve energy efficiency and indoor air pollution. When used effectively, airtight systems can be used to balance indoor and outdoor air pollution. However, building occupiers are not always given adequate information to understand the risks of poor ventilation or to manage and maintain their systems.</p>	<p>Minor negative</p>
<p><b>Vulnerable communities:</b> Many people in the UK, especially people on lower incomes, live in poor-quality housing whose energy efficiency is also poor. Rises in energy costs fall more heavily on people who cannot afford to or have no power to improve the energy efficiency of the building fabric of their homes. The cost-of-living crisis of the early 2020s has made this inequality worse.</p>	<p>Positive</p>

**Support mechanisms**

The LGA and Local Partnerships produced a *Green Finance Guide* in 2022, which provides practical guidance and examples of good practice to help find the most appropriate and affordable financial support for local authorities.<sup>92</sup>

Many local authorities are retrofitting existing properties to make them more energy efficient. Local Partnerships produced a *Domestic Retrofit Handbook*<sup>93</sup> in 2021, updated in 2023, which provides practical advice to local authorities. The 2023 edition reflects the cost-of-living crisis and highlights funding initiatives which may be of use.

At the time of writing this document, the Government provides advice to the public on energy efficiency, through the Help for Households campaign. Other organisations also provide advice on domestic energy efficiency, including the Energy Saving Trust, the Centre for Sustainable Energy, Citizens Advice Bureau and charities such as Age Concern.

Residents who live in social housing or claim certain benefits can access additional support from their energy supplier for efficiency measures through the Energy Company Obligation.<sup>94</sup>

## What can local authorities do?

Local authorities can:

- Lead by example by improving the energy efficiency of their own premises.
- Set local energy efficiency standards.
- Ensure buildings in their areas comply with minimum energy efficiency standards by reviewing energy performance certificates.
- Ensure that developments minimise emissions from energy use. The London Plan, for instance, requires developers to show that its [energy hierarchy](#) has been considered.
- Help point local businesses to appropriate advice and guidance through services such as business advice and licensing, as well as groups such as business/ economic forums, and via links to local chambers of commerce. Corporate social responsibility, brand and reputation drive the behaviour of many private sector organisations. Environmental, social, and governance concerns form part of these concerns. Local authorities can work with local business communities to help connect and communicate work to improve energy efficiency with these concerns.
- Provide energy efficiency funding or sustainable growth grants.

## Other issues

Some homes are hard to treat, as common energy efficiency measures such as loft insulation, cavity wall insulation and/ or high efficiency boilers cannot be fitted. Other technologies are available, such as solid wall insulation, but these can be more expensive and harder to access.

The majority of commercial property is rented rather than owned by the occupier. This adds complications due to split responsibilities, where one party is responsible for ownership of the building (and therefore incurs the costs of energy efficiency improvements), whilst another pays for fuel bills.

## Further information

- Local Government Association: [Financing Green Ambitions](#)
- Help for Households: [How to save energy and lower your bills this winter](#)
- [Home Energy Scotland](#)
- Centre for Sustainable Energy: [Advice and information for households](#)
- UK Government: [Help from your energy supplier: the Energy Company Obligation](#)
- Local Partnerships: [Domestic Retrofit Handbook](#)
- UK Energy Support: ECO4 Scheme

## B6: Non-combustion renewables

Non-combustion renewables are often a win-win option for air quality and climate change. There are various technologies in use in the UK.

**Heat pumps** are essentially ‘reverse fridges’: they move heat from one area to another to provide space heating and hot water. A heat collector element can either be immersed in a body of water (water source), buried underground (ground source) or simply be in the open air (air source). Heat pumps use electricity to operate, so are not zero carbon unless renewable electricity is used. They effectively act as an energy multiplier: more heat energy is provided than the electricity used to operate the heat pump. Some heat pumps can also be used to provide cooling.

**Solar technologies** capture energy from the sun. Two types of technology are available. Solar photovoltaic panels produce electricity, whilst solar thermal panels heat water, most commonly for domestic hot water supply.

**Micro wind turbines** are small wind turbines that can either be mounted on a pole or directly onto the roof of a building. Electricity produced by the turbine can be used in the building it is connected to or exported into the national grid. Micro wind turbines need sufficient wind speeds to generate appreciable quantities of electricity. It is important to assess potential sites adequately before installation.

### Air quality impacts

### Climate impacts

#### on hotspots

#### on emissions

#### on emissions

Minor positive

Positive

Positive

Non-combustion technologies have zero emissions of air pollutants at the point of use, and will have a direct positive impact on air quality if they displace fossil fuel heating and hot water supply.

Heat pumps need a small amount of electricity to run, which creates air pollutant emissions from power stations (but these are usually removed from densely populated areas).

Solar photovoltaic panels and micro-wind turbines may have an additional small benefit for air quality, as they displace electricity from the national grid, reducing emissions from power stations.

The climate benefit of non-combustion technologies depends on what they displace, with substantially larger benefits when displacing oil and coal.

The main heat pump technologies vary in their efficiency. Some air source heat pumps have little difference in GHG emissions from an equivalent modern, high-efficiency gas boiler.

Solar thermal panels reduce the need for fossil fuel combustion or electricity drawn from the grid to provide hot water. Electricity produced from photovoltaic panels or micro-wind turbines also displaces electricity from the national grid, reducing CO<sub>2</sub> emissions from power stations.

### Other impacts

<p><b>Equity:</b> Less well-off people will struggle to afford non-combustion renewable technologies such as heat pumps and solar panels. People in rented accommodation are unlikely to be able to get them installed.</p>	<p>Negative</p>
<p><b>Local economy:</b> The initial costs of non-renewable technologies are substantially higher than conventional boilers, but this cost premium has been reducing in recent years as technology has developed. Once operational, running costs should be much lower, leaving people with more money to spend in the local economy.</p>	<p>Positive</p>
<p><b>Noise:</b> Air source heat pumps can be noisy. There are some concerns over the cumulative noise impact of multiple air source heat pumps, which are being widely introduced in new large urban developments.</p>	<p>Negative</p>
<p><b>Natural environment:</b> Water source heat pumps can increase the temperature of natural water bodies.</p>	<p>Minor negative</p>
<p><b>Back-up generators:</b> Some developments use on-site renewable energy but also have back-up generators installed, which can provide power in an emergency. These are often diesel-powered generators, and their short-term impacts from emergency use and testing can be substantial, if poorly sited or high emitting. The cumulative impacts of multiple buildings with back-up generators have the potential to be extreme if operated simultaneously due to a power outage.</p>	<p>Negative</p>

## What can local authorities do?

The planning system is the main means for local authorities to promote these technologies. Small-scale renewables are permitted development and do not require a planning application in most circumstances.<sup>95</sup>

Local authorities can:

- Include requirements for renewable energy in their strategic plans or supplementary planning guidance.
- Use planning conditions and engage with applicants to: consider alternatives to diesel-fuelled backup generators; mitigate backup generator emissions as far as possible, for instance by not over-sizing generators, specifying cleaner ones meeting stringent emission standards and using the minimum number of hours for testing for each generator, and only at times without current or forecast pollution issues.
- Support [community renewable energy schemes](#), for example Oxford City Council supported the development of the [Low Carbon Hub social enterprise](#) that produces solar and hydro power.
- Support the development of efficient district heating schemes. Larger renewable schemes can also be linked to district heating, and this is very common in other countries, especially in Scandinavia.
- Require best practice and stringent emission standards for any new backup generators through planning.

## Other issues

Heat pumps are frequently proposed in new developments. However, the technology and cumulative impacts may be poorly understood.

There is often a lack of information on reputable local installers, especially for heat pumps.

Correct siting of micro wind turbines is essential to ensure that they generate appreciable quantities of electricity, and that noise and vibration problems are minimised. In built-up urban areas the wind can be turbulent and wind speeds low, which can make turbines unsuitable there. Turbine noise in neighbouring properties, and any vibration issues where the turbine is mounted directly onto a building, need to be taken into account.

## Further information

- [Community Energy England](#)
- [The Heat Pump Association](#)
- [Solar Energy UK Trade Association](#)
- [Renewables UK: Micro Wind Turbines](#)
- [Energy Saving Trust: Renewable Energy](#)

## B7: Reducing emissions from wood burning and other solid fuels

Solid-fuel burning in homes increased significantly between 2013 and 2023, and in 2021 was the largest source of PM<sub>2.5</sub> emissions in the UK.<sup>96</sup> Wood is the main solid fuel used, such as in wood burning stoves or open fires.

Evidence shows that wood burning is bad for the climate, due to the high emissions of CO<sub>2</sub>, methane and black carbon compared to other fuels and the time taken for forests to regrow and reabsorb the carbon.<sup>97</sup> This is a change from the historical classification of wood as a low-carbon or carbon-neutral fuel.

The public have relatively little understanding of the air quality impacts of wood burning. Once educated they are likely to be more willing to take or accept action: one study showed that 67% of people in London backed a ban on wood burning stoves once they learned about their air quality impacts.<sup>98</sup>

### Air quality impacts

### Climate impacts

#### on hotspots

#### on emissions

#### on emissions

Positive

Minor positive

Minor positive

Widespread burning of solid fuels in urban areas adds to urban air pollution problems.

Solid fuel burning creates high levels of air pollution where the burning takes place, typically in the home and surrounding area.

Measures to reduce wood burning will have a positive impact on local air quality.

Wood burning causes high emissions of GHGs, which will only be reabsorbed by forests in the long term. Wood burning produces black carbon, a potent climate pollutant.

Measures to reduce wood burning will have a positive impact on climate change.

### Other impacts

**Health:** The air pollution from wood burning has huge health risks for those in or near homes burning wood. According to analysis by the European Public Health Alliance it causes 40% of harm from home heating, but provides only 6% of heat.<sup>99</sup> Another study has found that wood burners cause almost half of cancer risk from air pollution in urban areas.<sup>100</sup> The health-related impacts are estimated to cost the UK almost £1 billion a year.<sup>101</sup>

Positive

<p><b>Vulnerable communities:</b> The majority of those using wood burning stoves do so for aesthetic reasons, though around 8% of households rely on solid fuel burning for heating and cooking, especially those living on houseboats or in rural areas.<sup>102, 103</sup> According to research by Impact on Urban Health and Global Action Plan, switching from wood burning to other methods of heating is also typically cheaper, unless the wood is being sourced for free.<sup>104</sup> Wood sourced for free often has characteristics that make it especially bad for human health, such as being chemically treated. There is some evidence that burning of free or waste wood increased in 2023, potentially linked to the cost of living crisis.<sup>105</sup></p>	<p>Minor negative</p>
<p><b>Natural environment:</b> Large-scale harvesting of trees to burn as fuel damages forests, ecosystems and biodiversity.</p>	<p>Positive</p>

**Support mechanisms**

In England local authorities are also responsible for enforcing the *Domestic Solid Fuels Regulations 2020*, which restricts the sale of the most polluting solid fuels, for example wood with high moisture content. In reality, many local authorities have little capacity or resources to enforce smoke control areas or the domestic solid fuels regulations.<sup>106</sup> The Government could provide local authorities with more powers and resources to enforce limits on domestic wood burning.

As this is an area where local authorities do not have effective powers, local authorities could consider creating enhanced local powers, for instance through byelaws. They could also work with other local authorities to push for enhanced regulatory powers in this area.

Most installations of stoves are registered with building control under the HETAS system and can be viewed by the public on planning portals if uploaded by the local authority.<sup>107</sup>

National public health campaigns to increase understanding of the negative air quality impacts of wood burning would support action taken by local authorities. Expanding Defra’s Burn Better campaign, and providing local authorities with template communication tools and assets, would be a good step towards this.<sup>108</sup>



## What can local authorities do?

Local authorities can:

- Declare and enforce smoke control areas to control domestic solid fuel use. Smoke control areas ban smoke from household chimneys; only authorised fuels may be used, unless using an exempt appliance. They can also ban smoke from heating appliances in vessels. The *Clean Air Act 1993*, as amended by the *Environment Act 2021*, gives local authorities the powers to designate smoke control areas and to issue penalties or abatement notices where needed.
- Address smoke from chimneys under statutory nuisance legislation if it is causing a nuisance.
- Support increased awareness and behaviour change on wood burning. Global Action Plan and Impact on Global Health's [Wood Burning Toolkit](#) offers a useful guide for local authorities and other stakeholders on how to raise awareness, shift public norms and influence behaviour on wood burning. Global Action Plan's [Clean Air Night campaign](#) includes template newsletter and social media materials to raise awareness on the problems with wood burning. The [London Wood Burning Project](#) has developed an ambitious and evidence-informed public awareness campaign.
- Wood burning is not usually covered within planning processes. In London, the Mayor of London has planning guidance that sets air pollution limits for new developments. This restricts the use of wood or other solid fuel heating.<sup>109</sup> Outside London, local authority officers can request or require through the planning process that residential developments not incorporate chimney stacks into the design of new homes.

## Further information

- GAP: [Clean Air Night](#)
- Parliamentary Office of Science and Technology: [Indoor Air Quality Briefing](#)
- NICE: [Indoor Air Quality at Home](#)

## 4.3 Overarching

### 01: Waste

Local authorities have various responsibilities for municipal waste. Commercial and industrial waste falls outside their responsibilities.

Unitary authorities in England and local authorities in Scotland are responsible for collecting and disposing of waste. In two-tier authorities in England, district councils collect waste, which is then managed under a service-level agreement with a disposal authority, usually a county council or metropolitan council.

Emissions from waste management activities can be reduced through more sustainable waste collection, sustainable procurement or management of waste at the collection, recycling, recovery and disposal stages.

Air quality impacts		Climate impacts
on hotspots	on emissions	on emissions
Minor positive	Minor positive	Minor positive
<p>Measures to reduce waste and encourage recycling rates can benefit air quality.</p> <p>The combustion of waste has the potential to produce air pollutants if not carried out correctly. Large industrial waste sites such as energy from waste sites must use best available technologies to reduce pollution. These sites are tightly regulated by the Environment Agency and the other devolved regulators.</p> <p>Dust can be an issue, particularly at transfer stations such as those handling construction and demolition wastes.</p>		<p>Measures to reduce waste production, and encourage recycling and recovery, can reduce GHG emissions: decomposing organic waste produces GHGs; landfill sites produce GHGs, including methane and carbon dioxide; and energy from waste also produces GHGs.<sup>110</sup></p>

### Other impacts

<p><b>Vulnerable communities:</b> Circular economy initiatives, such as repair cafes, libraries of things and redistributing food waste can be used to benefit those on low incomes, as well as reducing waste.</p>	Minor positive
<p><b>Odour pollution:</b> Waste and recycling sites can produce unpleasant odour that impacts local residents if not managed properly.</p>	Minor negative
<p><b>Pests and scavengers:</b> Waste and recycling sites can attract pests and scavengers.</p>	Minor negative

## Support mechanisms

The UK Government has set a recycling target of 65% in England by 2035 and a maximum 10% of waste being sent to landfill. There is a target to reduce the amount of residual waste sent to landfill by 50% by 2042. The separate collection of food waste from households in England will start in 2026.

The Welsh Government has a statutory recycling target of 70% by 2025, which Welsh local authorities must meet or face fines. The Welsh Government has an aim to become a zero-waste nation by 2050.

Many councils have long-term contracts with waste disposal authorities and/or commercial providers.

## How can local authorities support implementation?

Local authorities can:

- Reduce their waste generation, encourage waste re-use in council activities and buildings, and encourage others to do the same.
- Run campaigns to encourage waste reduction and recycling. For example, see Bristol City Council's [Bristol's Binning campaign](#).
- Consider how commercial and trade waste fits into planning and air quality management.
- Locate waste management sites near to the sources of waste production to reduce transport emissions.
- Provide clear and consistent recycling information through leaflets and online information.
- Encourage redistribution of surplus food waste, for example supporting food redistribution charities and community fridges.
- Produce a circular economy strategy, supporting initiatives such as repair shops, swap shops and libraries of things. For example, see [this Friends of the Earth case study](#) for more information.
- Collect recycling more frequently than non-recyclable waste and reduce the size of non-recyclable waste bins to promote recycling.
- Use the planning process to encourage new developments to include convenient recycling.
- Operate specialist recycling services and assisted recycling services.
- Implement weekly food waste collections (all local authorities in England are required to transition towards this with [compliance dates depending on existing contracts](#)). See [WRAP's guidance](#).
- Use sustainable waste collection vehicles.
- Centralise waste collection points.
- Have sustainable procurement practices in place for waste disposal contracts.
- Promote avoiding the use of bonfires, which residents sometimes use to dispose of waste (see [EPIC's Garden Bonfire Guidance](#)).

If the local authority is the waste disposal authority:

- Reduce total waste to landfill.
- Divert biodegradable waste from landfill or incineration to composting.
- Divert biodegradable waste from landfill or incineration to anaerobic digestion at biogas facilities.

Friends of the Earth has a [bank of case studies \(filter the topic to show waste\)](#) showing how local authorities across the UK are cutting waste.

### Further information

- WRAP
- LARAC



## O2: Sustainable procurement

Sustainable procurement means sourcing goods and services in a way that achieves value for money and promotes positive outcomes for an organisation and for the wider economy, environment and society. Local authorities buy a wide range of products and services, so can lead by example in their procurement practices. They also work with and support local businesses, directly and through Business Improvement Districts, chambers of commerce and trade, and other local networks.

### Air quality impacts

### Climate impacts

on hotspots	on emissions	on emissions
Positive	Positive	Positive
<p>Air quality impacts can come from plant and equipment used in works procured and goods delivered to an organisation. Tender specifications can include various requirements to avoid impacts, for instance: low and zero emission vehicles and plant; targets to reduce emissions over the life of the contract; and zero-emission last-mile deliveries.</p>		<p>Climate impacts come directly from emissions in delivery of a good or service. They can also come from the whole supply chain. These can be addressed through tender specifications.</p>

### Other impacts

<p><b>Local economy:</b> Good responsible procurement policy can benefit the local economy by including requirements to procure goods locally where possible.</p>	Positive
<p><b>Community:</b> Good sustainable procurement can deliver other positive impacts, such as social value and ethical sourcing.</p>	Positive

### What can local authorities do?

Local authorities can:

- adopt their own sustainable procurement policies: for example see GLA's [Responsible Procurement Policy](#) and [Responsible Procurement Implementation Plan 2022–2024](#)
- lead by example by valuing air quality and climate impacts in procurement, including for vehicles and plant (for waste collection, street-cleansing, patient and schools transport, housing and parks maintenance, gritters, snowploughs etc.), and for other services and products
- lead by example in demonstrating to local businesses and communities the viability and cost effectiveness of new low and zero emission technologies
- encourage and advise businesses in their areas on how to procure goods and services sustainably.

### Further information

- Centre for Local Economic Strategies (CLES): [Community Wealth Building](#)
- CLES: [Community Wealth Building: A Guide for New Council Members](#)
- LGA: [Sustainable Procurement Toolkit](#)
- Welsh LGA: [Local Authority Sustainable Procurement Toolkit](#)



## Low Carbon Procurement Guidance – City of London Corporation

## Case Study 5

The City of London Corporation has published *Low Carbon Procurement Guidance*, focusing on air quality and climate action, as well as waste and biodiversity. It applies to all contracts that the Corporation awards. It has a menu of options for applicants for tenders to consider.<sup>1</sup> It aims to ensure that small businesses are not placed at a disadvantage against large organisations tendering for the same piece of work. Options for applicants include the following:

- Set ambitious targets for the reduction of NO<sub>x</sub>, PM<sub>10</sub> and PM<sub>2.5</sub> emissions from vehicles over the life of contracts.
- Set an ambitious target for increasing the use of zero-emission vehicles over the life of the contracts.
- Set a target for reducing the number of motorised vehicle trips that form part of the services.
- Develop a logistics approach that avoids deliveries vehicle movements during peak congestion and pedestrian footfall times: 7am–10am, 12–2pm and 4–7pm.
- Develop a plan, with the City, for reducing the air quality impact on days of ‘high’ and ‘very high’ air pollution.
- Retrofit and/or trial a new technology that supports air quality improvement e.g. gear shift indicators, stop-start ignition and software to monitor green driving.
- Deliver green driver training for the majority of contractor staff used on contracts, and offer safer urban driving courses to drivers.

*For more sustainable procurement case studies, please see this [LGA article](#)*

## Chapter 4 references

<sup>1</sup> **Department for Transport (2023)** Transport and environment statistics 2023. <https://www.gov.uk/government/statistics/transport-and-environment-statistics-2023/transport-and-environment-statistics-2023>. (Accessed: 20 July 2024)

<sup>2</sup> **Department for Energy Security and Net Zero (2023)** UK local authority greenhouse gas emissions estimates 2021. <https://assets.publishing.service.gov.uk/media/64a67cc37a4c230013bba230/2005-21-local-authority-ghg-emissions-statistical-release-update-060723.pdf> (Accessed: 10 July 2024)

<sup>3</sup> **Department for Business, Energy & Industrial Strategy (2023)** 2021 UK Greenhouse Gas Emissions, Final Figures. <https://assets.publishing.service.gov.uk/media/63e131dde90e07626846bdf9/greenhouse-gas-emissions-statistical-release-2021.pdf> (Accessed: 10 July 2024)

<sup>4</sup> **Department for Transport (2023)** Transport and environment statistics 2023. <https://www.gov.uk/government/statistics/transport-and-environment-statistics-2023/transport-and-environment-statistics-2023> (Accessed: 10 July 2024)

<sup>5</sup> **Department for Transport (2023)** Transport and environment statistics 2023: CO2 emissions from transport by local authority. <https://www.gov.uk/government/statistics/transport-and-environment-statistics-2023/transport-and-environment-statistics-2023#co2-emissions-from-transport-by-local-authority> (Accessed: 10 July 2024)

<sup>6</sup> **Department for Transport (2023)** Transport and environment statistics 2023: Air pollution Table ENV301 <https://www.gov.uk/government/statistics/transport-and-environment-statistics-2023/transport-and-environment-statistics-2023#air-pollution-table-env301> (Accessed: 10 July 2024)

**transport-and-environment-statistics-2023/transport-and-environment-statistics-2023#air-pollution** (Accessed: 10 July 2024)

<sup>7</sup> **Transport Scotland (2019)** Act 2019. <https://www.legislation.gov.uk/asp/2019/17/notes/division/2> (Accessed: 10 July 2024)

<sup>8</sup> **Transport Scotland (2023)** More bus powers for local authorities. <https://www.transport.gov.scot/news/more-bus-powers-for-local-authorities/> (Accessed: 10 July 2024)

<sup>9</sup> **ONS (2023)** Characteristics of homeworkers, Great Britain: September 2022 to January 2023. <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/articles/characteristicsofhomeworkersgreatbritain/september2022tojanuary2023> (Accessed: 20 July 2024)

<sup>10</sup> **Friends of the Earth (2019)**. Briefing: Segregated cycleways and e-bikes – the future of urban travel. <http://www.transportforqualityoflife.com/u/files/4%20Segregated%20cycleways%20and%20e-bikes%20briefing.pdf> (Accessed 15 December 2023)

<sup>11</sup> **National Institute for Health and Care Excellence (2012)**. Physical activity: walking and cycling. <https://www.nice.org.uk/guidance/ph41/resources/physical-activity-walking-and-cycling-pdf-1996352901061> (Accessed 15 December 2023); <https://www.bmj.com/content/329/7469/763>



<sup>12</sup> **Department for Transport (2020)**. Gear Change: A bold vision for cycling and walking. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/904146/gear-change-a-bold-vision-for-cycling-and-walking.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/904146/gear-change-a-bold-vision-for-cycling-and-walking.pdf) (Accessed: 17 December 2023)

<sup>13</sup> **Cepeda, M. et al. (2017)** 'Levels of ambient air pollution according to mode of transport: A systematic review', *The Lancet Public Health*, 2 (1). doi:10.1016/s2468-2667(16)30021-4

<sup>14</sup> **Cepeda, M. et al. (2017)** 'Levels of ambient air pollution according to mode of transport: A systematic review', *The Lancet Public Health*, 2 (1). doi:10.1016/s2468-2667(16)30021-4

<sup>15</sup> **UK100 (2020)** Waltham Forest's Mini Holland: LTNs and Clean Air. <https://www.uk100.org/blog/2020/10/waltham-forests-mini-holland-why-ltns-are-so-important-clean-air> (Accessed: 17 December 2023).

<sup>16</sup> **TFL (2018)** Walking & Cycling: The Economic Benefits. Available at: <https://content.tfl.gov.uk/walking-cycling-economic-benefits-summary-pack.pdf> (Accessed: 10 January 2024)

<sup>17</sup> **Living Streets (2018)**, The Pedestrian Pound – the business case for better streets and places. <https://www.livingstreets.org.uk/media/3890/pedestrian-pound-2018.pdf> (Accessed: 10 January 2024)

<sup>18</sup> **Cycling UK (No date)** The case for cycling: health. <https://www.cyclinguk.org/briefing/case-cycling-health> (Accessed: 5 June 2024)

<sup>19</sup> **FACTS (2022)** The safety of private e-scooters in the UK. <https://www.pacts.org.uk/the-safety-of-private-e-scooters-in-the-uk-pacts-research/> (Accessed: 5 June 2024)

<sup>20</sup> **NICE (2012)** Physical Activity: walking and cycling. Available at: <https://www.nice.org.uk/guidance/ph41/resources/physical-activity-walking-and-cycling-pdf-1996352901061>. (Accessed 17 December 2023)

<sup>21</sup> **Transport Scotland (2020)** Active Travel Framework.

<https://www.transport.gov.scot/publication/active-travel-framework-1/> (Accessed: 5 June 2024)

<sup>22</sup> **Transport for Wales (No date)** Active travel. <https://tfw.wales/about-us/our-culture/active-travel> (Accessed: 5 June 2024)

<sup>23</sup> **Environment (Air Quality and Soundscapes) (Wales) Act 2024** <https://www.legislation.gov.uk/asc/2024/2/enacted> (Accessed: 5 June 2024)

<sup>24</sup> **Campaign for Better Transport (2023)** Government must step in after annual bus stats reveal a decade of decline. <https://bettertransport.org.uk/media/government-must-step-in-after-annual-bus-stats-reveal-a-decade-of-decline/> (Accessed 17 December 2023)

<sup>25</sup> **Campaign for Better Transport (2022)** New research reveals 1 in 4 bus services have disappeared in a decade. <https://bettertransport.org.uk/media/04-april-2022-1-in-4-bus-services-cut/> (Accessed 17 December 2023)

<sup>26</sup> **Department for Transport (2023)** Increasing bus patronage through an audience strategy. <https://www.gov.uk/government/publications/increasing-bus-patronage-through-an-audience-strategy/increasing-bus-patronage-through-an-audience-strategy> (Accessed 17 December 2023)

<sup>27</sup> **Statista (2023)** Carbon footprint of selected modes of transportation in the United Kingdom in 2023. <https://www.statista.com/statistics/1233337/carbon-footprint-of-travel-per-kilometer-by-mode-of-transport-uk/> (Accessed 17 December 2023)

<sup>28</sup> **Department for Transport (2023)** Increasing bus patronage through an audience strategy <https://www.gov.uk/government/publications/increasing-bus-patronage-through-an-audience-strategy/increasing-bus-patronage-through-an-audience-strategy> (Accessed 17 December 2023)

<sup>29</sup> **Statista (2023)** Carbon footprint of selected modes of transportation in the United Kingdom in 2023. <https://assets.publishing.service.gov.uk/media/6086912fd3bf7f013c8f4510/DfT-Bus-Back->

**Better-national-bus-strategy-for-England.pdf**

(Accessed 17 December)

<sup>30</sup> **Campaign for Better Transport (2022)** Finding better local bus services in England. [https://bettertransport.org.uk/wp-content/uploads/legacy-files/research-files/Funding\\_local\\_bus\\_services\\_in\\_England\\_June\\_2022.pdf](https://bettertransport.org.uk/wp-content/uploads/legacy-files/research-files/Funding_local_bus_services_in_England_June_2022.pdf) (Accessed: 17 December 2023)

<sup>31</sup> **Local Government Association (2023)** End ‘spiral of decline’ of bus services by handing control to councils. <https://www.local.gov.uk/about/news/end-spiral-decline-bus-services-handing-control-councils> (Accessed: 17 December 2023)

<sup>32</sup> **CPT (2022)** New research shows councils can be bold with plans to improve bus services. <https://www.cpt-uk.org/news/new-research-shows-councils-can-be-bold-with-plans-to-improve-bus-services/> (Accessed 17 December 2023)

<sup>33</sup> **IACCESA (no date)** IMO NOx regulation. <https://www.iaccsea.com/faq/nox/imo-nox-regulation/> (Accessed: 17 December 2023)

<sup>34</sup> **DNV (2020)** Using biodiesel in marine diesel engines: new fuels, new challenges. <https://www.dnv.com/news/using-biodiesel-in-marine-diesel-engines-new-fuels-new-challenges-186705> (Accessed 17 December 2023)

<sup>35</sup> **Canal & River Trust (no date)** Islington Eco-Mooring Zone trial. <https://canalrivertrust.org.uk/about-us/where-we-work/london-and-south-east/islington-eco-mooring-zone-trial> (Accessed: 17 December 2023)

<sup>36</sup> **Department for Environment Food & Rural Affairs (2022)** Smoke control area enforcement by local authorities in England. <https://www.gov.uk/government/publications/smoke-control-area-enforcement-local-authorities-in-england/> (Accessed 17 December 2023)

<sup>37</sup> **Cross River Partnership (2022)** Light Freight: Design Solutions for Thames Freight Infrastructure. <https://crossriverpartnership.org/wp-content/uploads/2022/03/Light-Freight-Design-Solutions-for-Thames-Infrastructure.pdf> (Accessed 17 December 2023)

<sup>38</sup> **CoMoUK (no date)** Shared cars: Overview and benefits. <https://www.como.org.uk/shared-cars/overview-and-benefits> (Accessed 17 December 2023)

<sup>39</sup> Such as Zipcar Flex in London.

<sup>40</sup> **MobilityWays (no date)** Liftshare for Work. <https://www.mobilityways.com/liftshare-for-work/> (Accessed 17 December 2023)

<sup>41</sup> **Local Government Association (2022)** New mobility options: car clubs. <https://www.local.gov.uk/publications/new-mobility-options-car-clubs> (Accessed 17 December 2023)

<sup>42</sup> **CoMoUK (2022)** Car Club Annual Report UK 2022. <https://www.como.org.uk/documents/car-club-annual-report-uk-2022> (Accessed 17 December 2023)

<sup>43</sup> **CoMoUK (2022)** Car Club Annual Report UK 2022. <https://www.como.org.uk/documents/car-club-annual-report-uk-2022> (Accessed 17 December 2023)

<sup>44</sup> **CoMoUK (2022)** Car Club Annual Report UK 2022. <https://www.como.org.uk/documents/car-club-annual-report-uk-2022> (Accessed 17 December 2023)

<sup>45</sup> **CoMoUK (2022)** Car Club Annual Report UK 2022. <https://www.como.org.uk/documents/car-club-annual-report-uk-2022> (Accessed 17 December 2023)

<sup>46</sup> **Department for Transport (2021)** Transport Decarbonisation Plan. <https://www.gov.uk/government/publications/transport-decarbonisation-plan> (Accessed 18 December 2023)

<sup>47</sup> **Local Government Association (2022)** New mobility options: car clubs. <https://www.local.gov.uk/publications/new-mobility-options-car-clubs> (Accessed 17 December 2023)

<sup>48</sup> **Designing Buildings (2022)** Integrated Transport System. [https://www.designingbuildings.co.uk/wiki/Integrated\\_transport\\_system](https://www.designingbuildings.co.uk/wiki/Integrated_transport_system) (Accessed 17 December 2023)

<sup>49</sup> **Sustrans (2017)** Active Travel Toolkit – The role of active travel in improving health. <https://www.sustrans.org.uk/our-blog/research/all-themes/all/active-travel-toolkit-the-role-of-active-travel-in-improving-health> (Accessed 17 December 2023)

<sup>50</sup> **Cepeda, M. et al. (2017)** ‘Levels of ambient air pollution according to mode of transport: A systematic review’, *The Lancet Public Health*, 2 (1). doi:10.1016/S2468-2667(16)30021-4

<sup>51</sup> **Statista (2023)** Average annual number of fatalities on modes of road transport in Great Britain between 2013 and 2021. <https://www.statista.com/statistics/300601/average-number-of-fatalities-according-to-transport-in-the-united-kingdom/> (Accessed 17 December 2023)

<sup>52</sup> See, for instance, **City of Santa Monica (No date)** Zero Emission Delivery Zone. <https://www.santamonica.gov/zero-emission-delivery-zone> (Accessed: 17 December 2023)

<sup>53</sup> **Department for Environment, Food & Rural Affairs (2020)** Clean air zones. <https://www.gov.uk/guidance/driving-in-a-clean-air-zone> (Accessed 17 December 2023)

<sup>54</sup> **Mayor of London (2019)** CENTRAL LONDON ULTRA LOW EMISSION ZONE – SIX MONTH REPORT. [https://www.london.gov.uk/sites/default/files/u1ez\\_six\\_month\\_evaluation\\_report\\_final\\_oct.pdf](https://www.london.gov.uk/sites/default/files/u1ez_six_month_evaluation_report_final_oct.pdf) (Accessed: 19 December 2023)

<sup>55</sup> **Mayor of London (2023)** INNER LONDON ULTRA LOW EMISSION ZONE – ONE YEAR REPORT. <https://www.london.gov.uk/sites/default/files/2023-02/Inner%20London%20ULEZ%20One%20Year%20Report%20-%20final.pdf> (Accessed 19 December 2023)

<sup>56</sup> **Mayor of London (2019)** CENTRAL LONDON ULTRA LOW EMISSION ZONE – SIX MONTH REPORT. [https://www.london.gov.uk/sites/default/files/u1ez\\_six\\_month\\_evaluation\\_report\\_final\\_oct.pdf](https://www.london.gov.uk/sites/default/files/u1ez_six_month_evaluation_report_final_oct.pdf)

[www.london.gov.uk/sites/default/files/u1ez\\_six\\_month\\_evaluation\\_report\\_final\\_oct.pdf](https://www.london.gov.uk/sites/default/files/u1ez_six_month_evaluation_report_final_oct.pdf) (Accessed: 19 December 2023)

<sup>57</sup> **Mayor of London (2023)** INNER LONDON ULTRA LOW EMISSION ZONE – ONE YEAR REPORT. <https://www.london.gov.uk/sites/default/files/2023-02/Inner%20London%20ULEZ%20One%20Year%20Report%20-%20final.pdf> (Accessed: 19 December 2023)

<sup>58</sup> **Bradford Council (2021)** Breathe better Bradford: Exemption information. <https://www.bradford.gov.uk/breathe-better-bradford/what-help-is-available/exemptions/> (Accessed 17 December 2023)

<sup>59</sup> **Morton, C., Mattioli, G., Anable, J. (2021)** ‘Public acceptability towards Low Emission Zones: The role of attitudes, norms, emotions, and trust’, *Transportation Research Part A: Policy and Practice*, Vol. 150 <https://www.sciencedirect.com/science/article/abs/pii/S0965856421001555> (Accessed 17 December 2023)

<sup>60</sup> **UK Government (2024)** Clean air zones. <https://www.gov.uk/guidance/driving-in-a-clean-air-zone#check-and-pay-a-charge> (Accessed 17 December 2023)

<sup>61</sup> **Albalade, D. and Gangera, A. (2019)** The impact of curbside parking regulations on car ownership. Research Institute of Applied Economics. Working Paper 2019/09 1/34 [www.ub.edu/irea/working\\_papers/2019/201909.pdf](http://www.ub.edu/irea/working_papers/2019/201909.pdf) (Accessed 27th July 2020)

<sup>62</sup> **Bates, J. and Leibling, D. (2012)** Spaced Out: Perspectives on parking policy. London RAC Foundation. [https://www.racfoundation.org/assets/rac\\_foundation/content/downloadables/spaced\\_out-bates\\_leibling-jul12.pdf](https://www.racfoundation.org/assets/rac_foundation/content/downloadables/spaced_out-bates_leibling-jul12.pdf) (Accessed 27th July 2020)

<sup>63</sup> **Living Streets (2014)** The Pedestrian Pound. <https://www.livingstreets.org.uk/media/2t0hyzcm/pedestrian-pound-2018.pdf> (Accessed 18 December 2023)

<sup>64</sup> **Raje, F and Saffrey (2016)** The value of cycling. University of Birmingham and Phil Jones Associates for Department for Transport. <https://assets.publishing.service.gov.uk/media/5a74ad3aed915d7ab83b5a59/value-of-cycling.pdf> (Accessed 27th July 2020)

<sup>65</sup> **Marsden, G. (2006)** The evidence base for parking policies—a review. *Transport Policy* 13, 447-457 <https://www.sciencedirect.com/science/article/abs/pii/S0967070X06000412> (Accessed 17 December 2023)

<sup>66</sup> **Thomas, A. and Aldred, R. (2024)** ‘Changes in motor traffic in London’s Low Traffic Neighbourhoods and boundary roads’, *Case Studies on Transport Policy* 15 <https://www.sciencedirect.com/science/article/pii/S2213624X23001785> (Accessed 17 December 2023)

<sup>67</sup> **Goodman, A., Urban, S. and Aldred, R. (2020)** The Impact of Low Traffic Neighbourhoods and Other Active Travel Interventions on Vehicle Ownership: Findings from the Outer London Mini-Holland Programme. <https://westminsterresearch.westminster.ac.uk/download/7c7efd25e05663c00d9a6ccb494858fb242a9207044ef16741afdb72003f65a0/759713/18200-the-impact-of-low-traffic-neighbourhoods-and-other-active-travel-interventions-on-vehicle-ownership-findings-from-the-outer-london-mini-holland-programme.pdf> (Accessed 17 December 2023)

<sup>68</sup> **Goodman, A., Urban, S. and Aldred, R. (2020)** The Impact of Low Traffic Neighbourhoods and Other Active Travel Interventions on Vehicle Ownership: Findings from the Outer London Mini-Holland Programme. <https://westminsterresearch.westminster.ac.uk/download/7c7efd25e05663c00d9a6ccb494858fb242a9207044ef16741afdb72003f65a0/759713/18200-the-impact-of-low-traffic-neighbourhoods-and-other-active-travel-interventions-on-vehicle-ownership-findings-from-the-outer-london-mini-holland-programme.pdf> (Accessed 17 December 2023)

<sup>69</sup> **Mayor of London (2021)** New studies show School Streets improve air quality. <https://www.london.gov.uk/press-releases/mayoral/school-streets-improve-air-quality> (Accessed 17 December 2023)

<sup>70</sup> **Aldred, R., Goodman, A., Woodcock, J. (2024)** Impacts of active travel interventions on travel behaviour and health: Results from a five-year longitudinal travel survey in Outer London. *Journal of Transport and Health* 25 <https://westminsterresearch.westminster.ac.uk/download/6d3bead1b8e4583ca408239d43942f948bca8939eee900f927cbc8a2e455054a/5852161/1-s2.0-S2214140524000173-main.pdf> (Accessed 18 December)

<sup>71</sup> **Air Quality Consultants (2021)** Air Quality Monitoring Study: London School Streets. [https://www.london.gov.uk/sites/default/files/school\\_streets\\_monitoring\\_study\\_march21.pdf](https://www.london.gov.uk/sites/default/files/school_streets_monitoring_study_march21.pdf) (Accessed 17 December 2023)

<sup>72</sup> **UK100 (2020)** Waltham Forest’s Mini Holland: LTNs and Clean Air. Available at: <https://www.uk100.org/blog/2020/10/waltham-forests-mini-holland-why-ltns-are-so-important-clean-air> (Accessed: 17 December 2023).

<sup>73</sup> **Ipsos (2024)** Low traffic neighbourhoods. <https://assets.publishing.service.gov.uk/media/65f400adfa18510011011787/low-traffic-neighbourhoods-research-report.pdf> (Accessed 17 December 2023)

<sup>74</sup> **Department for Environment, Food & Rural Affairs (No date)** Local Air Quality Management Helpdesk. <https://laqm.defra.gov.uk/helpdesk/> (Accessed 17 December 2023)

<sup>75</sup> **Abrams, D. et al. (2021)** ‘Cleaning up our acts: Psychological interventions to reduce engine idling and improve air quality’, *Journal of Environmental Psychology* 74, p. 101587. doi:10.1016/j.jenvp.2021.101587

<sup>76</sup> **The Behavioural Insights Team (2022)** Using behavioural insights to improve air quality in the London Borough of Merton. <https://www.local.gov.uk/sites/default/files/documents/Final%20BIT%20report%20-%20Merton%20anti-idling.pdf> (Accessed 17 December 2023)

<sup>77</sup> **ETIP (no date)** Biohydrogen. <https://www.etipbioenergy.eu/value-chains/products-end-use/products/biohydrogen> (Accessed 18 December 2023)

<sup>78</sup> **Elshout PMF, van Zelm R, van der Velde M, Steinmann Z, Huijbregts MAJ (2019)** ‘Global relative species loss due to first-generation biofuel production for the transport sector’, *Glob Change Biol Bioenergy* 11 (6), 763–772. doi: 10.1111/gcbb.12597 Epub 2019 Mar 6. PMID: 31423154; PMCID: PMC6686982

<sup>79</sup> **Europa.eu (2015)** The impact of biofuels on transport and the environment, and their connection with the agricultural development in europe. [https://www.europarl.europa.eu/RegData/etudes/STUD/2015/513991/IPOL\\_STU%282015%29513991\\_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/STUD/2015/513991/IPOL_STU%282015%29513991_EN.pdf) (Accessed 18 December 2023)

<sup>80</sup> **Department for Transport (2022)** Future of Freight: a long-term plan. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1085917/future-of-freight-plan.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1085917/future-of-freight-plan.pdf) (Accessed 17 December 2023)

<sup>81</sup> **Charged (2022)** Online home deliveries will add £20bn to UK market by 2025. <https://www.chargedretail.co.uk/2022/02/10/online-home-delivery-20-billion-uk-market-2025/> (Accessed 17 December 2023)

<sup>82</sup> **Department for Transport and R. Holden (2023)** £7 million tech fund to decarbonise freight and boost innovation. <https://www.gov.uk/government/news/7-million-tech-fund-to-decarbonise-freight-and-boost-innovation> (Accessed 17 December 2023)

<sup>83</sup> **UK Green Building Council (2021)** Net Zero Whole Life Carbon Roadmap Technical Report. <https://ukgbc.org/wp-content/uploads/2021/11/UKGBC-Whole-Life-Carbon-Roadmap-A-Pathway-to-Net-Zero.pdf> (p. 15)

<sup>84</sup> **Centre for Low Emission Construction (2022)** Air quality and emissions in construction. [https://urbanhealth.org.uk/wp-content/uploads/2022/09/IOUH-CLEC-Report\\_v08\\_FINAL.pdf](https://urbanhealth.org.uk/wp-content/uploads/2022/09/IOUH-CLEC-Report_v08_FINAL.pdf) (Accessed 19 December 2023)

<sup>85</sup> **Defra (2024)** Emissions of air pollutants in the UK – Particulate matter (PM10 and PM2.5) <https://www.gov.uk/government/statistics/emissions-of-air-pollutants/emissions-of-air-pollutants-in-the-uk-particulate-matter-pm10-and-pm25> (Accessed 17 December 2023)

<sup>86</sup> **Moorcroft and Barrowcliffe. et al. (2017)** Land-Use Planning & Development Control: Planning for Air Quality. <https://www.iaqm.co.uk/text/guidance/air-quality-planning-guidance.pdf> (Accessed 17 December 2023)

<sup>87</sup> **Department for Levelling Up, Housing & Communities (2021)** National Planning Policy Framework [A new version was being consulted on at the time of writing this report]. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/1182995/NPPF\\_Sept\\_23.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1182995/NPPF_Sept_23.pdf) (Accessed 17 December 2023)

<sup>88</sup> **Greater London Authority (2021)** The London Plan. [https://www.london.gov.uk/sites/default/files/the\\_london\\_plan\\_2021.pdf](https://www.london.gov.uk/sites/default/files/the_london_plan_2021.pdf) (Accessed 17 December 2023)

<sup>89</sup> **Greater London Authority (2023)** London Plan Guidance. <https://www.london.gov.uk/sites/default/files/2023-02/Air%20Quality%20Neutral%20LPG.pdf> (Accessed 17 December 2023)

<sup>90</sup> **Greater London Authority (2023)** London Plan Guidance. <https://www.london.gov.uk/sites/default/files/2023-02/Air%20Quality%20Neutral%20LPG.pdf> (Accessed 17 December 2023)

<sup>91</sup> **Pragmatix advisory (2021)** The Future of High Streets and Town Centres: Trends Analysis. <https://www.local.gov.uk/sites/default/files/documents/The%20future%20of%20high%20streets%20and%20town%20centres%20-%20trends%20analysis.pdf> (Accessed 17 December 2023)

<sup>92</sup> **Local Government Association (2022)** Guide: Financing Green Ambitions. <https://www.local.gov>

[uk/publications/financing-green-ambitions](#) (Accessed 18 December 2023)

<sup>93</sup> **Local Partnerships (2023)** The Housing Retrofit Handbook. <https://localpartnerships.gov.uk/resources/domestic-retrofit-handbook/> (Accessed 17 December 2023)

<sup>94</sup> UK Energy Support What is the ECO4 scheme? <https://ukenergysupport.co.uk/eco4-scheme/> (Accessed 17 December 2023)

<sup>95</sup> **UK Government (2015)** The Town and Country Planning (General Permitted Development) (England) Order 2015. <https://www.legislation.gov.uk/ukxi/2015/596/schedule/2/part/14/made> (Accessed 18 December 2023)

<sup>96</sup> **Department for Environment Food & Rural Affairs (2023)** Emissions of air pollutants in the UK – Particulate matter. <https://www.gov.uk/government/statistics/emissions-of-air-pollutants/emissions-of-air-pollutants-in-the-uk-particulate-matter-pm10-and-pm25> (Accessed 17 December 2023)

<sup>97</sup> **Fuller, G. (2022)** ‘Pollutionwatch: wood fires are bad for planet, more evidence shows’, *The Guardian*, 25 February. <https://www.theguardian.com/environment/2022/feb/25/pollutionwatch-wood-fires-bad-for-planet-more-evidence-shows> (Accessed 17 December 2023)

<sup>98</sup> **Carrington, D. (2023)** ‘Significant majority of Londoners support ban on wood burner, poll shows’, *The Guardian*, 20 February. <https://www.theguardian.com/environment/2023/feb/20/wood-burners-urban-air-pollution-londoners-support-ban> (Accessed 17 December 2023)

<sup>99</sup> **Carrington, D. (2022)** ‘Home wood burning in UK causes almost £1bn health costs a year, report says’, *The Guardian*, 20 March. <https://www.theguardian.com/environment/2022/mar/30/home-wood-burning-in-uk-causes-1bn-of-health-costs-a-year-report-says> (Accessed 17 December 2023)

<sup>100</sup> **Carrington, D. (2021)** ‘Wood burners case nearly half of urban air pollution cancer risk – study’, *The Guardian*, 17 December. <https://www.theguardian.com/environment/2021/dec/17/wood-burners-urban-air-pollution-cancer-risk-study> (Accessed 17 December 2023)

<sup>101</sup> **Carrington, D. (2022)** ‘Home wood burning in UK causes almost £1bn health costs a year, report says’, *The Guardian*, 20 March. <https://www.theguardian.com/environment/2022/mar/30/home-wood-burning-in-uk-causes-1bn-of-health-costs-a-year-report-says> (Accessed 17 December 2023)

<sup>102</sup> **KANTAR (2020)** Burning in UK Homes and Gardens. [https://www.burnright.co.uk/wp-content/uploads/2022/02/14972\\_Finalreport-BurninginUKhomesandgardens-1.pdf](https://www.burnright.co.uk/wp-content/uploads/2022/02/14972_Finalreport-BurninginUKhomesandgardens-1.pdf) (Accessed 17 December 2023)

<sup>103</sup> **Impact on Urban Health (2023)** Wood burning is more expensive than central heating. <https://urbanhealth.org.uk/insights/reports/wood-burning-is-more-expensive-than-central-heating> (Accessed 17 December 2023)

<sup>104</sup> **Impact on Urban Health (2023)** Wood burning is more expensive than central heating. <https://urbanhealth.org.uk/insights/reports/wood-burning-is-more-expensive-than-central-heating> (Accessed 17 December 2023)

<sup>105</sup> **Fuller, G. (2023)** ‘Arsenic found in London air raises fears over use of waste wood as fuel’, *The Guardian*, 9 February. <https://www.theguardian.com/environment/2023/feb/09/arsenic-london-air-burning-waste-wood> (Accessed 17 December 2023)

<sup>106</sup> **Harvey, F. and Horton, H. (2023)** ‘Councils say they lack funds to enforce structure limits on wood burners’, *The Guardian*, 3 February. <https://www.theguardian.com/environment/2023/feb/03/councils-say-they-lack-funds-to-enforce-stricter-limits-on-wood-burners> (Accessed 17 December 2023)

<sup>107</sup> **HETAS (2024)** Home page. <https://www.hetas.co.uk/> (Accessed 17 December 2023)



Part of the IES family

<sup>108</sup> **UK AIR (No date)** Burn Better, Breathe Better. <https://uk-air.defra.gov.uk/library/burnbetter/> (Accessed 17 December 2023)

---

<sup>109</sup> **Greater London Authority (2023)** Air Quality Neutral (AQN) guidance. <https://www.london.gov.uk/programmes-strategies/planning/implementing-london-plan/london-plan-guidance/air-quality-neutral-aqn-guidance> (Accessed 17 December 2023)

---

<sup>110</sup> **Eunomia (2020)** Gas and Air Quality Impacts of Incineration and Landfill - ClientEarth <https://www.clientearth.org/media/1h2nalrh/greenhouse-gas-and-air-quality-impacts-of-incineration-and-landfill.pdf> (Accessed 17 December 2023)

---



Part of the IES family

# Appendix A

## Air Quality Background Information

### Key Pollutants

**Nitrogen dioxide** (NO<sub>2</sub>). This pollutant gas is released through combustion processes, for example vehicle engines and domestic boilers. It is a respiratory irritant, and also helps to form ground level ozone.

**Nitric oxide** (NO). NO is a precursor to NO<sub>2</sub>. NO<sub>2</sub> and NO together are often referred to as oxides of nitrogen, or NO<sub>x</sub>.

**Particulate matter** (PM). PM is released through certain combustion processes, for example diesel engines and domestic solid fuel burning, as well as through processes such as tyre and brake wear on road vehicles, quarrying and mining. Ammonia, sulphates and nitrates are also sources of secondary PM (PM formed in chemical reactions in the air). PM<sub>10</sub> and PM<sub>2.5</sub> are the most common metrics for PM (the subscript refers to the maximum mean aerodynamic diameter, in microns), with PM<sub>2.5</sub> small enough to pass through the lungs into the bloodstream and into other organs. Long-term exposure to PM is associated with premature death, especially from heart and lung conditions. Studies have also suggested that high levels of PM<sub>2.5</sub> in childhood can permanently impair lung function.

**Ozone.** Ground-level ozone is not emitted directly. It is formed through the reaction of

other pollutant gases such as NO<sub>2</sub> and volatile organic compounds in strong sunlight. Unlike stratospheric ozone, which blocks ultraviolet radiation, ground-level ozone is damaging, causing inflammation and narrowing of the airways after only relatively short exposure.

The term 'smog' is often used to describe pollution episodes. This is a combination of the words 'smoke' and 'fog', although modern smogs are normally of the photochemical variety.

For current information on key pollutant trends in the UK, see the [National Atmospheric Emissions Inventory](#).

### Health and Ecosystem Impacts

#### **Air Pollution Causes Premature Death and Serious Illness**

Human exposure to air pollution is associated with premature death and serious illness from cardiovascular (heart), respiratory (lung) disease and other conditions. In addition, existing health conditions, such as asthma, can be exacerbated and in some cases caused by air pollution. Of the common air pollutants, PM is thought to be the most harmful to health, and efforts to quantify the health impacts of air pollution have therefore centred on this pollutant. The most



common ways of expressing the health impacts of air pollution are through numbers of premature deaths in a particular area, average months of life lost across a population (e.g. UK or a city region) and the estimated economic cost of poor health caused by air pollution.<sup>1</sup>

In 2020 for the first time a coroner recorded air pollution as contributing to a specific death. Nine-year-old Ella Kissi-Debrah lived near a very polluted road in London. Asthma attacks associated with high pollution episodes were linked to her death.

The health and social care costs of air pollution in England could reach £5.3 billion by 2035 unless action is taken.<sup>2</sup> When diseases with weaker evidence of association are also added, including chronic obstructive pulmonary disease, diabetes, low birth weight, lung cancer

and dementia, the costs were £157 million in 2017 and could reach £18.6 billion by 2035. There could be around 2.5 million new cases of all of the above diseases by 2035 if current air pollution levels persist.

Public Health Wales has estimated the burden of long-term exposure to be the equivalent of 1,000 to 1,400 deaths each year.<sup>3</sup> A 2016 study<sup>4</sup> also found that air pollution was higher in Wales' most deprived areas.

A relatively small reduction in the population's exposure to PM<sub>2.5</sub> and NO<sub>2</sub> could lead to a significant reduction in costs. Modelling was carried out across England and for two sample local authorities (see Table A below).<sup>1</sup> The modelling found substantial potential reductions in new cases of diseases and costs to the NHS and social care.

**Table A – Cumulative new cases of all diseases and NHS and social care costs avoided in England**

	1µg/m <sup>3</sup> reduction PM <sub>2.5</sub>	1µg/m <sup>3</sup> reduction PM <sub>2.5</sub>	1µg/m <sup>3</sup> reduction NO <sub>2</sub>	1µg/m <sup>3</sup> reduction NO <sub>2</sub>
<b>Years</b>	New cases avoided (per 100,000 people)	Costs avoided (per 100,000 people)	New cases avoided (per 100,000 people)	Costs avoided (per 100,000 people)
<b>2015–2035</b>	314	£2.42m	59	£0.06m

### Air Pollution Damages Sensitive Ecosystems

Air pollution has direct impacts on the environment and is a factor in the poor conservation status of many of our protected sites. Over time, air pollutants have had negative impacts on plant and animal communities in many habitats and on agriculture. Reducing air pollution will reduce the pressure on natural habitats and animals and allow affected areas to start recovering.

Many atmospheric pollutants, such as ammonia and ozone, can cause damage to plants.

Ammonia harms sensitive plant and lichen species through leaf discolouration, bleaching and algal overgrowth. Plants weakened by ammonia or ozone are also more susceptible to attack by pests and diseases. Ozone enters the leaves of plants and causes reduced growth, and, at high levels, visible injuries.

Persistent organic pollutants accumulate in the fatty tissues of animals and are concentrated as they pass up the food chain. Predatory animals and humans are most susceptible to their toxic effects.

Nitrogen deposition is one of the main threats to worldwide biodiversity, alongside climate change and habitat destruction. Manure management on livestock farms and applied to soils, and nitrogen-based fertiliser application produce high emissions of ammonia. In some urban and industrial areas, NO<sub>x</sub> emissions from road transport and other combustion sources are high. These air pollutants are transported, react in the atmosphere and are then introduced into habitats through deposition.

Increased levels of nutrients in watercourses encourage plant growth, leading to problems such as algal blooms which reduce light and oxygen levels. This process, known as eutrophication, affects ecosystems, killing fish and altering plant communities.

Increased nitrogen deposition to land can alter the composition and diversity of plant communities, for example by favouring certain plants such as grasses, which then outcompete nitrogen-sensitive species. In turn this affects the diversity of wildlife. This can be a serious threat to protected habitats and conservation areas. Nitrogen deposition also damages the growth of lichens, which are very sensitive to air pollution. They are recognised worldwide as useful indicators of air quality.

Nitrogen and sulphur compounds can also react with water in the air or soil to have an acidifying effect on the soils. Acidification of soils alters nutrient cycles and damages plant growth. Of England's nitrogen-sensitive habitats, 95% are adversely affected by nitrogen deposition.

## Regulation

UK air quality regulations define objectives for pollutants in ambient air. These are set out in the *Air quality (England) Regulations 2000* (as amended), the *Air quality (Scotland) Regulations 2000* (as amended) and the *Air quality (Wales) Regulations 2000* (as amended).

The *Air Quality Standards Regulations 2010* (as amended) set limit values for various pollutants,

as well as target values for other pollutants. In England, the Secretary of State has a duty to ensure that limit values are not exceeded (similar duties for the Scottish Ministers, Welsh Ministers and the Department of the Environment in Northern Ireland are set in the *Air Quality Standards (Scotland) Regulations 2010* (as amended), the *Air Quality Standards (Wales) Regulations 2010* (as amended) and the *Air Quality Standards Regulations (Northern Ireland) 2010* (as amended) respectively. Local authorities play a part in helping the relevant authorities achieve the limit values.

The Air Quality Standards Regulations also outline a national exposure reduction approach for PM<sub>2.5</sub>.

The Environment Act 2021 established a duty of government to bring forward new air quality targets for PM<sub>2.5</sub>. The *Environmental Targets (Fine Particulate Matter) (England) Regulations 2023* set annual mean and exposure-reduction targets for 2040, which are supplemented by an interim annual mean target in Defra's *25 Year Environment Plan Annual Progress Report*.<sup>5</sup> Scotland already had a more stringent PM<sub>2.5</sub> target than England.<sup>6</sup>

The *Environment Act 1995* (as amended) established a framework for local air quality management (in Northern Ireland the *Environment (Northern Ireland) Order 2002* established local air quality management there). Under this framework, local authorities need to periodically review air quality in their areas and assess whether air quality objectives are being achieved. A local authority must designate air quality management areas where any objectives are not being achieved.

Having designated an air quality management area, a local authority must then produce an air quality action plan to improve air quality there. Authorities have to work 'in pursuit of the achievement' of air quality objectives—in other words, they need to work towards achieving the objectives, but do not have a statutory duty to meet them.



Part of the IES family

Under the *Environmental Protection Act 1990*, smoke and gases can constitute 'statutory nuisance'. Local authorities need to inspect their areas to detect statutory nuisance, as well as investigating complaints about statutory nuisance. In England and Wales, local authorities are also involved in environmental permitting for smaller industrial operations under the Local Authority Pollution Prevention and Control regime. These duties include setting and enforcing permit conditions on emissions of pollutants to the air.

Local authority duties under the *Clean Air Act 1993* (as amended) include ensuring that smoke emissions from domestic and industrial premises are well controlled.

Local authorities (Environmental Health and Trading Standards officers) in England enforce the *Air Quality (Domestic Solid Fuel Standards) (England) Regulations 2020*. These regulations cover supply of wood, manufactured solid fuels and coal. Bituminous coal may not be supplied in most circumstances, and the supply of non-authorized solid fuels is prohibited.

### Useful Resources

The *Chief Medical Officer's Annual Report 2022: Air Pollution*<sup>8</sup> looked at air pollution, health impacts and challenges and opportunities. This included recommendations for organisations, including the NHS and government, and a range of sectors, such as transport, urban planning, industry and agriculture.

The [Air Quality Hub](#) is a free advice and information sharing resource for local authorities including advice on low emission planning approaches. It was developed by the Low Emission Strategies Partnership.

IPPR has produced a [briefing for local authority teams](#) setting out local authority powers and responsibilities on air pollution.

# Appendix B

## Climate Change Background Information

### Introduction

Climate change is driven by emissions of greenhouse gases. Greenhouse gases are produced naturally. They allow radiation from the sun through, but then trap re-radiated heat in the atmosphere. Human activity produces extra greenhouse gas emissions. These extra emissions warm the atmosphere and cause climate change.

The greenhouse gases of most concern are CO<sub>2</sub> and methane. Many others contribute to climate change including ozone, black carbon particulate matter and nitrous oxide, N<sub>2</sub>O. CO<sub>2</sub> is the dominant greenhouse gas from human activity. Greenhouse gas emissions are often expressed as carbon dioxide equivalent (CO<sub>2</sub>e) in order to give a single metric for all emissions.

About two thirds of the warming caused by anthropogenic greenhouse gases is due to CO<sub>2</sub>, mainly originating from the use of fossil fuels and some industrial processes. About one-quarter of the warming results from activities related to the land—agriculture, pastoralism, forestry and significantly changing natural land to human-dominated ones.

Short-lived climate forcers can warm the atmosphere more than CO<sub>2</sub>, but stay in the atmosphere for a short time only. Black carbon particulate matter has a lifetime of days to weeks in the atmosphere, but warms the atmosphere 460-1,500 times as strongly as CO<sub>2</sub>.<sup>9</sup>

Tropospheric ozone has a lifetime ranging from a few hours to a few weeks, with a radiative forcing effect around 1,000 times as much as CO<sub>2</sub>.

For information on current greenhouse gas trends, see the [UK Government's webpage](#).

### International Frameworks

The *United Nations Framework Convention on Climate Change* (UNFCCC) entered into force in 1994. It is an international treaty aimed at combatting human-caused climate change. The term UNFCCC refers both to the framework convention and to the United Nations secretariat charged with implementing the convention.

By 2020, the treaty had been ratified by 197 countries. The text of the convention was produced at the *Earth Summit* in Rio de Janeiro in 1992. Parties to the convention meet annually at Conferences of the Parties (COP) to assess progress.

The *Kyoto Protocol* extended the framework convention and committed parties to reduce greenhouse gas emissions. It had two commitment periods, ending in 2012 and 2020, respectively.

The *Paris Agreement* is a separate agreement under the UNFCCC. Negotiated at COP-21 in Paris, it is a legally binding international treaty. Its goal is to limit global warming to well below 2°C degrees Celsius compared to pre-industrial levels and to pursue efforts to limit any temperature increase to 1.5°C. It covers climate change mitigation, adaptation and finance.

In 2021 the United Kingdom hosted COP-26 in Glasgow. Nations collectively agreed to work to reduce the gap between existing emissions reduction plans and what is required to limit the rise in global average temperature to 1.5°C. It included commitments to ‘phase down’ the use of unabated coal and to provide climate finance for developing countries. COP-27 and COP-28 built on the commitments to support developing countries and food security.

The *Intergovernmental Panel on Climate Change* (IPCC) is the United Nations body assessing the science relating to climate change. IPCC reports play a major role informing work under the UNFCCC. Headline statements from its Sixth Assessment Report include the following:

- It is unequivocal that human influence has warmed the atmosphere, ocean and land.
- The scale of recent change changes is unprecedented over many centuries to many thousands of years.
- Human-induced climate change is already affecting many weather and climate extremes in every region across the globe.
- Global warming of 1.5°C and 2°C will be exceeded during the 21st century unless deep reductions in CO<sub>2</sub> and other greenhouse gas emissions occur in the coming decades.

**Table B – UK Carbon Budgets**

Budget	Years covered	Five-year budget limit (Mt CO <sub>2</sub> e)
CB1	2008–2012	3,018
CB2	2013–2017	2,782
CB3	2018–2022	2,544
CB4	2023–2027	1,950
CB5	2028–2032	1,752
CB6	2033–2037	965

## UK Legal Framework

The *Climate Change Act 2008* forms the legal basis for the UK's approach to tackling and responding to climate change. It sets targets for reducing greenhouse gas emissions, provides a system of carbon budgeting and established the Climate Change Committee, as well as other provisions including emissions trading schemes and adaptation.

The Act was amended in 2019 in response to the *Paris Agreement*. It now has a target for the UK carbon account to be net zero by 2050. Scotland, Wales and Northern Ireland also have specific carbon reduction targets set by separate legislation.

- Scotland has set a net zero emissions target date of 2045. There is also an interim target of a 75 per cent reduction in emissions by 2030, relative to 1990 levels.
- In 2021 the Senedd Cymru approved a net zero target for 2050, along with interim targets for 2030 and 2040.
- At the time of writing this document, the Northern Ireland Executive is considering what targets to set.

At the time of writing this report, the UK has set six carbon budgets, as recommended by the Climate Change Committee, with a seventh due to be set in 2025. The carbon budgets are caps on the amount of greenhouse gases emitted over a five-year period. They are shown in Table B. The UK met the first three budgets. However, according to the Climate Change Committee, the UK is not on track to meet Carbon Budgets 4, 5 and 6 (from 2023 to 2027, 2028 to 2032, and 2033 to 2037, respectively).<sup>10</sup> Carbon Budget 6 requires a reduction of 78% below 1990 levels.

The government's 2021 policy document *Net Zero Strategy: Build Back Greener*<sup>3</sup> sets out how the UK government plans to meet the Carbon Budget 6, then net zero in 2050. It includes policies for reducing emissions across the economy and supporting the transition to net zero.

The government is also working on climate adaptation. However, the Climate Change Committee, in its 2021 *Independent Assessment of UK Climate Risk*,<sup>11</sup> concluded that progress with adaptation is not keeping up with the rate of increase in climate risk. The Committee also concluded that risks to all aspects of life in the UK had increased in the previous five years.

## Local Climate Change Policy

### Context

*Net Zero Strategy: Build Back Greener* identifies that 82% of UK greenhouse gas emissions are within local authorities' scope of influence. There are currently no net-zero targets for local authorities. *Net Zero Strategy: Build Back Greener* also indicates that government does not currently think a statutory requirement is needed.

The Nottingham Declaration was launched in 2000. It is a voluntary agreement committing to develop a strategy to tackle climate change. Hundreds of local authorities signed, leading to an increased focus on local climate change policy.

More recently, many local authorities have declared a climate emergency. A climate emergency declaration acknowledges that humanity is in a climate emergency. Declarations typically include commitments and targets for the local authority and the local authority's area to become net-zero carbon. Local authorities will then typically develop a climate change strategy and/ or net-zero carbon plan.

### Local Planning Authorities

Planning can be key to local authorities with planning responsibilities delivering climate change mitigation and adaptation in their areas. Strong planning policies can help local authorities encourage development that is in line with local climate change strategies and UK carbon budgets.



Part of the IES family

Local authorities may need to review environmental impact assessments containing greenhouse gas emissions assessments. Greenhouse gases need to be assessed under the Town and Country Planning (Environmental Impact Assessment) Regulations 2017 and the Infrastructure Planning (Environmental Impact Assessment) Regulations 2017. A key test of significance of effects for greenhouse gas emissions is whether a development contributes to reducing emissions relative to trajectories towards net zero.

## Useful Resources

Climate Emergency UK has produced [scorecards showing how it assessed local authorities on their climate action](#). It has also produced a [Climate Action Plan Explorer Tool](#).

The Local Government Association website hosts guidance for local authorities, produced by Arup, entitled *You've Declared a Climate Emergency... What Next?*.<sup>12</sup> The guidance contains steps that authorities can take after declaring a climate emergency.

The C40 Cities website hosts a Climate Action Planning Resource Centre, that provides a 'step-by-step guide to developing a city-wide climate action plan that is consistent with the objectives of the Paris Agreement and addresses the city's wider socio-economic needs'.<sup>13</sup>

The Institute of Environmental Management and Assessment has produced guidance on assessing greenhouse gas emissions and evaluating their significance within environmental impact assessments.<sup>14</sup> This may be of use to local planning authorities.

# Appendix C

## Air Pollution Impacts of Net-Zero Strategies

The government set out its strategy for achieving net-zero emissions in its 2021 document *Net Zero Strategy: Build Back Greener*. Net-zero policies are positive for air quality overall. Some measures, though, need to be managed carefully. Studies prior to its release indicate that its policies will benefit air quality and that some policies need to be managed carefully for their potential air quality impacts.

In 2021 the Royal Society published *Effects of Net-Zero Policies and Climate Change on Air Quality*. On the effects of net-zero measures, the report concluded the following.

- The transition to net-zero will deliver significant improvements in air quality as a co-benefit and the policy challenge is to maximise air quality improvements while retaining greenhouse gas mitigation.
- Many measures to achieve net-zero are unequivocally positive for air quality.
- For some measures, action can be taken to enhance air quality benefits.
- A few net-zero measures may have adverse impacts on air quality. Either impacts need to be mitigated or measures need to be swapped for others that have no adverse air quality effects.
- The report identified measures with clear co-benefits, measures that could be enhanced to benefit air quality and

measures that may need mitigation to protect air quality.

Opportunities with clear co-benefits:

- Replacing fossil-fuel-derived electricity with decarbonised electricity.
- Active travel measures.

Opportunities to enhance net-zero policies to benefit air quality:

- The transition to fully electric fleet: PM<sub>2.5</sub> emissions from friction, abrasion and resuspension could be mitigated by regenerative braking, vehicle autonomy, low-emission tyres and particle capture from brake callipers.
- Reduced emissions of NO<sub>x</sub> will lead to higher ozone. Benefits are likely to be positive overall, but higher roadside levels of ozone need to be recognised.

Measures that may need mitigation:

- Carbon capture and storage (fugitive emissions of volatile chemicals).
- Impacts from temporary back-up facilities, such as diesel farms, during the transition to decarbonised and nuclear infrastructure.
- Emissions of NO<sub>x</sub> from domestic hydrogen or biogas boilers.



- Managing indoor air quality impacts of net-zero measures.
  - Choosing tree and plant species (for biofuels and green urban spaces) with low emissions of biogenic volatile compounds. These compounds lead to more ozone and secondary PM<sub>2.5</sub>.
  - With agriculture, avoid ‘pollution swapping’. For instance, switching from ammonium nitrate fertilisers to urea could increase ammonia emissions.
  - Biomass combustion can reduce net greenhouse gas emissions but increase air pollution. Biomass combustion in areas of high population needs to be avoided.
  - Aviation has limited options for decarbonisation, so airports are likely to remain air pollution hotspots.
- Areas for ongoing investigation:
- Differential toxicity of particles (and how net-zero policies may influence PM composition).
  - Better understanding of more diffuse pollution sources as pollutant emissions decline.
  - Where to target air quality monitoring as different source types become less important.
- In 2020 Defra’s Air Quality Expert Group looked at the Climate Change Committee’s recommendations on net zero and the UK’s contribution to stopping global warming. The Expert Group reported on an initial assessment<sup>15</sup> of possible air quality impacts from net-zero policies. The assessment found that better air quality outcomes are likely for virtually all changes proposed in the Climate Change Committee’s proposed net-zero pathway. Other findings included the following:
- Implementing net zero will lead to some immediate improvements in air quality. Reduced levels of secondary pollutants (ozone and secondary PM) are likely to be fully realised onto towards the end of net-zero transition. We need to consider and minimise air quality impacts during the transition. For instance, major low-carbon infrastructure could potentially create localised air quality problems during their development.
  - Decarbonising the road and rail fleets will bring very significant air quality benefits. PM from friction and abrasion will remain and could plausibly increase if vehicle-miles increase. Clean transport options within the net zero strategy, such as walking, cycling and public transport, are integral to optimising air quality benefits.
  - Sustainable and lower-greenhouse-gas food production supports improved air quality. Lower ammonia emissions from farming may also lead to lower urban and rural PM.
  - For any widespread forest planting, tree choice is important. Some species give off far higher levels of natural volatile organic chemicals, which can lead to higher surface ozone.
  - Hydrogen used at industrial scales and in fuel cells will be highly positive for air quality. Hydrogen used in domestic boilers or engines is likely to lead to similar emissions of NO<sub>x</sub>.
  - Regulatory risk assessments for industrial-scale carbon capture and sequestration are important to ensure there are no unintended air quality impacts.
  - Improvements in energy efficiency will help reduce energy demand. Care is needed to avoid unintentional indoor air pollution problems.



Part of the IES family

The benefits of policy integration have been understood for some time. In 2008 Defra commissioned a study of the benefits of integrated policy for air quality and climate change against a business-as-usual approach to both. The study concluded that integrated policy brought significantly greater benefits than pursuing separate measures, particularly in the early years of policies.

These top-down studies, which look at the overall impacts of climate policies and action on air pollution, complement the bottom-up approach taken by this guidance.



# Image Credits

**Front Cover – The Victorian and Beaux arts style City Chambers of Glasgow**

© Marinesea | Adobe Stock

**p. 8 – Aerial view of the Olympic Stadium and ArcelorMittal Orbit in Queen Elizabeth Olympic Park, Stratford, London**

© Andy Evans Photos | Adobe Stock

**p. 27 – Workers remove a layer of old asphalt with a jackhammer on an autumn day**

© Oksana | Adobe Stock

**p. 41 Southampton Port**

© Joiseyshowa | Climate Visuals

**p. 32 – Electronic scooters parked up in the city of London ready for hire**

© russell102 | Adobe Stock

**p. 44 – Night view of a busy UK motorway traffic jam**

© Jevanto Protography | Adobe Stock

**p. 47 – Bikes at Paddington Station**

© Frank Gärtner | stock.adobe.com

**p. 51 – Low emission zone sign in London**

© Claudio Divizia | Adobe Stock

**p. 54 – Families walking to school in Didsbury, Manchester**

© Mary Turner | Climate Visuals

**p. 63 – A black London taxi cab is being charged at an e-taxi rapid charging point in the city**

© Bennphoto | stock.adobe.com

**p. 72 – Van vehicles travelling on the motorway in England**

© Jevanto Protography | Adobe Stock

**p. 100 – Clean Ocean Sailing: a group of volunteers who are cleaning hard to reach parts of coasts and ocean sustainably under sail, raising awareness about ocean plastics**

© Monika Hertlova | Climate Visuals

**p. 102 – Aerial view of the Camden Lock Market in London**

© Aerial Film Studio | Adobe Stock

**p. 122 – Weathervane against a sunset sky**

© tkyszk | Adobe Stock

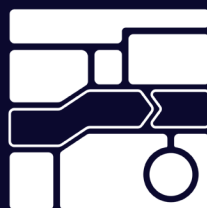
Institution of Environmental Sciences  
6-8 Great Eastern Street | London  
EC2A 3NT  
+44 (0)20 3862 7484

[info@the-ies.org](mailto:info@the-ies.org)

[www.the-ies.org](http://www.the-ies.org)

Registered charity no. 277611

**The Institution  
of Environmental  
Sciences**



**Environmental Policy  
Implementation  
Community**

Part of the IES family