Yes we CANZ!

Local leaders delivering Clean Air and Net Zero

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About UK100

UK100 is a network of local authorities that have pledged to shift their communities to Net Zero ahead of the government's legal target. They do this to demonstrate their ambition, make the case for rapid change, and enable a fast and fair transition.

The network provides local leaders opportunities to learn from each other, agree priorities for legislative and regulatory change, engage with national decision-makers and businesses, and develop a better understanding of how to build consent and support for rapid climate action in their communities.

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Foreword

William Bloss

William Bloss is Professor of Atmospheric Science at the University of Birmingham. He leads the NERC WM-Air project, which provides the latest environmental science support to stakeholders working to improve air quality and health across the West Midlands. He was a Working Group member for the Royal Society's report on the Effects of Net Zero Policies and Climate Change on Air Quality in 2021.

Clean Air Net Zero (CANZ): How can action to reduce carbon emissions also improve local air quality and health?

We face a climate emergency, with an urgent need for action to reduce greenhouse gas emissions (GHG) to avoid dangerous climate change and achieve Net Zero. The science is not in dispute. The UK Government has committed to Net Zero, and local authorities up and down the country have declared climate emergencies. What is urgently needed is for action on the ground to ensure declarations turn into delivery.

We also face a major public health challenge: air pollution – which leads to around 30,000 premature deaths in the UK each year, reducing average life expectancy by several months. Air pollution levels exceed World Health Organisation (WHO) guidelines in almost every city in the UK. The latest research shows air pollutants have significant health impacts at concentrations well below the UK's current legal air quality limit.

Bringing the Clean Air and Net Zero (CANZ) challenges together creates an opportunity, as many sources of GHGs are also sources of air pollutants. The most obvious examples include the combustion of fossil fuels in transport, industry, power generation and heating, which release carbon dioxide and harmful air pollutants, such as; nitrogen dioxide gas (NO_2) and fine particles (PM). If we get the policies right, we can reduce carbon dioxide (CO_2), NO_2 and PM emissions.

And local approaches matter. GHGs which drive climate change, such as CO_2, last a long time in the atmosphere: they spread globally. The same is not the case for the air pollutants that harm health, such as NO_2 and PM emissions – which typically last in the air for hours or days.
Therefore, local policies to reduce carbon and air pollutant emissions can bring localised air quality improvements and health benefits. Air pollution responds very quickly to emissions changes. The benefits of effective action can be realised more or less immediately. Moreover, action by local leaders, exploiting the Clean Air / Net Zero link, brings these direct community benefits while delivering on the promise to tackle the global climate crisis.

Optimising CANZ policy choices can help leverage the significant Net Zero investment to deliver the greatest local benefit while encouraging behaviour change and reducing local environmental health inequalities. After all, it's the least advantaged communities that tend to suffer the worst air quality. For example, analysis performed by WM-Air shows that electrification of all buses and 50% of light delivery vehicles in the West Midlands could reduce carbon emissions, and also reduce NO_2 levels by 20% to 35% across the region. The health benefits of this boost for cleaner air would include reduced asthma admissions and lung cancer diagnosis rates – reducing pressure on local NHS services.[1]

1 https://www.birmingham.ac.uk/research/climate/climate-publications/publications.aspx

But CANZ is not just about future opportunities. We also need to avoid past failures. For example, the promotion of diesel vehicles across Europe. Diesel vehicles have a greater fuel efficiency and lower carbon emissions, but generate greater air pollutant emissions. Together with the 'dieselgate' scandal, diesel vehicle promotion has driven the NO_2 air quality problem in many UK cities. With the effects still impacting communities today, it's a stark reminder that we separate clean air and Net Zero policies at our peril.

At the same time, as this report makes clear, CANZ needs to include looking beyond transport. To tackle PM and carbon emissions related to solid fuel and wood combustion in domestic and commercial settings, our analysis shows local action can deliver local benefits.

Local authorities cannot deliver this agenda alone: national scale initiatives and infrastructure investment are needed to accelerate Net Zero progress and help tackle the air pollution problem — which spreads from one area to another. But, local leaders can drive the pace of change. Local leaders have already shown ambition to adopt CANZ approaches, to go beyond the targets set nationally — and to deliver greater benefits for their communities.

This timely report introduces CANZ, and highlights the key local and regional policies for win-win local solutions. It also identifies areas where challenges remain, and recommendations for supporting local leadership of the CANZ agenda. In a time of significant pressures, this support needs to recognise how CANZ has the potential to boost local and regional growth while reducing the large health and productivity costs of air pollution and environmental inequalities between communities.

We understand the science, and the need for action on both climate and clean air. This report highlights how local leaders — with appropriate national backing — can implement CANZ to accelerate bold and ambitious change towards a sustainable future with multiple benefits for local communities.

Executive Summary

This report summarises win-wins for local authorities (LAs) in aligning clean air and Net Zero (CANZ) policies, as well as some challenges that joining up action presents. It also makes some recommendations to support LAs in navigating the win-wins and trade-offs to maximise the delivery of successful, cohesive outcomes.

We need to rebuild following the COVID-19 pandemic; we face a climate emergency and a cost of living crisis with rocketing fuel bills, and air pollution is currently responsible for one in every nineteen deaths in the UK.[2] We have never been more in need of urgent joined-up policy making that can tackle these issues side-by-side at the pace and scale required. And the case for CANZ action is clear **- 16% of the annual cost of Net Zero in the UK could be clawed back by making sure we deliver safe air.**[3]

A detailed report in 2007[4] investigated the links between air quality and climate change in the UK, but responses to tackle both issues in tandem did not emerge at the time. In recent years, more attention has been paid to the linkages between tackling clean air and meeting Net Zero, for example, the Air Quality Expert Group's report on Net Zero pathways in 2020,[5] and more recently the Royal Society's report on the synergies between clean air and carbon emissions, released in November 2021.[6] The Government's Net Zero Review cites air quality as a co-benefit of UK climate action.[7] Our work builds on this insight as the first report to focus on understanding the potential for CANZ approaches to speed up impactful action at the local level. This report identifies what LAs can and are currently doing, what the current barriers to action might be and where more insight is required.

2 https://www.centreforcities.org/press/more-than-one-in-19-deaths-in-the-uks-largest-cities-and-towns-now-linked-to-air-pollution-and-the-south-is-worse-off/
3 CBI Economics estimates a £1.6 billion annual economic benefit to the UK from meeting the World Health Organisation's (WHO) guidelines for safe air https://www.cbi.org.uk/media/5539/2020-09-cbi-economics-caf-report.pdf; Committee on Climate Change (CCC) state that current annual investment in Net Zero solutions is £10 billion https://www.theccc.org.uk/wp-content/uploads/2021/06/Progress-in-reducing-emissions-2021-Report-to-Parliament.pdf
4 https://uk-air.defra.gov.uk/library/assets/documents/reports/aqeg/fullreport.pdf
5 https://uk-air.defra.gov.uk/assets/documents/reports/cat09/2006240802_Impacts_of_Net_Zero_pathways_on_future_air_quality_in_the_UK.pdf
6 https://royalsociety.org/topics-policy/projects/air-quality-climate-change/
7 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1026725/NZR_-_Final_Report_-_Published_version.pdf

LAs know their communities and the challenges they face day-to-day, so can develop solutions that work best in any given area - Cornwall is distinct from Cambridgeshire, Birmingham and Leeds are different; the solutions to delivering Net Zero need to be place-based to reflect this diversity. The growing evidence base makes a compelling case for making LAs central to addressing all of these crucial issues.[8] This seminal role was acknowledged by the Government in the Net Zero Strategy:

> **"We will [also] take a place-based approach to net zero, working with local government to ensure that all local areas have the capability and capacity for net zero delivery as we level up the country.**[9]

In parallel, LAs have been required to monitor and manage air pollution since 1995. As with the Net Zero transition, some LAs have set, or are considering setting, more ambitious clean air targets than those of the national Government, driven by concerns for the health of their communities.

The local approach to air quality has to date been primarily focused on roadside emissions and nitrogen dioxide (NO_2). But as policies to phase out dirty vehicles take effect and as broader air pollution impacts become better understood, particulate matter (PM) is increasingly a major concern which requires more immediate attention. PM comes from a varied range of sources, from heating to agricultural processes (through chemical reactions).

LAs need to reframe the local air quality discussion to consider this emerging insight and develop responses to these challenges. As they do so, working to deliver Net Zero at the same time, there are clear opportunities to ensure that their responses capitalise on co-benefits and minimise trade-offs.

8 https://www.uk100.org/sites/default/files/publications/Power_Shift.pdf, https://www.theccc.org.uk/publication/local-authorities-and-the-sixth-carbon-budget/, https://www.nao.org.uk/report/local-government-and-net-zero-in-england/
9 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1033990/net-zero-strategy-beis.pdf

The ‘win-wins’

We have identified four key win-win actions, that deliver positive outcomes for both agendas, and four key challenges - where a clean air win does not necessarily deliver a Net Zero win and/or vice versa, for which LAs may need to consider interventions to avoid serious trade-offs. LAs are at the forefront of delivering these actions, deliberating how to address multiple local priorities alongside national goals and statutory duties. LAs and national policy makers need to better understand and take account of these win-wins and challenges, in order to develop cohesive policy solutions which enable change at the pace and scale required, whilst also delivering associated local benefits.

- **Win-win 1: Transport modal shift**

Promoting the shift from private cars towards public transport and active travel (walking and cycling), and reducing freight mileage, as part of wider sustainable transport planning, is a win-win in terms of reducing greenhouse gas emissions (GHGs) and primary air pollutants. It also delivers health benefits - associated with improved air and more active lifestyles - and supports local economies with increased footfall for local businesses and can make communities safer

- **Win-win 2: Heat demand reduction and decarbonisation with renewable energy**

Accelerating measures to cut heating demand through insulation and energy efficiency alongside decarbonisation of heating, utilising solar and wind-powered heating systems would deliver significant progress towards Net Zero, improve air quality, and deliver co-benefits such as reduced fuel poverty, green jobs and skills and contribute to the national levelling-up agenda

- **Win-win 3: Better management of nitrogen in agricultural systems**

Supporting the transition to agricultural management practices with lower ammonia (NH_3) emissions - a major precursor of PM air pollutants - and lower GHG emissions, in particular nitrous oxide, contributing to UK Net Zero. LAs can take action on their council-owned farms, create innovative funding to encourage agricultural transition, and opt for sustainable food procurement. Additionally, they can play a role in supporting rural renewables and other lower carbon economic development making a contribution to levelling-up in rural communities

- **Win-win 4: Empowering local communities with air quality data**

LAs can play an important role in empowering local communities with better data on air quality to help them make personal choices to avoid negative impacts of air pollution. Better data on air quality, and GHG emissions can also boost community awareness and support for CANZ actions, and help communities hold LAs to account on delivering their commitments.

Cross-cutting benefits

With better aligned CANZ action, such as the win-wins above, several overarching benefits can be delivered:

- **Health and wellbeing improvements** from clean air, active travel, decent homes and improved public spaces
- **Economic benefits -** through LA and healthcare cost savings, boosted workplace productivity and employment opportunities
- **Levelling-up' contributions -** reducing health inequalities and widely distributed green job opportunities
- **Outreach and communications -** engaging communities on locally meaningful health and economic benefits, a potential route to engagement on wider climate and air quality issues
- **Future proofing** CANZ investments and innovation to maximise positive impacts and avoid unintended negative consequences.

The challenges

Some unintended consequences of taking action to reduce GHG emissions alone have been experienced in recent years - for example, the promotion of diesel as a 'fuel efficient' option with lower GHG led to a significant increase in the purchase of private diesel cars over the last 15 years, which has been a significant contributor to the NO_2 increase in our towns and cities.[10] It is important to flag other such impacts that may occur without due consideration.

- **Challenge 1: Combustion of 'low carbon' fuels such as biomass and hydrogen**

  The combustion of low carbon fuels like biomass and other biofuel in stoves, boilers and district heating systems, and hydrogen in boilers, can be positive in terms of Net Zero (depending on how fuel is produced and distributed) but could have potential negative impacts in terms of local air quality

- **Challenge 2: Road vehicle choices**

  Many LAs are promoting cleaner, greener road vehicles - through interventions focused on air quality such as Clean Air Zones (CAZ), transitioning their own fleet and other interventions more geared towards Net Zero such as supporting transport electrification. Unless both clean air and Net Zero objectives are fully considered in the design of such initiatives, a conflict can arise over which vehicle types are most beneficial on the whole. As outlined above, a comprehensive package of measures is required to ensure that mode shift, active travel and cleaner vehicles are included. Reducing overall traffic is necessary for LAs to achieve a good CANZ outcome

- **Challenge 3: Poorly designed tree planting**

  Tree planting and green infrastructure can act as a carbon sink and be used as a screen against air pollution, as well as delivering other benefits like visual amenity, positive mental health impacts and biodiversity benefits. Poorly designed planting schemes can, however, worsen the build up by reducing dispers of pollutants, and some specific tree species can emit volatile organic compounds (VOC) which harm air quality

- **Challenge 4: Indoor air quality**

Indoor air quality and Net Zero objectives can come into conflict particularly in relation to choice of home heating and ventilation options. Improving 'air-tightness' saves energy, but can exacerbate poor indoor air quality and conversely ventilation systems to improve air quality can increase energy use and so hamper progress to Net Zero.

Acknowledging these challenges can enable LAs to navigate towards investing in solutions that have economic, social and CANZ benefits for their communities.

10 A Defra report from 2007 highlights that fuel switching from diesel to petrol was a 'climate mitigation measure that could increase emissions of air quality pollutants' - https://uk-air.defra.gov.uk/library/assets/documents/reports/aqeg/fullreport.pdf

Recommendations for action

The following recommendations for action could enable LAs and national policy makers take decisive action swiftly to deliver progress on these fundamentally important issues.

- **A clearer ambition and new narrative** focused on the benefits of delivering CANZ responses together. Net Zero plans and policies must include a goal to improve air quality. Nationally, the Air Quality Strategy Consultation due for consultation in May 2023 is a key opportunity to reset ambition. In the shorter term, a more ambitious and positive national and local rhetoric can unlock progress. CANZ should be seen as a way to transition from a view of air pollution that is solely roadside/NO_2 focused. PM is the biggest health challenge in terms of air quality, especially $PM_{2.5}$. Therefore all combustion sources, especially heat, need to be considered in forward-thinking CANZ strategies

- **Sustained support for local action:** longer term, dedicated funding commitments to allow proper planning and implementation. These could include a comprehensive package on retrofit; more investment in local renewables across LA estates. Revenue funding should complement capital funding to ensure resources are available for development, capacity building, management and community engagement

- **Good local governance supported by a national regulatory framework:** a clearer mandate and guidance on local implementation which takes into account huge opportunities for LAs to be delivery partners on CANZ ambitions. LAs can explicitly set corporate CANZ objectives and systematically integrate these into decision-making, accountability and staffing. Greater transport and development planning powers, an overhaul of national building regulations and simpler enforcement would enable more action at the pace and scale required

- **Better access to data:** Monitoring and reporting of both air pollutants and GHGs needs improving. A comprehensive network of air quality sensors, scope 3, industrial point source GHG data provided to LAs, as well as improved and local meteorological monitoring stations would allow better understanding of other factors influencing air pollutants and GHG emissions. This in turn could support more effective policy intervention design and delivery

- **Identifying key moments and partnerships:** when joined-up action is crucial and use place-shaping powers to bring the two agendas together at key stages - for example, in the development of local plans, consideration of large planning applications, etc. Stakeholders across the community should be engaged, communications on plans should be clear and inclusive and partnership opportunities to develop and scale initiatives should be sought. Partnerships across neighbouring LAs would ensure that the transboundary impacts of pollutants can be considered

- **Better grid access for local renewables:** a modernised grid which should facilitate and incentivise greater investment in and deployment of energy storage. Smart local grids and decarbonised heat should be developed so that power can be generated and consumed locally, reducing costs. These developments, coupled with electrification of the rail network, would unlock many CANZ opportunities and help accelerate progress

- **Upskilling medical practitioners:** Updating national training programmes for physicians and medical professionals regarding health impacts of air pollution and risk reduction strategies for high risk patients.

1. Introduction

Why CANZ, and why now?

2021 saw significant policy developments across both Clean Air and Net Zero – with the release of the Net Zero[11] and Heat and Buildings[12] strategies, the Transport Decarbonisation Plan[13] and the passage into law of the Environment Act.[14] In 2022, the government must introduce two new air quality targets, which were out for consultation at the time of publication.[15] At the same time, more attention is being paid to the linkages and connections between tackling clean air and meeting Net Zero, for example, the Air Quality Expert Group's report on Net Zero pathways in 2020,[16] and more recently the Royal Society's report on the synergies between clean air and carbon emissions, released in November 2021.[17] But little investigation has so far been undertaken on the local contexts in which action will be delivered, nor on the powers, resources and expertise that LAs may need to be able to implement such cohesive policies that will deliver important co-benefits, including health and economic improvements.

The science - how GHGs and air pollutants interact

Common sources of air pollutants and GHGs mean that a CANZ approach is a natural 'fit'. Some regulated air pollutants (NO, NO_2) and some PM are co-emitted with CO_2 during fossil fuel combustion from sources such as power, transport and heat.[18] Fine particulates ($PM_{2.5}$) are also generated by vehicles through the friction and abrasion of surfaces (tyres/brakes), regardless of fuel. Other air pollutants with sources not linked to fossil fuel combustion include NH_3, which is emitted from agriculture (during storage and spreading of manures and slurries and from the application of inorganic fertilisers),[19] and VOCs, which are emitted from a range of sources both outdoors (from transport) and indoors (for example, cleaning products and paint). NO_x from agricultural soils are also contributing increasingly to total air pollutants and methane (CH_4) from livestock is a significant GHG.[20]

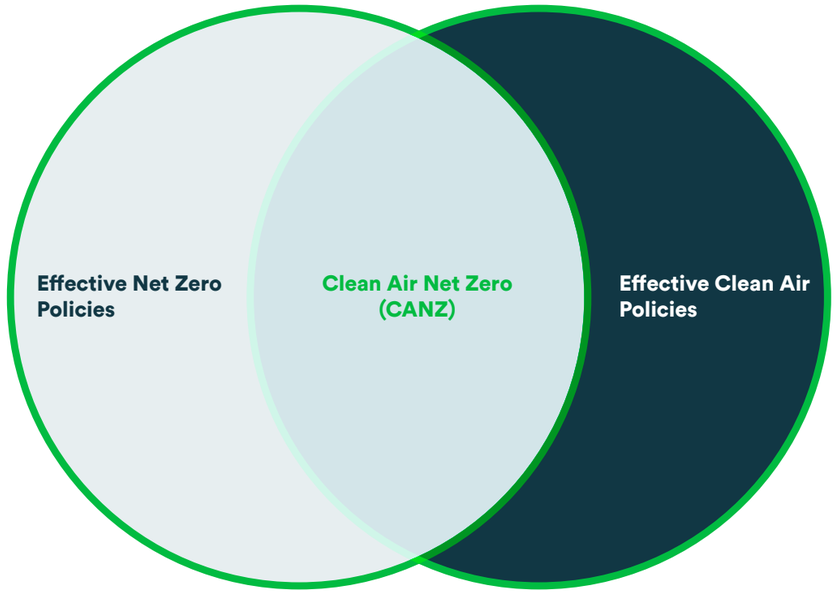
Both NH_3 and VOCs play an important role in the formation of secondary PM through chemical reactions, a phenomenon that is exacerbated during some weather conditions. Episodes of intense heat, for example, will result in greater release of some emissions from vegetation and soils and increased local peaks in PM.[21] So climate change itself will influence the emission, dispersion and formation of air pollutants in the atmosphere.[22] Ozone (O_3) comes from a combination of natural and human processes and is also a secondary pollutant that can, in turn, contribute to PM formation. Unlike the other five pollutants listed, ozone cannot be managed locally.[23]

Action must be sped up

Recent developments from the Intergovernmental Panel on Climate Change (IPCC)[24] and the Met Office[25] suggest that the 1.5°C threshold for warming above pre-industrial levels may be breached sooner than expected. The need for comprehensive cross-sector, economy-wide policies to deliver Net Zero has never been greater. And according to the UK's Air Quality Expert Group:

> **The implementation of Net Zero will lead to some immediate improvements in certain primary air quality parameters. However, due to non-linear formation, large reductions in ambient concentrations of secondary pollutants (PM and O_3) may not be fully realised until towards the end of the Net Zero transition.**

11 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1033990/net-zero-strategy-beis.pdf
12 https://www.gov.uk/government/publications/heat-and-buildings-strategy
13 https://www.gov.uk/government/publications/transport-decarbonisation-plan
14 https://www.gov.uk/government/news/world-leading-environment-act-becomes-law
15 https://www.gov.uk/government/publications/environment-bill-2020/10-march-2020-air-quality-factsheet-part-4, https://consult.defra.gov.uk/natural-environment-policy/consultation-on-environmental-targets/
16 https://uk-air.defra.gov.uk/assets/documents/reports/cat09/2006240802_Impacts_of_Net_Zero_pathways_on_future_air_quality_in_the_UK.pdf
17 https://royalsociety.org/topics-policy/projects/air-quality-climate-change/
18 https://uk-air.defra.gov.uk/assets/documents/reports/cat09/2006240802_Impacts_of_Net_Zero_pathways_on_future_air_quality_in_the_UK.pdf
19 https://www.gov.uk/government/publications/clean-air-strategy-2019/clean-air-strategy-2019-executive-summary
20 https://uk-air.defra.gov.uk/assets/documents/reports/aqeg/2800829_Agricultural_emissions_vfinal2.pdf
21 https://royalsociety.org/topics-policy/projects/air-quality-climate-change/
22 https://c40.my.salesforce.com/sfc/p/#36000001Enhz/a/1Q0000001ohs/BVDK79r._55v0VLGVperJA.U1w-Cgv9wXz8O7NUD3WhA
23 https://www.local.gov.uk/sites/default/files/documents/6.3091_DEFRA_AirQualityGuide_9web_0.pdf
24 https://www.ipcc.ch/report/sixth-assessment-report-working-group-3/
25 https://www.metoffice.gov.uk/about-us/press-office/news/weather-and-climate/2022/decadal-forecast-2022



Air pollution is our single greatest environmental health challenge.[26] It has been linked to one in every 19 deaths in the UK.[27] $PM_{2.5}$ is causing the most significant health problems and premature mortality.[28] Those with existing lung conditions, as well as older people, children and babies are more likely to experience symptoms from breathing polluted air.[29] The effects of air pollution are immediate and costly,[30] particularly for the most vulnerable, as demonstrated by the tragic death of Ella Adoo-Kissi-Debrah where air pollution was listed as a cause of death at inquest.[31]

In some situations, Net Zero policies may need to be modified to optimise air quality benefits. In others, with indoor air pollution, for example, the measures that need to be introduced will be different from, and additional to, those needed to reduce GHG emissions. But there is great potential to develop joint solutions to tackle these issues with the pace and scale required.

26 https://www.gov.uk/government/publications/environment-bill-2020/10-march-2020-air-quality-factsheet-part-4
27 https://www.centreforcities.org/press/more-than-one-in-19-deaths-in-the-uks-largest-cities-and-towns-now-linked-to-air-pollution-and-the-south-is-worse-off/
28 https://www.eea.europa.eu/themes/air/health-impacts-of-air-pollution
29 https://www.blf.org.uk/support-for-you/air-pollution/whos-at-risk
30 https://uk-air.defra.gov.uk/assets/documents/reports/cat09/2006240802_Impacts_of_Net_Zero_pathways_on_future_air_quality_in_the_UK.pdf
31 https://www.judiciary.uk/wp-content/uploads/2021/04/Ella-Kissi-Debrah-2021-0113-1.pdf

Local action underpinned by strong national policy

Air quality is highly dependent on local conditions and sources, and LAs are uniquely placed to understand how air pollution impacts their area. They also know where their vulnerable communities live and are well positioned to empower them to act, and they already have obligations to review and assess air quality under the Local Air Quality Management (LAQM) framework.[32] In parallel, according to the Government's Net Zero Strategy, up to 82% of the UK's carbon emissions are within the scope of influence of local authority remit.[33]

In this context, it's clear that a locally-based approach is key to successfully implementing joined-up CANZ actions. The placemaking vision adopted by many LAs (when developing local plans, for example), is an ideal starting point to bring these two agendas together - putting infrastructure, housing and transport in the context of wider sustainability and liveability issues such as the environment, health, inequality and post-COVID-19 recovery.

National policy developments, such as the Net Zero Strategy[34] and the 2021 Environment Act[35] have highlighted the role of LAs as a delivery partner, but this acknowledgement needs to be supported, with guidance, resources and a clear framework for action.[36]

32 https://laqm.defra.gov.uk/, https://laqm.defra.gov.uk/documents/LAQM-PG16-April-16-v1.pdf
33 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1033990/net-zero-strategy-beis.pdf
34 Ibid.
35 https://bills.parliament.uk/bills/2593
36 https://www.uk100.org/sites/default/files/publications/Power_Shift.pdf

Box 1: Place-shaping: bringing clean air and Net Zero together

LAs have an established role as place-shapers - improving services, and connections between services to make life better for citizens.

This brings an opportunity to align Net Zero and clean air together, and tackle multiple other sustainability, liveability and equality challenges.

LAs should ensure that CANZ stakeholders are working together at key place-shaping moments - the development and updating of a Local Plan, for example, and the assessment of major planning applications.

The 2022 Queen's Speech[37] announced a new Levelling-Up and Regeneration Bill - intended to drive local growth, empowering local leaders to regenerate their areas. Simplifying and standardising the process for local plans so that they are produced more quickly and are easier for communities to influence is also a key element of the proposed legislation.

Box 2: Focus on CANZ in rural areas

Air pollution levels may be lower on average in rural areas, but there is no safe level of fine PM from a health perspective, and rural areas may have pollution hotspots around busy junctions, for example, or industrial facilities.

Because of climate change and expected increases in hot weather, the gap between air quality in rural and urban areas is expected to narrow.

Rural areas will need different solutions from urban ones - with transport, for example, there will need to be a greater focus on bus networks and taxi fleets.

Rural authorities may need to work with a range of partners to facilitate change – with the Highways Authority, for example, on major roads.

37 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1074113/Lobby_Pack_10_May_2022.pdf

2. Understanding CANZ

Research aims

This research aimed to identify potential opportunities for LA to take joined-up action on CANZ. Despite growing acknowledgement of the need to consider these two agendas concurrently, there had been little analysis of how the interlinkages could be factored into local decisions and investments. We sought to identify the powers, resources and expertise that LAs may need to be able to implement cohesive CANZ policies that are capable of delivering important co-benefits. Our key questions at the outset were:

- What are the key opportunities for LAs in aligning these two agendas?
- What are the key win-win actions which contribute to delivering both clean air and Net Zero, with the scale and pace needed?
- How well are LAs able to assess and track impacts of their decisions on these two agendas, and so make well-informed decisions?
- What are the opportunities within the remit of LA delivery and decision-making to ensure progress is made on both agendas?
- Are LAs experiencing significant contradictions or having to make trade-offs, making it difficult to meet their goals on both agendas concurrently?
- What are the internal and external barriers preventing the win-win local actions?
- What support and advocacy can UK100 prioritise to help align these two agendas?

This research explored what needs to happen to enable LAs to make progress with both these critical issues. It will inform UK100's future programmes of work and provide insights to help our ambitious members and other LA take steps towards more joined-up action.

Research process

For this scoping exercise we gathered information, examples and insights from UK100's members via one-to-one interviews with officers working on Net Zero and/or air quality in different parts of England, in different types of administrations. We also held an interactive workshop attended by 19 officers and councillors from across the UK (see Annex 1 for a full list of contributors). Both activities helped us to interrogate our research questions. We supplemented this with desk-based research and conversations with external expert stakeholders, including academics who are working on relevant issues . We also drew on UK100's existing evidence base.[38]

Summary research findings

Our research highlighted many actions and opportunity areas within the remit of LAs which can deliver progress towards Net Zero and significant air quality improvements - 'win-win' CANZ actions for LAs set out in Section 3. We heard many examples of LAs successfully taking these actions forward, as well as insight about the cross-cutting benefits that can be delivered through CANZ policies (Section 4). We also explored where contradictions may exist between clean air and Net Zero, as well as a variety of challenges hampering efforts, such as funding and policy gaps (Section 5). Finally, there are clear messages about what would help enable CANZ delivery - these recommendations for action (Section 7).

38 https://www.uk100.org/publications

3. Win-win CANZ actions

Four key areas were identified where clean air and Net Zero are closely aligned, offering significant win-wins for LAs. These are:

- **Win-win 1:** Transport modal shift - away from private vehicles to public transport and active travel, and reducing freight mileage - as part of wider sustainable transport planning
- **Win-win 2:** Heating demand reduction and decarbonisation with renewable energy
- **Win-win 3:** Management of nitrogen in agricultural systems
- **Win-win 4:** Empowering local residents with air quality data.

Win-win 1: Transport modal shift

Making a shift from private vehicles towards public transport and active travel (walking and cycling), and reducing freight mileage, as part of wider sustainable transport planning, is a win-win in terms of reducing GHGs and primary air pollutants. It also delivers health benefits and supports local economies with increased footfall for local businesses. For example, increasing the proportion of regular cyclists in England from 4.8% to 25% would lead to a 2.2% reduction in passenger-related GHG emissions, as well as a 2.1% reduction in life lost due to premature mortality.[39]

39 https://acmedsci.ac.uk/file-download/11365167

Transport electrification, while beneficial in terms of Net Zero, is not currently optimising these other co-benefits, nor the potential air quality improvements. Tailpipe PM emissions have been substantially reduced by more fuel efficient vehicles (and will be reduced further by the transition to electric vehicles (EVs)), to the point that they are now exceeded by non-exhaust PM emissions, such as those from tyres and brake systems.[40] Modal shift away from private vehicles, offers an opportunity to cut these remaining PM emissions, alongside GHG reductions and health benefits of active travel.

In addition to modal shift, modifications, such as street design changes to encourage smoother driving, and electrification of public transport can be implemented by LA, alongside modifications from vehicle manufacturers, such as low emission tyres[41] to allow the clean air benefits of EVs to be realised alongside the Net Zero benefits.

LAs have powers to introduce a range of initiatives. Low Traffic Neighbourhoods (LTNs), for example, use measures such as road layout changes, parking restrictions and public realm improvements to encourage the shift away from car use. Such schemes can be focused around vulnerable communities – School Streets, for example, already introduced by a wide range of LAs, restrict traffic around school pick up and drop off. The design of the built environment, as much as the design of vehicles and transport services, influences how people choose to get around and planning powers are therefore integral to creating neighbourhoods where walking and cycling arise naturally.[42]

Initiatives to encourage modal shift need to fit into a broader sustainable transport policy which may cover, for example, electrification and CAZ. The overall package of solutions, as well as the design of individual elements is context dependent and different in urban and rural areas. LAs know their own communities best and should be empowered to deliver place-based solutions which can optimise the co-benefits outlined above.

40 https://uk-air.defra. gov.uk/library/reports.php?report_id=992, for an example of low emission tyres, see this pilot project funded by UKRI: https://gtr.ukri.org/projects?ref=971 646
41 https://www.acu.ac.uk/universities-for-our-planet/uk-universities-team-up-for-clean-air-and-better-public-health/
42 https://www.ukcleanair.org/2021/06/30/focus-on-the-planning-white-paper-a-chain-of-consequences-for-clean-air/

Considerations for LAs: Communicating the benefits and getting local stakeholders on board for the scale of changes needed can be difficult, particularly if there isn't a shared view on the urgency to deliver CANZ solutions. UK100 insight[43] reveals that there is a significant proportion of residents across the UK who do not object to the implementation of measures to reduce traffic, and only a very marginal, vocal opposition to such developments. Indeed, whilst several candidates in the 2022 local elections ran on single issue, anti-LTN platforms across the country, only a few were elected - demonstrating that there is public will for such changes.[44]

Integrated public transport provision is essential to support modal shift - funding is largely competitive and short term, meaning that connectivity between modes and provision between areas is often patchy and complex. Regional coordination to create solutions that work across LA boundaries can also be challenging, although some LAs, particularly those with devolved transport powers are making significant progress with this.

Examples: Birmingham City Council's Birmingham City Council's Transport Plan is underpinned by the need to tackle the Climate Emergency. This cannot be achieved without levelling-up and reducing inequalities, including health and putting air quality front and centre. The delivery of the Birmingham Transport Plan (BTP) will follow four principles: reallocating road space, transforming the city centre, prioritising active travel in local neighbourhoods and managing demand through parking measures. Revenue generated by the city's CAZ will be reinvested in schemes to improve the transport network and further reduce emissions,[45] and will also follow the BTP principles.

The London Borough of Camden, has formally adopted a target to achieve WHO air quality targets and to do everything it can to support a zero carbon Camden by 2030. These ambitions provide a clear justification for implementing modal shift initiatives such as improved walking and cycling infrastructure, our Safe and Health Streets programme and timed road closures next to Camden schools.

Birmingham and Camden are both lobbying the government to accelerate rail electrification, for example through integrating air quality requirements into franchise renewal. As well as maximising the Net Zero contribution of any shift to public transport, this will contribute to addressing current health inequalities. In Camden, for example, disadvantaged communities who live near major rail stations will benefit from better air quality from rail electrification.[46]

43 UK100 private members' briefing - 'Attitudes towards environmental interventions', Ipsos MORI, September 2021
44 https://www.bigissue.com/news/politics/anti-ltn-candidates-fail-to-make-inroads-in-local-elections/
45 https://www.birmingham.gov.uk/info/20013/roads_travel_and_parking/2032/birmingham_transport_plan
46 Research interviews

Win-win 2: Heat demand reduction and decarbonisation with renewable energy

Accelerating local delivery of a programme of measures to cut heat demand, through insulation and energy efficiency, alongside the decarbonisation of heating through renewable-powered heating systems. This would deliver significant progress towards Net Zero, improve air quality, and deliver co-benefits such as reduced fuel poverty, green jobs and contribute to the national levelling-up agenda.

Buildings are the second highest contributor to UK GHG emissions after transport, accounting for almost a third of carbon emissions.[47] In 2021, 16% of emissions from buildings came from heating homes.[48] At present, less than 5% of domestic heating is low carbon[49] – and that includes wood burners and biomass boilers, which can contribute to local air pollution (see below). Fossil fuel heating in domestic and commercial buildings is also a significant source of air pollution - for example gas boilers are becoming a relatively more significant source of NO_2 in cities as LAs continue to take action on NO_2 tailpipe emissions.[50]

The role of LAs as a delivery partner in shifting heat to renewable sources is vital, because a place-based approach is more economically viable than a top-down one, where one size fits all.[51] Authorities have already shown that they are well placed to act - of the £2 billion Green Homes Grant scheme, the £500m delivered through LAs was successful and oversubscribed.

When considering the heat transition, it is important to note that not all options are equal in terms of delivering clean, healthy air. Local solar photovoltaics, heat pumps (powered by low carbon electricity), direct grid electricity generated from low carbon sources, or combinations of all three offer the clearest CANZ wins[52] (although issues around embedded carbon in heat pumps, for example, need to be addressed).

47 https://www.gov.uk/government/publications/energy-white-paper-powering-our-net-zero-future/energy-white-paper-powering-our-net-zero-future-accessible-html-version#chapter-4-buildings
48 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1064926/2021-provisional-emissions-data-tables.xlsx
49 https://www.theccc.org.uk/publication/net-zero-the-uks-contribution-to-stopping-global-warming/
50 Project interviews - Camden particularly highlighted this, but others mentioned it as a key target after transport emissions
51 https://www.ukri.org/wp-content/uploads/2022/03/IUK-090322-AcceleratingNetZeroDelivery-UnlockingBenefitsClimateActionUKCityRegions.pdf
52 https://royalsociety.org/-/media/policy/projects/air-quality/air-quality-and-climate-change-summary.pdf?la=en-GB&hash=E8650539DD5F180B2A4094A9279F4EC7

District Heating Combined Heat and Power (CHP) (when powered by biomass and in urban areas, or close to key infrastructure like schools) and hydrogen boilers have a role to play, but their potential impacts on clean air need to be addressed (see below).

To realise the full benefits of levelling-up, the heat transition needs to be accompanied by energy efficiency measures for new and existing buildings (see below, for the potential interactions with indoor air quality). The right measures taken in the right places can deliver positive CANZ outcomes and other co-benefits. For example, improving insulation, ventilation and switching from fossil fuel sources would result in a reduction of 0.6 megatonnes CO_2 per million population (relative to 2010 baseline) and potentially save 850 disability-adjusted life years per million population (relative to 2010 baseline) due to improved air quality.[53]

This presents an opportunity for LAs to drive the development of new green markets – for example by prioritising the retrofit of social housing (17% of the UK housing stock, 40% of which is directly owned by LAs[54]), or by supporting retrofit delivery at a 'terrace by terrace' level to mixed (including private) housing. Through their planning powers, and power to implement social value in procurement in their own house building programmes, LAs are also critical to developing new housing which can deliver CANZ benefits.

Examples: London Councils have adopted Net Zero standards for all new housing since 2016 - going beyond national commitments - moving away from fossil fuel heating. By 2050, London's Net Zero policy is estimated to reduce more than 25 tonnes CO_2e, compared to building to national standards.[55] The Retrofit London Housing Action Plan will also retrofit 390,000 council homes and facilitate retrofit of London's 3.8 million homes. London Homes estimate that achieving Net Zero in every London property will cost £98 billion overall, but that this will support 200,000 jobs linked to insulation and retrofit by 2030.[56]

Considerations for LAs: Transitioning to low carbon heating and retrofitting the building stock, is arguably one of the single biggest challenges of the UK's Net Zero transition. There is a need to address the current instability of the UK retrofit market and the piecemeal, competitive, short term approach to distributing public funding for retrofit and heat decarbonisation, which has compounded the challenge further.[57]

53 https://acmedsci.ac.uk/file-download/11365167
54 https://www.gov.uk/government/statistical-data-sets/live-tables-on-dwelling-stock-including-vacants
55 https://www.c40knowledgehub.org/s/article/Cities100-Net-zero-new-builds-put-London-ahead-of-the-pack?language=en_US
56 https://beta.londoncouncils.gov.uk/news/2021/london-housing-plan-help-achieve-net-zero-and-unlock-ps98-billion-boost-greener-future
57 https://www.nao.org.uk/report/green-homes-grant/

There is also a need for more ambitious building regulations, which set standards for Net Zero new homes and for indoor and outdoor air quality. **The Greater London Authority (GLA)** and other leading LAs have set standards higher than national building regulations, but national policy has historically limited them to a 19% energy efficiency uplift on 2013 building regulations. Furthermore, councils can be reluctant to do this either because developers are protected by conditions around financial viability, or for fear that house builders will avoid their region, making it difficult to reach their house building goals.[58]

District heat networks also need more investment, up to £22 billion of capital could be needed for heat networks to deliver their full contribution to Net Zero.[59] However, LAs currently lack powers and resources to be able to deliver this transition at the scale required.

The recently published British Energy Security Strategy[60] misses the opportunity to set out a more ambitious policy and support package on demand reduction, particularly for domestic properties, which would cut fossil fuel demand and reduce household fuel bills. It does not follow on from the recognition given to LAs in the Net Zero Strategy and largely misses the fundamental role that LAs can play in the delivery of the heat transition.

Other challenges include:

- the current energy price uncertainty, which could undermine government intention to move price levies away from electricity to gas as outlined in the Heat and Buildings Strategy[61]
- the lack of a sufficiently ambitious framework from government to drive markets and support robust local action (e.g. on energy efficiency and gas boiler phase out)
- the stop-start nature of retrofit support and highly centralised funding programmes that have only served to reduce capacity in the construction sector; as well as the lack of LA powers over private homes. [62]

58 https://www.uk100.org/sites/default/files/publications/Power_Shift.pdf
59 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/922705/green-heat-networks-fund-call-for-evidence.pdf
60 https://www.gov.uk/government/publications/british-energy-security-strategy/british-energy-security-strategy
61 https://www.gov.uk/government/publications/heat-and-buildings-strategy
62 https://www.uk100.org/sites/default/files/publications/Power_Shift.pdf

Win-win 3: Management of nitrogen in agricultural systems

LAs have a clear role in supporting agricultural management practices which can lower NH_3 emissions - a major precursor of PM air pollutants - and GHG emissions. They also have opportunities to create innovative additional funding routes for sustainable land management, opt for sustainable food procurement and support rural renewables and other lower carbon economic development in rural communities.

In the UK 71% of land area is under agricultural management. Agriculture accounts for 10% of domestic GHG emissions, but this figure disguises the emissions associated with production of nitrogen fertilisers in the UK and overseas which can be a significant additional source of emissions.

In the absence of large reductions in NH_3 from agriculture (manure, fertilisers, slurry, waste etc.), UK NH_3 emissions are expected to grow to become the dominant source of nitrogen, in response to a warmer climate, which will impact on ecosystems and human health substantially through to 2050.[63] A recent study estimated that over 40% of $PM_{2.5}$ in Europe comes from NH_3 from farms, leading to £8 billion of health damage a year.[64] Control measures on agricultural NH_3 emissions would be effective in mitigating this risk.[65] National policies, regulations and funding programmes to support the transition to a more sustainable agricultural system, such as the new Environmental Land Management Scheme (ELMS)[66] are a significant driver of change. Voluntary sustainability standards and other requirements cascaded down to farmers from major corporate buyers are also influential. The National Farmers Union (NFU) flags a variety of ways in which LAs can also help: build a more productive, profitable and sustainable agriculture sector and in turn accelerate our national transition to a net-zero economy.[67]

63 https://royalsociety.org/topics-policy/projects/air-quality-climate-change/
64 https://www.science.org/doi/10.1126/science.abf8623 - referenced in https://www.theguardian.com/environment/2021/nov/04/ammonia-from-farms-behind-60-of-uk-particulate-air-pollution-study
65 Ibid.
66 https://www.gov.uk/government/publications/environmental-land-management-schemes-overview
67 https://www.nfuonline.com/updates-and-information/nfu-helping-local-authorities-work-with-farmers-towards-net-zero/

LAs with their own county farms can take direct action to reduce NH_3 from agriculture by increasing nitrogen use efficiency in cropping and improving livestock slurry management. LAs can also help by planting natural shelter belts around point source emissions or using their planning powers to require this for relevant new developments if emissions cannot be avoided.[68] These actions also bring Net Zero benefits as will the shift to more sustainable farming practices, focusing on sequestering soil and biomass carbon and improving on-farm nature. LAs can also pursue sustainable food procurement for schools and other council facilities which, particularly if it includes an element of local, seasonable sourcing could bring CANZ benefits, alongside other positive outcomes for healthy communities and improving biodiversity.[69]

Farmers, land managers and rural communities are also critical to the expansion of renewables and delivery of UK biodiversity and tree planting goals. Farmers already provide renewable energy that helps power an average of 10 million homes,[70] and could provide more with supportive national and local policy, whilst also enabling 'win-win 2' on reducing heating demand and increasing renewables above.[71]

Example: Gloucestershire County Council, in partnership with Gloucestershire Farming and Wildlife Advisory Group, and other local stakeholders such as members of the Local Nature Partnership are working together to accelerate the transition to more sustainable and regenerative farming practices in the county. The GREAT Project[72] funnels advice and financial support to local farmers to help them transition to more sustainable farming practices, building on the national support packaging and harnessing additional funding sources.

Gloucestershire is exploring the creation of the Gloucestershire Nature and Climate Fund. This fund has the primary aim of developing a local market for offsite Biodiversity Net Gain, whilst also exploring opportunities around a local carbon market. Both these markets represent alternative sources of funding for farmers and landowners, enabling diversification of farm income and delivering myriad environmental benefits. This, it is felt, will be a vital component of the council's responses to the climate and ecological emergencies.

68 https://uk-air.defra.gov.uk/assets/documents/reports/aqeg/2800829_Agricultural_emissions_vfinal2.pdf
69 https://www.sustainweb.org/climatechange/councils/
70 https://www.nfuonline.com/archive?treeid=150210
71 https://www.nfuonline.com/archive?treeid=150210
72 https://www.greatglos.co.uk

In general, however, this potential win-win is less frequently included in LAs strategies and plans for CANZ, and is less well understood in part because LAs have limited data on agricultural based emissions and restricted opportunities for improvement within their farmed estates.

Considerations for LAs: This potential win-win generally receives less attention and is less frequently included in LAs strategies and CANZ plans. It is less well understood in part because LAs have limited data on emissions and opportunities for improvement with their areas and their own remit. Although there is a wide variability in the extent of agricultural land owned and tenanted by LAs, they could be key players in demonstrating and promoting an agricultural transition, beyond the proposed new ELMS.

LAs lack powers to control some key agricultural developments and permitting, such as applications for new or extended intensive livestock units - these are decided by the Environment Agency. This can make it harder for LAs to ensure their CANZ objectives are factored in, particularly where they are more ambitious than national legislation. To play a supportive role in improving management of nitrogen in agriculture, LAs will need to harness their skills and resources for partnership building and innovative, locally-tailored programmes which complete and enhance existing sector-based and national schemes. LA skills and relationships have traditionally been more focused on nature and biodiversity, for example through local nature recovery partnerships - additional programme development and partnership building capacity, along with better data could help.

Regarding sustainable food procurement - skills, tight budgets and procurement rules are often cited as challenges, but these are not insurmountable - LAs do have power to enact social value in procurement which can be effectively used to improve sustainability of food procurement, and aim to target CANZ approaches.

Win-win 4: Empowering local communities with air quality data

LAs can play an important role in empowering local communities with better data on air quality to help them make personal choices to reduce air pollutants and GHGs. Better data on air quality, and GHGs can also boost community support for CANZ actions, and help communities hold LAs to account for delivering on their CANZ commitments.

We heard during our research that individuals are often more likely to take actions with positive CANZ outcomes (deciding not to drive the school-run, for example) based on immediate and local issues, like health. So giving them the data that empowers them to make these choices is essential.

LAs already carry out air quality monitoring as part of their statutory duties to review and assess local air quality and protect human health.[73] However, traditional air monitoring methods rely on a scarce distribution of sensors which can only approximate data, making it difficult to pinpoint areas of concern.[74] Communicating air quality data in a more real time, interactive way - for example through individual air monitoring sensors which capture personal exposure to pollutants - can empower individuals to make choices for themselves, their families and their communities which minimise the impacts.

This, in turn, can provide LAs with a real-time network delivering hyperlocal information, for smarter policy development.[75]

Many LAs are making improvements to their monitoring networks to show more real-time data and from more locations to inform their decisions and monitor impacts of recent initiatives, particularly in relation to CAZ and LTNs. They are also putting significant efforts into assessing the climate impact of initiatives and decisions, and using this data to engage local residents.

73 https://www.gov.uk/government/collections/air-quality-and-emissions-statistics
74 https://www.local.gov.uk/sites/default/files/documents/6.3091_DEFRA_AirQualityGuide_9web_0.pdf
75 https://www.localgov.co.uk/The-role-of-citizen-science-in-air-monitoring/53728

Examples: **Sheffield City Council** collaborated with the Better with Data Society to deliver a programme of co-design activities to engage local people with data and use it to better understand and tackle the issue of air quality in the city.[76] Camden has increased their network of air quality monitors from 14 to 600 which is now enabling them to better understand the impacts of modal shift interventions that they have introduced.

Considerations for LAs: Empowering communities with better data for personal behaviour change has some specific challenges:

- air quality datasets are generally difficult to understand due to their format and structure so making them public can be challenging
- different types of sensors and monitors require different levels of knowledge in terms of use and interpretation of results
- there is a resource challenge associated with supporting communities in citizen science projects, although working with academic partners may be one way of overcoming this (UKRI is investing significant amounts of research funding in this area).

The lack of data is also an issue for LA decision-making. Particular challenges highlighted during our research included:

- limited monitoring capacity - many LAs still only have basic data on key pollutants at limited sites
- lack of access to data about industrial sources of air pollutants from commercial sites, which can have implications for local air quality and GHG emissions
- lack of standardised approach to calculating 'Scope 3'[77] GHGs for LAs and lack of any available national data set regarding this[78]
- lack of real data on GHG emissions changes - often assessments of decisions and initiatives have to be based on models and estimated data which is not locally specific - better data could help design and monitor schemes and demonstrate tangible benefits.

76 https://www.local.gov.uk/case-studies/tackling-air-quality-issue-through-open-data
77 https://www.local.gov.uk/climate-change-reporting-guidance-local-authorities
78 https://www.uk100.org/sites/default/files/publications/LA%20Contributions_Final.pdf

4. Cross-cutting benefits

Our research highlighted five overarching co-benefits associated with taking coordinated CANZ action. These are:

- Health and wellbeing improvements
- Economic benefits
- Contributes to 'levelling-up'
- Outreach and communications
- Future proofing - CANZ investments and innovation.

Health and wellbeing improvements

By urgently focusing on CANZ approaches, health co-benefits will be maximised. Air pollution is the biggest environmental threat to health in the UK, with between 28,000 and 36,000 deaths a year attributed to long term exposure. Air pollution contributes to the development of coronary heart disease, stroke, respiratory disease and lung cancer, and exacerbates asthma.[79] The health impact of reducing air pollution is felt quickly.[80] Climate change is also damaging the people's health - in addition to the associated air pollution from burning fossil fuels, impacts include extreme temperature events and the mental health impacts of flooding, for example.[81]

Encouraging behaviours which minimise air pollutants and GHG emissions - such as active travel - also have important health benefits through encouraging more regular exercise. Modelling has shown that replacing car journeys with active travel in London would lead to a reduction in more than 500 premature deaths per million people through improvements in health outcomes related to physical activity and air pollution. The health benefits also extend to less road-traffic accidents and better mental health as a result of amenity and liveability improvements. Such a change, when delivered in conjunction with lower carbon vehicles, would also result in a 2-5 fold decrease in per person CO_2 emissions.[82]

LAs representatives, both elected officials and officers, frequently mentioned in this research, that the opportunity for tangible health benefits, was a significant motivation for taking action. The potential for reduced respiratory problems from cleaner air, mental health benefits from better green space, as well as active travel amongst recipients of adult social care were flagged as potential tangible health benefits which could reduce their healthcare costs, particularly in the light of service pressures facing LAs as a result of our ageing population.

There are opportunities to identify air pollution as a local health priority within Joint Strategic Needs Assessments (JSNA) carried out with other local delivery partners as part of development of Health and Wellbeing Strategy. Birmingham's JSNA for example includes air quality as a key health challenge facing the local population, which should be addressed.

People highlighted that aiming to achieve health and wellbeing benefits from reduced air pollution is a potential driver of climate action, as long as win-win actions (see Section 3) are prioritised to maximise the synergies between the two agendas.

Economic benefits

According to the IPCC: 'integrating air pollution abatement and climate change mitigation policies offers potentially large cost reductions compared to treating [those] policies in isolation'.[83] Such cost reductions can be realised in a number of ways - from optimising policy delivery and improving efficiencies, to avoiding unnecessary mortality and morbidity.

In the UK, the estimated net cost of reaching our Net Zero target, is equivalent to 1-2% of GDP in 2050.[84] However, this does not take into account the benefits of improved air quality. For example, the CBI estimates a £1.6 billion annual economic

79 https://www.gov.uk/government/news/public-health-england-publishes-air-pollution-evidence-review
80 For example, during the 2008 Beijing Olympics, factory and travel restrictions saw a 62% reduction in air pollutants, with 58% fewer asthma-related physician visits and less cardiovascular mortality within about two months https://www.atsjournals.org/doi/10.1513/AnnalsATS.201907-538CME
81 https://www.instituteofhealthequity.org/resources-reports/sustainable-health-equity-achieving-a-net-zero-uk/main-report.pdf

82 https://acmedsci.ac.uk/file-download/11365167
83 https://archive.ipcc.ch/publications_and_data/ar4/wg3/en/spmsspm-c.html
84 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1033990/net-zero-strategy-beis.pdf

benefit to the UK from meeting the WHO's guidelines[85] for safe air.[86] The CCC[87] states that current investment in Net Zero delivery is around £10 billion annually, so CANZ action today has the potential to save 16% of the annual cost of Net Zero delivery in the UK.

According to recent research commissioned by UKRI, cost efficiencies can be achieved by adopting locally 'place-specific' approaches to climate action, rather than 'place-agnostic' approaches.[88] Those we spoke to identified opportunities for more partnership working with other key stakeholders locally - including managers of other health and government premises, local enterprise partnerships (LEPs) and Chambers of Commerce to deliver on CANZ initiatives - for example district heat networks and transport network improvements.

In terms of jobs, in 2018 there were 185,000 full-time workers in England's low carbon and renewable energy economy. By 2050 across England there could be as many as 1.8 million.[89] Jobs that contribute to controlling air quality both in- and outdoors are part of the green jobs market. Often these will come from interactions with other markets - for example, ultra low emission zone (ULEZ) regulations incentivise the production and purchase of new, cleaner cars – with associated new jobs likely to be in the broader automotive sector. However, the requirement to monitor strong air quality targets would lead to some growth in this sector directly.[90] Moreover, limiting the worst impacts of climate change and improving air quality in densely populated cities, will have far-reaching implications for job quality and productivity - it is estimated that three million working days could be gained by reducing worker sickness, or sickness of children.[91] [92]

At a local level, tackling air pollution can be a key element of growth and regeneration. Local businesses and town centres can benefit in many different ways from CANZ policies. For example, pedestrianisation and creating green spaces can improve a town centre's appeal as a place to visit or do business; while taking action to reduce traffic emissions can also help save money on cleaning buildings.[93]

85 As of September 2020
86 https://www.cbi.org.uk/articles/what-is-the-economic-potential-released-by-achieving-clean-air-in-the-uk-1/
87 https://www.theccc.org.uk/wp-content/uploads/2021/06/Progress-in-reducing-emissions-2021-Report-to-Parliament.pdf
88 https://www.ukri.org/publications/accelerating-net-zero-delivery/
89 https://www.local.gov.uk/local-green-jobs-accelerating-sustainable-economic-recovery
90 https://www.local.london/wp-content/uploads/2021/11/Green-Jobs-and-Skills-in-London-Final-Report.pdf
91 https://journals.openedition.org/poldev/3107
92 https://www.cbi.org.uk/articles/what-is-the-economic-potential-released-by-achieving-clean-air-in-the-uk-1/
93 https://www.local.gov.uk/sites/default/files/documents/6.3091_DEFRA_AirQualityGuide_9web_0.pdf

Cost savings from energy efficiency and renewable energy in LA buildings and service delivery can be substantial. **Lancaster City Council's** scheme to power Salt Ayre Leisure Centre using a solar array on a disused landfill site is expected to deliver £130,000 in energy savings each year, recouping the initial investment in around seven years, alongside significant carbon reduction and clean air benefits.[94] Many UK100 members are looking ahead and aiming to minimise future energy costs by investing in renewables on buildings and land within their estates

Contributes to 'levelling-up'

CANZ policies have the scope to reduce inequalities and level up areas across the UK. The North East, West Midlands, North West and Yorkshire and the Humber regions have the highest per capita energy efficiency investment need in England[95] - improving efficiency in these areas will help put money back in the pockets of local communities. However, joined up thinking is required to maximise the opportunity. Suitable construction materials, ventilation and air management must all be in place to avoid worsening indoor air pollution when looking for building efficiency improvements.[96]

Health inequalities can also be targeted with a CANZ approach. In England, the most deprived 20% of neighbourhoods have been found to have higher air pollution levels than the least deprived neighbourhoods.[97] The poorest in society are also least likely to have control over their built environment and will struggle most with the need to balance heat indoors with ventilation (closing windows to stay warm, for example).[98] They are less likely to be able to afford new technologies like heat pumps, further increasing the burden of exposure compared to better off households. Deprived households are more vulnerable to the systemic shocks associated with climate change - extreme weather events such as flooding or hot and cold weather.[99]

94 https://www.uk100.org/projects/knowledgehub/lancaster-city-councils-salt-ayre-leisure-centre-salc-solar-farm
95 https://www.gov.uk/government/publications/energy-white-paper-powering-our-net-zero-future/energy-white-paper-powering-our-net-zero-future-accessible-html-version#chapter-4-buildings
96 https://uk-air.defra.gov.uk/assets/documents/reports/cat09/2006240802_Impacts_of_Net_Zero_pathways_on_future_air_quality_in_the_UK.pdf
97 https://www.imperial.ac.uk/news/163408/ethnic-minorities-deprived-communities-hardest-pollution/#:~:text=In%20England%2C%20the%20most%20deprived,the%20case%20in%20the%20Netherlands
98 https://www.rcpch.ac.uk/resources/inside-story-health-effects-indoor-air-quality-children-young-people
99 https://www.instituteofhealthequity.org/resources-reports/sustainable-health-equity-achieving-a-net-zero-uk/main-report.pdf

LAs are often one of the biggest landlords and builders of new homes in their areas, successfully implementing CANZ policies could reduce the number of residents experiencing fuel insecurity.

Net Zero policies need to maximise air quality improvements (and vice versa) and these policies need targeting in areas of greatest need - for example, introducing sustainable transport and other green infrastructure in the most deprived areas first - can reduce inequalities on multiple fronts.

Research participants clearly see how a CANZ approach will support their contribution to the national government's 'levelling-up' agenda and are already designing their approach to both agendas with this in mind. Acknowledging that mobility and accessibility inequalities, such as car ownership and access to public transport are highly associated with social disadvantage - **West Midlands Combined Authority** has prioritised transport interventions to better connect deprived communities.[100]

South Tyneside Council highlighted that a shift to EVs may be out of reach for people on lower incomes as they are currently more expensive to buy than fossil fuel vehicles. Future policies must be mindful of these social impacts.

Outreach and communications

Many of the key CANZ actions discussed, like modal shift towards active travel, rely on individual behaviour change, so finding the right communications messaging is essential. LAs are uniquely positioned to target messaging to local communities and other stakeholder groups in their areas.

We heard during our research from several LAs that talking about air quality and co-benefits such as health improvements with communities is often a more effective way to connect with them than climate change. Even though many people are concerned about climate change, our members found it is often more meaningful to explain the benefits of local actions in terms of local air quality and residents health and wellbeing and more likely to motivate behaviour change. Linking climate action and air quality is an opportunity for LAs to collaborate with and gather support from local communities to accelerate progress to Net Zero - the more benefits people can see from this transition, the easier it will be to achieve the scale and pace of change needed.

100 https://www.wmca.org.uk/news/full-13-billion-transport-investment-programme-confirmed/

Polling by Climate Outreach supports this idea - 87% of people were very or somewhat worried about climate change, with 50 - 94% of respondents accepting that climate change was *"real and caused by human action."* However, significant proportions (up to 40%) felt that we should *"focus on protecting the environment at home,"* rather than global engagement. Analysis of the results shows that, *"there is a strong correlation between the groups which are least engaged with the climate challenge, and those who support a local focus for environmental improvement."*[101]

Certain communities, for example, within schools, have been particularly receptive to health messaging around actions such as reduced private car use.[102] And targeting local policy makers with data from hospitals, schools and care homes in relation to air pollution, has proven to be an effective way to build political will - British Lung Foundation, for example, has successfully used their data tracker to engage local MPs.[103]

Birmingham City Council's 'Brum Breathes' engagement campaign around its CAZ implementation focuses on the health benefits of cleaner air, and has been critical in winning support from local people for their approach. It is now being expanded to include other organisations within the city, such as the Chamber of Commerce.

Future proofing CANZ approaches

Our understanding of the impacts and relative merits of some CANZ solutions is inevitably evolving. We stand a greater chance of avoiding lock-in to 'solutions' with unintended negative consequences if we proactively consider these two agendas simultaneously when selecting solutions or designing new initiatives.

The unintended consequences of incentivising diesel vehicles over petrol[104] in a bid to cut carbon emissions, only for subsequent air quality problems to arise from diesel fumes is a case in point. Our understanding of the health impacts of air pollution is expanding continuously, as is demonstrated by the fact that WHO has revised down it's air quality guidelines,[105] and the UK government intends to set new legal targets on $PM_{2.5}$.[106]

101 https://blog.bham.ac.uk/publicaffairs/wp-content/uploads/sites/89/2021/09/Addressing-the-climate-challenge.pdf
102 From interview with Philippa Borrowman, British Lung Foundation/Asthma UK
103 https://www.blf.org.uk/taskforce/data-tracker/air-quality/no2
104 https://uk-air.defra.gov.uk/library/assets/documents/reports/aqeg/fullreport.pdf
105 https://www.who.int/news-room/fact-sheets/detail/ambient-(outdoor)-air-quality-and-health
106 https://consult.defra.gov.uk/natural-environment-policy/consultation-on-environmental-targets/

The quality of GHG monitoring data is also improving, creating better opportunities to assess 'real-life' impacts rather than relying on models or extrapolated data.

We stand a greater chance of making decisions with fewer unintended consequences and maximising positive outcomes, by carefully considering air quality implications of Net Zero initiatives, and vice versa - ideally alongside other important agendas such as ecosystem recovery.

As LAs, and other organisations, ramp up efforts to meet their Net Zero targets and urgently act to address air pollution, there is a unique opportunity to innovate and maximise benefits for both agendas. Investing in long term cohesive programmes has potential to avoid the need for complex and costly rethinks in future.

In South Tyneside, new developments seeking planning permission are assessed for air quality and climate change implications - for example if a development would include biomass boilers or CHP an air quality assessment may be required. Any new development that is within the criteria set out in the *Validation of Planning Applications in Tyneside 2019* would require an air quality assessment e.g. a development in excess of 100 dwelling or 10,000m^2 floor space, or a development that would include a biomass boiler or a CHP plant.[107]

South Tyneside has also pursued innovative schemes to harness heat from water in disused mines, and from the River Tyne, and are sequestering Blue Carbon through coastal seagrass restoration projects. These innovative and bold, locally-tailored schemes steer clear of debates about pros and cons and marginal gains of one or technology solution versus another, such as marginal benefits of burning one fuel over another.

Other UK100 members flagged greater cross-boundary working to identify CANZ opportunities to address emissions from new industrial and business developments - for example collaborating to ensure active and sustainable travel options and non-fossil fuel energy sources are incorporated in developments.

107 Validation of Planning Applications in South Tyneside 2019 (which applies jointly to Gateshead, Newcastle, North Tyneside and South Tyneside) https://www.southtyneside.gov.uk/article/36142/Air-quality

Future proofing estates and local housing stock against future energy price rises is also something that leading LAs are pursuing. **Wiltshire Council's** Housing Energy Efficiency Programme (HEEP) is working to get all existing council housing properties up to EPC level B within ten years. This £50m project will deliver retrofits to approximately 5,000 homes over the next 10 years, with the key impact being on reduced energy consumption and reduced carbon emissions of this social housing. But the long term investment will also make the air cleaner, create jobs, increase health and wellbeing, tackle fuel poverty and generate council income. It will also contribute to providing expertise and knowledge on energy efficient technologies, their installation and creation of renewable energy in the local area.[108]

108 https://www.uk100.org/projects/knowledgehub/wiltshire-councils-housing-energy-efficiency-programme-heep

5. Challenges

Our research uncovered four key areas where clean air and Net Zero actions are potentially contradictory, indicating that greater oversight is needed in order to make optimal progress across both agendas. These are:

- **Challenge 1:** Combustion of fuels such as biomass and hydrogen
- **Challenge 2:** Road vehicle choices
- **Challenge 3:** Poorly designed tree planting and green infrastructure
- **Challenge 4:** Indoor air quality

Challenge 1: Combustion of fuels such as biomass and hydrogen

The combustion of low carbon fuels like biomass and other biofuel in stoves, boilers and district heating systems, as well as hydrogen in boilers, can be positive in terms of Net Zero but could have potential negative impacts in terms of air quality. LAs will need to think about how and where they are used.

While the treatment of emissions from biomass is economic at an industrial scale, this is not currently the case with domestic wood burning stoves and pellet boilers.[109] Latest government research shows that the wood-burning stoves, which are used by only around 8% of the UK population, emit more fine PM than road traffic.[110] These stoves account for just 11% of the energy used for heating and cooking, but cause 54% of health-related costs.[111] And that does not include their negative impact on indoor air quality.

The air quality impacts of biomass/biofuel combustion can be hyper-local, so where installations are positioned, for example, how close they are to high density residential areas and key infrastructure like schools, is important.

109 https://royalsociety.org/-/media/policy/projects/air-quality/air-quality-and-climate-change-report.pdf?la=en-GB&hash=D0318D2EE1F11A087C8CBF03373DF770
110 https://www.gov.uk/government/statistics/emissions-of-air-pollutants
111 https://cedelft.eu/wp-content/uploads/sites/2/2022/03/CE_Delft_210135_Health-related_social_costs_of_residential_heating_and_cooking_Def_29march22.pdf

The CCC's pathways are designed to exclude measures or structural changes that would be anticipated to make air quality significantly worse over the long term, for example permanent shifts to combustion of biomass to heat buildings.[112] However, LAs are at the forefront of minimising air quality impacts from the combustion of biomass in the immediate term. The key powers at their disposal to ensure CANZ goals are met are:

- the introduction of Smoke Control Zones (SCZ) - where smoke cannot be emitted from a chimney unless burning an authorised fuel or using 'exempt appliances', powers which were extended under the 2021 Environment Act113
- exerting control over the positioning of biomass and biofuel combustion sources, like CHP in district heating systems, through the planning system. In general, these installations should be avoided in built up areas and close to key infrastructure like schools.

There is an additional risk that the transition of hydrogen combustion in domestic boilers could have negative NO_x impacts. At present, there are a range of hydrogen boiler designs, some of which already show lower NO_x emissions when burning hydrogen (than natural gas). Others, however, show higher emissions. So, setting the standard for future installations to the least polluting is essential to avoid baking-in a domestic NO_x source for the next 20+ years, given the lifetime of boilers.[114]

Challenges for LAs:

- The absence of stricter targets for air quality, including $PM_{2.5}$ is a key issue - without a clear mandate it is harder for LAs to act
- Patchy coverage and lack of resources to enforce SCZs (for most authorities, communicating with residents about the potential negative health impacts is more realistic than policing installations and issuing penalties)
- limits to planning powers, especially with large scale developments
- reliance on national government to set clear standards on hydrogen boilers to avoid locking in a new potential NO_2 source.

112 https://www.theccc.org.uk/publication/sixth-carbon-budget/
113 https://www.gov.uk/government/publications/environment-bill-2020/10-march-2020-air-quality-factsheet-part-4
114 https://www.endsreport.com/article/1723633/scientist-warns-nox-urban-pollution-hydrogen-boilers

Challenge 2: Road vehicle choices

Alongside modal shift, many LAs are promoting non-fossil fuel powered road vehicles - through interventions focused on air quality such as CAZ, and others more geared towards Net Zero such as supporting transport electrification. As outlined above, a comprehensive package of measures is required to ensure that mode shift, active travel and cleaner vehicles are included. Reducing overall traffic is necessary for LAs to achieve a good CANZ outcome.

The research highlighted the complexities LAs experience when considering how to make future road vehicle choices and policies, thinking about achieving multiple policy objectives and navigating conflicts between national interventions and their local needs. For example, non-fuel related PM emissions (from brakes and tyres, for example) are still an issue with EVs. The source of the electricity used to power EVs also has significant implications for their contribution to Net Zero - electricity from renewables needs to be prioritised for the electrification to make maximum contribution to UK Net Zero. The differences between petrol and diesel vehicles, charging infrastructure technologies, and different vehicle emissions ratings, can be complex and the landscape of various vehicles taxes, charges and regulations is challenging.

Moreover, the role and benefits of EVs varies across locations and socio-economic groups. A shift to EVs or other lower emission vehicles also involves a significant up-front cost, which makes them prohibitively expensive for many people on lower incomes.

In rural areas where it is more difficult to create comprehensive public transport coverage, EVs are important to the Net Zet transition. And whilst issues of tyre and brake dust causing $PM_{2.5}$ are still a concern for rural areas, it is possible that the immediate health impacts of these are not as impactful in less densely populated areas. Charging infrastructure provision is also a key challenge for rural areas.

Challenges for LAs: Our research flagged the following challenges:

- complexity of data modelling needed to assess real-life implications of different vehicle choices
- the national focus on CAZ as an intervention to achieve short term legal compliance with NO_2 air pollution levels, misses the opportunity to design more ambitious national and local approaches which could make a more significant contribution to CANZ overall
- lack of clarity over roles and responsibilities for EV charging infrastructure.

Box 3: Clean Air Zones

LAs can set up a CAZ as part of a plan to improve air quality through a CAZ Charging Scheme Order (CSO). These can be charging or non-charging.

The aim of CAZ is to prevent the most polluting vehicles entering a specific area.

In 2017, 28 authorities with high levels of pollution were asked to consider implementing CAZ, unless they could show other measures could reduce NO_2 'as soon as possible'.

In city centres, it has been found that the best way to cut NO_2 and GHGs is to target high mileage vehicles such as delivery vehicles or taxis.[115]

Examples: The City of Edinburgh Council's LEZ was introduced on 31 May 2022 and will be enforced from 1 June 2024. The LEZ is targeted at addressing areas where certain pollutants, including nitrogen dioxide (NO_2), are higher than the legal standard, primarily due to road traffic. The city centre LEZ will reduce pollution across the whole city, not only within the zone, evidenced by modelling undertaken by SEPA. The City of Edinburgh Council has also considered how the LEZ supports progress on Net Zero targets. Edinburgh's LEZ aligns with the City Mobility Plan (CMP) of which GHG reduction and carbon emission-free mobility is a fundamental element. Edinburgh's strategic prioritisation of sustainable travel choices supports the city's 2030 Net Zero target by reducing the need for private car use and creating more pleasant environments for people to live, work and enjoy leisure time.[116]

115 https://green-alliance.org.uk/wp-content/uploads/2021/11/The_case_for_clean_air_zones.pdf
116 Workshop comment

Leeds City Council is supportive in principle of hydrogen for heavier vehicles which would help both local Net Zero and air quality ambitions. The council is exploring the case for investing in refuelling infrastructure. Clarity is needed on the details of the new Bus Services Operator Grant to understand how/whether hydrogen will be factored into the subsidy for Zero Emission Buses, which will help local authorities like Leeds with their future fleet investment decisions. Leeds also identified a potential conflict between clean air and Net Zero when designing its proposed CAZ for consultation.[117] A shift away from diesel to Euro IV petrol vehicles, which the proposed CAZ B[118] was designed to encourage, was expected to improve air quality but would increase CO_2 emissions. The council worked with University of Leeds to evaluate real-life emissions of different vehicles and identified a clear rationale for their CAZ B Plus proposal - raising the charge-free standard to encourage petrol hybrids instead in order to deliver CANZ benefits.

Leeds also ran a pilot electric van initiative with funding from Highways England which gave local businesses an opportunity to test-drive one of 70 electric vans for two months. They helped the businesses assess costs, create a business case for a switch to an EV and encouraged peer-to-peer promotion of business experiences. After the pilot 80% of participants said they would consider buying an electric van. Schemes like this will bring more benefits as technology to minimise non-exhaust emissions can also be incorporated, along with supporting a business case and CANZ impact assessment.

Challenge 3: Poorly designed tree planting and green infrastructure

Tree planting is a key pillar of the UK's Net Zero Strategy, which sets a goal to treble woodland creation rates in England, contributing to the UK's overall target of increasing planting rates to 30,000 hectares per year by the end of the Parliament.[119] In non-woodland settings, LAs can apply to Defra's Local Authority Treescapes Fund for grants of between £50,000 and £300,000, working in partnership with NGOs and community groups.[120]

117 Leeds CAZ was not implemented in the end after monitoring showed that air quality had improved and a vast majority of drivers or vehicles which would have been subject to a charge, had already switched to a cleaner vehicle https://news.leeds.gov.uk/news/leeds-clean-air-zone-has-achieved-its-aims-early-and-is-no-longer-required-joint-review-finds
118 For definitions of CAZ types see: https://www.gov.uk/guidance/driving-in-a-clean-air-zone#types-of-clean-air-zones
119 https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1033990/net-zero-strategy-beis.pdf
120 The grants are for schemes in both rural and urban areas - for example, parks, copses and shelterbelts, as well as green lanes, small linear woodlands alongside roads and footpaths, and vacant and disused community spaces https://www.gov.uk/guidance/local-authority-treescapes-fund

Tree planting and green infrastructure have a range of benefits - contributing to biodiversity gain, acting as a carbon sink, and having a positive impact on visual amenity and mental health.

In terms of air quality, however, they can have both positive and negative effects. Trees can be used to screen against air pollution in both rural contexts (around farm buildings, for example), and urban ones (to protect school playgrounds). However, the way that trees are planted can have unexpected consequences - for example, by reducing air flow trees can in fact create higher exposure for street users like pedestrians.[121]

Furthermore, some tree species lead to elevated VOC emissions, which in turn contribute to PM levels. In urban areas, although trees could be expected to reduce pollution due to their cooling impact and increased surfaces for pollution deposition, planting high-emitting VOC species could limit this gain.[122]

Planning by LAs around the type of trees planted (beech and lime instead of willow and oak, for example) and the way that they are planted, particularly in urban areas, will be key to maximising the potential CANZ benefit.

And rural areas too need to plan for tree planting in a way which considers clean air, Net Zero and biodiversity. The experience of Berrier Farm, in which the Forestry Commission granted permission to plant conifers in ancient peatland - a significant carbon sink - should be learned from in this respect.[123]

Challenges for LAs:

- understanding the complexities around pollution flows and how this is impacted by tree planting
- resources/capacity for relevant teams within LAs to undertake suitable analysis and design to maximise co-benefits and minimise unintended consequences.

121 https://uk-air.defra.gov.uk/assets/documents/reports/cat09/1807251306_180509_Effects_of_vegetation_on_urban_air_pollution_v12_final.pdf
122 https://royalsociety.org/-/media/policy/projects/air-quality/air-quality-and-climate-change-report.pdf?la=en-GB&hash=D0318D2EE1F11A087C8CBF03373DF770
123 https://deframedia.blog.gov.uk/2020/12/09/channel-4-on-planting-on-peat-bogs/

Challenge 4: Indoor air quality

Indoor air quality and Net Zero objectives can come into conflict particularly in relation to energy efficiency and ventilation options. Improving 'air-tightness' saves energy, but can exacerbate poor indoor air quality and conversely ventilation systems to improve air quality can increase energy use and so hamper progress on Net Zero.

On average we spend 90% of our time indoors and children, in particular, may be exposed to high levels of indoor air pollution at school, and are particularly vulnerable to its impacts.[124]

Improving indoor air quality is a complex issue, and one where LAs have limited powers. However, it is central to addressing health inequalities and levelling-up ambitions. The poorest in society, for example, are most likely to reduce ventilation (closing windows, for example) in order to conserve heat and energy, potentially leading to the build up of pollutants indoors. These have a variety of sources, from combustion (such as cooking) to VOCs from building materials, furniture and cleaning products, as well as possible outdoor sources (traffic pollution entering from outside).

There are a number of complexities for LAs seeking to improve indoor air quality as part of a joined up CANZ strategy:

- the drive to improve energy efficiency in buildings has led to an increase in 'air-tight' construction - where indoor pollutants may be more likely to build up
- conversely, mechanical ventilation and air filtration systems can be energy intensive. Care must be paid to the balance between energy efficiency, thermal comfort and ventilation in the planning and retrofit processes
- the right solutions for any particular site or building are likely to be very site-specific. For example, a school or block of flats facing a main road may benefit from having closed windows, but one away from traffic will benefit from having windows that are open. The presence of green or blue space nearby may make a difference
- some important sources of indoor air pollution are completely unrelated to those associated with GHG emissions, so need to be addressed by separate initiatives (emissions from furniture, cleaning products etc).

124 www.tapasnetwork.co.uk

Key action points for LAs include working with the most vulnerable residents in contexts where they do have influence indoors. Schools across the UK, for example, have recently been given CO_2 monitors by the government to monitor indoor air as a result of COVID-19.[125] These are also a good indicator of indoor air pollutants generally, and LAs can work with schools and other partners to help empower the school community around the use of the monitors and interpretation of the data.

LAs can also play a role educating residents on how to balance ventilation and indoor air quality. NICE guidance[126] recommends that LAs can include indoor air quality with Air Quality Management Plans, but this guidance does not explicitly account for interlinkages with Net Zero.

Examples: Whilst, indoor air quality is not mandatory in the planning framework it can be added on by astute planners seeking a balance between ventilation and energy efficiency. Camden addresses indoor air quality in planning conditions for developments via Section 106 Legal Agreement.

Camden has also created an indoor air quality guide for homes,[127] is reaching out to residents in private rented accommodation by providing information to new tenants. It is also working with public health and NHS partners to raise awareness amongst health practitioners, as is Leeds CC, whose health work is raising awareness of all sources of pollution to help those most vulnerable.

These actions can be supported by making sure LAs are using their powers against private landlords regarding extreme heat and cold.

Challenges: LAs highlighted challenges arising from:

- a lack of influence over private rented housing and other private housing
- a lack of resources to train planning teams and to tailor solutions to individual buildings and locations
- building standards are lagging behind - current regulations place emphasis on energy efficiency and contain few specific standards for air quality. There are recommended minimum levels of air flow through a building, but there is evidence from the UK that of homes which do not meet these standards[128]
- lack of data can also hamper efforts to prioritise action and evaluate interventions.

125 https://www.cibsejournal.com/news/all-schools-to-get-co2-monitors/#:~:text=All%20schools%20to%20get%20CO2%20monitors%20DfE%20to,and%20ventilation%20effectiveness%20when%20pupils%20return%20this%20month
126 https://www.nice.org.uk/guidance/ng149
127 https://www.camden.gov.uk/documents/20142/0/Improving+Indoor+Air+Quality+-+Advice+for+Homes.pdf/d8bf8fe0-6db7-c7cf-858b-6eef0667a17e?t=1585820778519
128 https://www.rcpch.ac.uk/resources/inside-story-health-effects-indoor-air-quality-children-young-people

6. Key insights

The research has highlighted a number of key areas in need of improvement in order to make CANZ approaches easier to realise.

Clearer mandate for CANZ

Many LAs are taking bold steps towards their Net Zero ambitions, but feel hampered by lack of 'official' mandate pushing them to be more ambitious. A similar situation arises in relation to air quality. LAs' existing statutory duties are not adequate to drive action to address the full scale of health impacts which their communities are exposed to. The lack of ambition in national policy and specific local mandates, means many LAs are not driven to take forward more ambitious actions on air quality. Some LAs, such as Camden and Leeds have approved policies in line with recommended WHO guidelines for air pollutants, which flow through into their day-to-day decisions and investment plans.[129] However, the absence of clear targets from central government to set expectations for local delivery of Net Zero, and more ambitious goals for clean air means that opportunities for local action - such as the win-win areas set out above - are not always pursued. It is too easy to deprioritise action, hoping someone else will 'fix' it.

The Environment Act 2021 establishes a legally binding duty on government to bring forward at least two new air quality targets, one of which must relate to $PM_{2.5}$, by 31 October 2022.[130] [131] This is a significant opportunity to set a clear direction of travel to protect people's health and boost the transition to Net Zero efforts at the same time by providing the regulatory driver for the win-win solutions set out above which deliver multiple co-benefits.

129 The WHO recommended levels referred to are the 2005 standards. Updated WHO Global Air Quality Guidelines were released in September 2021. https://www.who.int/news/item/22-09-2021-new-who-global-air-quality-guidelines-aim-to-save-millions-of-lives-from-air-pollution
130 https://uk-air.defra.gov.uk/library/air-quality-targets
131 https://www.gov.uk/government/publications/environment-bill-2020/august-2020-environment-bill-environmental-targets

Proposals published for consultation by the government in March 2022, if achieved, are predicted by government analysis to deliver significant health improvements[132][133] but with the annual mean concentration proposed target at twice that recommended by WHO,[134] and with a compliance date of 2040, they appear to still lack the ambition needed for outdoor air quality, and there remains no target for indoor air quality.

Positive and ambitious messaging is important, alongside the right targets. LAs who have successfully introduced CAZ or other measures to improve air quality highlighted how important positive rhetoric from local leaders was to highlight the multiple benefits of actions to improve air quality. A broader positive rhetoric about climate, air quality and wellbeing benefits from leadership both nationally and locally would enable more rapid progress - the lack of this positive narrative, even the beginnings of a conversation on some issues, such as indoor air quality or the challenges of wood-burning stoves is a real barrier to action.

Concerns about negative reactions from residents and worries about clashes between CANZ and other LA goals, such as income generation from parking and economic development, are making some LAs hesitant to open the local debate on these issues, despite the clear opportunities for meaningful community benefits. There is a particular opportunity to create a new more positive vision to guide transformation of our city centres - as a large proportion of people live in and are experiencing some of the worst air pollution in these areas.

Enhanced local powers

LAs do have a wide range of powers which they can use to make progress towards Net Zero and improve local air quality, such as place-shaping powers via local development planning, traffic planning powers, and power to implement SCZ. They can also use their power to consider social value in procurement - South Tyneside Council integrated CANZ requirements in a contract for local development so these contractors now use EVs and solar panels on staff welfare cabins during the work, reducing pollutants from diesel vehicles and generators. Public health remits afford wide scope for action too.

132 https://consult.defra.gov.uk/natural-environment-policy/consultation-on-environmental-targets/
133 A reduction in population exposure in England of just 1µgm-3 could prevent an estimated 50,000 cases of coronary heart disease, 16,500 strokes, 9,000 cases of asthma and 4,000 lung cancers over 18 years according to Defra consultation March 2022 https://www.gov.uk/government/publications/health-matters-air-pollution/health-matters-air-pollution
134 https://www.who.int/news-room/fact-sheets/detail/ambient-(outdoor)-air-quality-and-health

Our research highlighted potential benefits from additional powers, such as bus franchise powers, greater planning powers to counter power on developers and extended powers over private sector accommodation (such as for terrace x terrace retrofit). More significantly, however, we heard that LAs would be able to make more progress if they had more resources and capability to effectively act on and enforce existing powers. Simpler and less costly processes for implementing traffic control orders; resources to engage communities and carrying out enforcement of SCZ; and more ambitious planning policy guidance to deliver the win-wins flagged above would help.

More comprehensive and longer term funding

During our research we heard a very clear message - including from LAs which had been successful in gaining significant funding to move forward their CANZ ambitions - that a sustained and much more significant investment is needed to create the necessary transition in our communities. Small, competitive pots of funding for piecemeal initiatives, often with unrealistic delivery timescales, and limited funding available to cover management time, will not deliver Net Zero or clean air for UK communities. There are some very specific opportunities to change the funding settlement:

- a large scale package of investment, well-designed delivery mechanism and supporting resources to drive retrofit and decarbonise home heating. The lack of this investment across the country is one of the single biggest barriers to making progress on Net Zero, and that this investment can easily be aligned to deliver air quality goals simultaneously. As we move towards electrification of transport, domestic energy use becomes a more significant proportion of the outdoor and indoor air quality challenge and demands a significant investment plan to create the transition needed. For the boiler upgrade scheme launched in April 2022, the government has set aside just £450m over up to three years, which will cover a maximum of 90,000 boilers, all of which will be rural, off-grid properties. And whilst this is an important intervention, it is well short of what is needed[135]

135 https://www.gov.uk/guidance/check-if-you-may-be-eligible-for-the-boiler-upgrade-scheme-from-april-2022 Note it will also cover biomass boilers in rural locations or properties not on the gas grid. EPC recommended insulation measures must be completed first, or as part of the works

- Social housing also needs retrofit - LAs need to be able to allocate funding to progress this, and this can be a useful market signal which will help drive market transformation which will make it more affordable and accessible to transform private housing stock, including driving the sector to develop the skills needed

- LAs are also well placed to transform their own estate buildings, and many are doing so with installation of renewables on their own land and buildings - this needs to happen consistently across the entire public sector estate. The Public Sector Decarbonisation Scheme is playing a role in this, however, the funding is still short term and competitive, so local authorities without capacity to apply are not enabled to upgrade their buildings. A coherent funding packaging which includes commitment to the resources needed for project development and coordination across local government and key delivery partners is required

- More funding to support modal shift, such as for school streets, cycling and walking infrastructure, LTNs and to improve public transport provision across rural and urban areas alike. The forthcoming consultation on Local Travel Plans represents a significant opportunity for more cohesive CANZ priorities to be factored into longer term planning and funding. and other things Low Traffic Neighbourhoods, to support other organisations such as bus companies to play their role in the transition

- With new expectations and duties set out in the Environment Act, and increasing need to deliver on CANZ goals, LAs need sufficient resources for the development, coordination, enforcement, community engagement, staff capacity building and other management activities which are necessary for an effective transition and delivery of all the duties expected of them. It is essential in this context that government grants allow for resource costs as well as capital

- Innovation funding must also align to both agendas, and focus on delivery of multiple benefits.

Better governance to prioritise win-wins

Integrating both climate impacts and air quality into governance and decision-making processes in LAs is a significant opportunity to ensure co-benefits can be maximised. Many decisions made by LAs leave long lasting legacies, shaping people's lives for generations to come - communities and the UK may be locked into unsustainable pathways which make it impossible to meet CANZ goals. Good governance processes and internal structures are required to avoid this lock-in.

Setting clear organisation objectives is the first step which then flows into better decisions. Camden's CANZ targets, for example, provide a clear justification for implementing initiatives such as LTNs because they contribute to delivering the council's agreed objectives.

Increasingly LAs are formally changing their decision-making processes to take account of climate change impacts of decisions, and also air quality. These often go beyond statutory requirements, to focus on implementing more ambitious council corporate objectives in relation to climate change, clean air, health and environmental goals. Several LAs including Cornwall Council and South Tyneside Borough Council are drawing on approaches such as 'Doughnut Economics' to help them take account of multiple issues simultaneously.[136]

Camden has recently changed its constitution to introduce a duty for all decisions to protect or enhance the national environment. Training staff to build their capacity to implement these effectively is being provided through a new e-learning module for all staff.

Even where a process to assess the climate or air quality impact of decisions is in place, the assessments may lack depth, may not be fully taken into account in the final decision, or may be hampered by lack of resource, data or expertise.

Good internal organisational structures can also help progress. Some LAs, such as Leeds, employ people with a joint remit to consider both climate impacts and air quality impacts and in many other LAs there are people working hard to join the dots between these two agendas and ensure opportunities to deliver on both are realised.

136 https://www.uk100.org/projects/knowledgehub/cornwall-council-decision-wheel

Collaboration across teams and avoiding silo working has been a critical success factor in enabling action.

Our research highlighted that the creation of a new National Regulatory Framework setting expectations for LAs - something which has been called for to support climate action - would also be beneficial for clean air and ensure LAs have clearer mandate to take action on multiple agendas they have responsibility for.[137]

Many of the good governance approaches that we heard about in our research are not specific to CANZ - they are common themes of more general organisational change. For CANZ, and other issues, a key step is recognising the nature and scale of change needed and then taking concerted action to enable that to happen.

Grid transformation

Many LAs are trying to increase local renewable energy generation, on their own premises and land and supporting community and local business to increase renewables - one of the biggest win-win actions which can deliver CANZ benefits. Significant challenges in accessing electricity grid connections due to lack of capacity and the expense and complexity of changing outdated energy contractual arrangements is not only holding back Net Zero, but was flagged to us as a barrier to delivery of clean air goals too.

Working with the energy sector to ensure that the transformation of the grid accounts for the needs and requirements of LAs and their communities is key. This can also improve understanding of potential that LAs can offer in terms of renewable development, which can also lend more flexibility to the grid; mutually beneficial for networks and local areas alike.

Rapid electrification of the rail network is another important national infrastructure change which is needed in order for LAs to deliver on the CANZ goals. This is particularly important for reducing health inequalities as many of people worst affected by air pollution near major railway stations are also highly deprived communities with significantly worse health outcomes.

137 https://www.uk100.org/sites/default/files/publications/Power_Shift.pdf

7. Recommendations for action

Taking the insights from the research above into consideration, it is clear that there are some recommendations that could help realise the implementation of CANZ approaches and the related cross-cutting co-benefits. These steps would help prioritise the win-win opportunities, and avoid the potential conflicts.

- **A clearer ambition and new narrative** focused on the benefits of delivering CANZ responses together. Net Zero plans and policies must include a goal to improve air quality. Nationally, the Air Quality Strategy Consultation due for consultation in May 2023 is a key opportunity to reset ambition. In the shorter term, a more ambitious and positive national and local rhetoric can unlock progress. CANZ should be seen as a way to transition from a view of air pollution that is solely roadside/NO_2 focused. PM (especially $PM_{2.5}$) is the biggest health challenge in terms of air quality. Therefore all combustion sources, especially heat, need to be considered in forward-thinking CANZ strategies

- **Sustained support for local action:** longer term, dedicated funding to allow effective planning and implementation. Revenue funding should complement capital funding to ensure resources are available for development, capacity building, management and community engagement

- **Good local governance supported by a national regulatory framework:** a clearer mandate and guidance on local implementation which takes into account huge opportunities for LAs to be delivery partners on CANZ ambitions. LAs can explicitly set corporate CANZ objectives and systematically integrate these into decision-making, accountability and staffing. Greater transport and development planning powers, an overhaul of national building regulations and simpler enforcement would enable more action at the pace and scale required

- **Better access to data:** Monitoring and reporting of both air pollutants and GHGs needs improving. A comprehensive network of air quality sensors and scope 3, industrial point source data provided to LAs, as well as improved local meteorological data monitoring stations would allow better understanding of other factors influencing air pollutants and GHG emissions, which could in turn support more effective policy intervention design and delivery

- **Identifying key moments and partnerships** when joined-up action is crucial. LAs should use place-shaping powers to bring the two agendas together at key stages - for example, in the development of local plans, consideration of large planning applications, etc. Stakeholders across the community should be engaged and communications on plans should be clear and inclusive. Partnership opportunities to develop and scale initiatives should be sought, including between neighbouring LAs to ensure that the transboundary impacts of pollutants can be considered

- **Better grid access for local renewables:** a modernised grid which should facilitate and incentivise greater investment in and deployment of energy storage. Smart local grids and decarbonised heat should be developed so that power can be generated and consumed locally, reducing costs. Rail network electrification should be prioritised

- **Upskilling medical practitioners:** Updating national training programmes for physicians and medical professionals regarding health impacts of air pollution and risk reduction strategies for high risk patients.

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