

Theme 4: Involvement and Engagement

TRANSITION Clean Air Network

Briefing Notes

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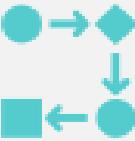
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Air Quality in Transport Hubs



Air Quality in Transport Hubs

Transport hubs (for example railway and bus stations) are key locations where people spend time, contributing significantly to overall pollutant exposure. This briefing note examines the current evidence and regulatory landscape, and explores potential opportunities to reduce exposure in these environments.

Background

Air pollution is a prominent public health concern in the UK, with over 200,000 premature deaths each year¹, and strongly linked to a range of harmful health effects.² Transport remains a significant source of air pollution, accounting for 10% of nitrogen dioxide (NO₂) emissions and 15% of fine particulate matter (PM_{2.5}) emissions in 2016.³ Exposure to traffic-related air pollution is known to be associated with harm to human health, including increased risk of childhood asthma,⁴ cardiovascular and respiratory disease,⁵ and daily mortality.⁶ To identify the point at which individual exposure is reduced, it is necessary to understand how, where and when an individual is exposed.⁷ Transport microenvironments are commonly associated with elevated pollution concentrations, and individuals and communities can receive a significant portion of their daily exposure while travelling.⁸ Spending just 10% of a day in transport environments can account for up to 30% of an individual's daily pollution exposure.⁹ Previous research has predominantly focused on how commuting in different transport modes can contribute to overall individual exposure.¹⁰⁻¹² However, this has largely ignored the potentially significant impact of time spent in transport hubs. Railway and bus stations are among the most concentrated transport hubs, and are often located in the heart of urban transport networks. Public transport modes are responsible for a small share of total UK air pollutant emissions, with rail and bus sectors both contributing approximately 1% or less of national NO₂ and PM_{2.5} emissions.¹³ However, these transport modes can still contribute substantially to air quality conditions at the local scale, especially while operating in transport hubs. These frequently enclosed or partially enclosed environments can lead to the accumulation of emissions, leading to potentially very high pollutant concentrations that pose a potentially significant risk to those using or working in these locations. Currently, emissions from diesel fuel-isolines are the most concerning of these emissions.

TRANSITION Clean Air Network
Policy Briefing Note No. 1 (May 2020)

Non-Exhaust Emissions from Road Transport



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TRANSITION Clean Air Network
Policy Briefing Note No.2 (June 2021)

Low Emission (Clean Air) Zones



Low Emission Zones – also known as Clean Air Zones – aim to achieve compliance with legal air quality objectives by decreasing the level of highly polluting vehicles in urban areas. This briefing note examines current knowledge as to whether these initiatives work, gaps in our understanding and lessons for future place-based air quality solutions.

Background

Air pollution presents the largest environmental risk to health in the UK, responsible for between 21,000–36,000 premature deaths each year.¹ Research has linked air quality with a wide range of adverse health effects, including the development of childhood asthma,² heart and lung disease and cancer;³ poor mental health and cognitive performance;⁴ and the onset of neurological conditions such as dementia⁵ and poor birth outcomes.⁶ This places significant financial burden on the NHS and national economy; in 2017 total NHS and social care costs associated with air pollution were estimated to be up to £157 billion⁷ and the wider economic costs to society are estimated to be £120 billion per year.⁸ The health effects of air pollution are disproportionately borne by disadvantaged socio-economic status and minority ethnic groups,⁹ and are more likely to experience pre-existing health conditions that make them more susceptible to health impacts from exposure.¹⁰

Over the last 20 years, concentrations of priority air pollutants such as nitrogen dioxide (NO₂) and the particulate matter (PM) have declined substantially.¹¹ However, the UK still currently fails to meet statutory air quality objectives for NO₂ in many urban areas¹², and mean PM_{2.5} concentrations exceed much of the UK's exceed World Health Organization (WHO) Air Quality Guidelines.¹³ Transport remains an important source of air pollution, accounting for 34% of nitrogen dioxide (NO₂) emissions and 13% of PM_{2.5} emissions in urban environments.¹⁴ Road traffic is thus the dominant source of NO₂ emissions¹⁵, and is consequently a target for policy intervention.¹⁶ Such interventions include the introduction of 'Low Emission (Clean Air) Zones', mandated in multiple UK cities as the most effective way to achieve legislative compliance and improve air quality.

Overview

- Clean Air Zones and Low Emission Zones aim to discourage the use of the most polluting vehicles, typically in urban areas.
- They are being increasingly introduced by local authorities to achieve compliance with legally binding air quality objectives.
- Many questions remain regarding their effectiveness to improve air quality, health, and impacts on wider society.
- Scientific evidence is used to inform future place-based air quality solutions.



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Policy Briefing Note No. 4

Environmental and Health Impacts of E-cycling



Electrically assisted bicycles (e-bikes) can have an important role in enabling UK transport to achieve net zero, improve air quality, increase levels of physical activity and improve mental and physical health. This briefing note reviews the current evidence on the environmental and health impacts of e-cycling, highlighting why the promotion of e-cycling should be a key component to address UK health, climate and clean air challenges.

Background

The movement of goods and people is fundamental for the economic and social development of an area. However, the transport sector is responsible for 24% of total carbon dioxide (CO₂) emissions in the UK¹ and significantly contributes to toxic air pollution (e.g., particulate matter and nitrogen oxides). Transport related CO₂ emissions and air pollutants are harmful to human physical and mental health.² To reduce CO₂ emissions, the UK has focused on the electrification of passenger cars and road goods vehicles.³ However, to meet the UK Climate Change Committee goal of transport decarbonisation to deliver net-zero by 2050,⁴ car use must also be reduced.⁵

E-bikes have been identified as a means through which to reduce land-based transport emissions

Environmental and Health Impacts of E-cycling

by modal shift away from motorised transport.⁶ At the same time, e-bike use can improve individual health and promote physical activity,⁷ and potentially reduce traffic and associated air pollution.⁸ In this context, refers to a pedal assisted electric bicycle, in which the individual must pedal for assistance to progress. The term e-bike is often used as bicycles in the UK with a maximum power output of 25 Watts and a top assisted speed of 25 km/hr.⁹ Sales of e-bikes in Europe grew by 28.5% between 2018 and 2019, while sales continue to be on the rise.¹⁰ Some notable trends in e-bikes have been observed in the UK, they are rising¹¹ with sales of both on- and off-road e-bikes increasing. The COVID-19 pandemic significantly accelerated bike sales, including e-bikes, across the UK and globally.¹² Specifically in the UK, Harper reported that 43% of all bicycles purchased in 2020 were electric.¹³

Who uses e-bikes

Historically, in countries with low levels of cycling, such as the UK, older adults and women were less likely to participate in cycling.¹⁴ E-cycling has been shown to appeal to a wide

UK Rail Freight and Emissions


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 Policy Briefing Note No. 5

Different Transport Modes

Air Pollution Exposure in Different Transport Modes

In this Briefing Note, we summarize recent scientific evidence on air pollution exposure experienced by people based on different transport modes, including road, rail, and active travel (walking and cycling). We also compare the magnitude of air pollution exposure within each mode and provide recommendations to mitigate against adverse health impacts.

Background

Air pollution is the greatest environmental risk to human health in the UK. The air pollution response is responsible for 28,000 – 36,000 premature deaths annually.¹ The transport sector remains a large source of air pollution globally,² emitting both ‘primary’ pollutants (nitrogen dioxide (NO₂) and fine particulate matter (PM_{2.5})) from both exhaust³ and non-exhaust⁴ sources. The sector also contributes significantly to ground-level gas emissions and street-level noise, such as noise pollution and road acoustics.⁵ In the UK, roadside areas are associated with high concentrations of ambient NO₂ and PM_{2.5} and are a focus of policy action.⁶ People working, living or travelling between roads are thereby exposed to harmful air pollutant concentrations, often exceeding those recommended by WHO Guidelines.⁷ Short and long-term exposure to traffic-related air pollutants (TRAPs) is associated with adverse health effects including respiratory and heart health, lung cancer and all-cause mortality.⁸ Those most affected by TRAPs

Overview

- Individuals are exposed to high concentrations of air pollutants when travelling in, or close to, motorised vehicles.
- Many factors influence the duration and intensity of air pollution exposure, including route choice, ventilation settings, in-vehicle passenger position, proximity to vehicles and time of day.
- The benefits of physical activity from walking and cycling are offset by increased air pollution exposure.

are disadvantaged communities, who typically live in more polluted areas,⁹ and have higher incidence of respiratory health conditions and other health impacts due to harmful air quality impacts.¹⁰ However, transport of people, goods and services by surface transport mode has been declining in the UK over the last 20 years, with people in England spent on average around 370 hours travelling¹¹ for a variety of reasons including leisure (less than 10% of trips), shopping (nearly 10%), work (nearly 15%) and education (15%) of total and other purposes including recreational walking (6% of trips). Despite most people spending only a relatively small amount of time in motorised vehicles, individual air pollution exposure in transport microenvironments can account for around 30% of daily cumulative exposure to air pollution.¹² Therefore, reduced air pollution can provide important health benefits for the majority of the general population.¹³ The intensity and duration of exposure to air pollution will differ between different transport modes, and understanding these differences, who they affect, and actions which can be taken to protect citizens, is a key focus of ongoing research.¹⁴




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Policy Briefing Note No. 7

Speed limits, air quality and health



Improving air quality and reducing emissions is important for public health. Limiting vehicle speeds on the UK strategic road network can reduce individual vehicle exhaust emissions, however, there are implications for driver behaviour and road safety.

This briefing note examines the current evidence for speed limit reduction to benefit air quality and health and provides recommendations for future policy research.

Overview

- Lowering vehicle speeds on the strategic road network has the potential to reduce vehicle fuel consumption and air pollutant emissions.
- Road-air quality impacts of lowering speed limits are dependent upon whole vehicle mobility, driving behaviour and emissions.
- At present, modelling and use of on-board vehicle GPS monitoring telematics data can inform speed limit lowering schemes and help understand how drivers respond to speed limit changes.
- The true air quality impacts of speed limit lowering in the UK are not yet fully understood due to a lack of high-quality real-world evaluations.

Background

Poor air quality is the largest environmental risk to public health and is a major cause of premature death.^{1,2} In England, approximately 26,000 – 30,000 deaths per year are attributed to air pollution.³ While air pollution exposure is not only a risk factor for cardiovascular and respiratory diseases including lung cancer, but also exacerbates these conditions leading to increased hospital admissions and premature death,^{4,5} air pollution is expensive, costing the UK economy an estimated £20 billion each year.⁶ The most important air pollutants, directly related with reduced health and disease, disproportionately affecting the poor and vulnerable – ‘Tackling air quality in the UK

requires a coordinated approach and it is important to understand the costs, benefits, and unintended consequences of policy options.

The introduction of the original燃費 contribution to UK greenhouse gas emissions, responsible for 42% in 2020 and is a major contributor to air pollutant emissions.⁷ Particulate matter (PM) and nitrogen dioxide (NO₂) ground-level ozone are the main air pollutants of concern.⁸ Fine particulate matter (PM_{2.5}) causes the most substantial health impacts.⁹ Transport accounts for 10% of PM_{2.5} emissions, with exhaust emissions (NEEEs) from brake and road-wear contributing to over 60% (by mass) of PM_{2.5} and PM₁₀ primary emissions from vehicles.¹⁰ Whereas vehicle tail pipe emissions remain a major source of NO_x emissions.¹¹ The Department