

The impact of poor air quality on health in Birmingham – Call for Evidence

Transport for West Midlands (TfWM) Response

1) What evidence is there about air quality, emission sources, and level of air pollution in Birmingham or in specific pollution hotspots?

Evidence of air pollution levels can be supplied through the complimentary use of monitoring (which gives highly localised measurements of air pollution) and models (which allow for the estimation of air quality across wide geographies and allow us to predict what air pollution might look like in the future).

TfWM primarily relies on the reporting and insight development of Environmental Protection departments responsible for air quality in the metropolitan local authorities (including Birmingham City Council) to provide evidence of air quality. In addition, national reporting of air pollution is supplied by DEFRA¹. TfWM is also aware of a number of trials of light-weight air quality sensors around Birmingham that are helping to build understanding of pollution at certain locations across the city. TfWM has not seen outputs from this study yet. The Low Emissions Town and Cities Partnership (LETCP) (comprised of officers from the WMCA constituent authorities) also commissioned Ricardo-AEA to produce evidence of air pollution across the West Midlands (including Birmingham) for its West Midlands Low Emission Zones: Technical Feasibility Study².

Nitrogen Dioxide

Evidence points to current problems with respect to meeting the UK's nitrogen dioxide limit value in air quality regulations at the following locations:

- Birmingham City Centre (within the A4540), particularly:
 - A38 and A4400 through the city centre
 - Areas of the A4540 – especially between Dartmouth Circus and Camp Hill Circus
 - Upper Dean St and the B4100 between Moor St Queensway and Digbeth Police Station
- A38 (M) Aston Expressway
- M6 (not within combined or local authority direct control)

Particulate Matter

Currently, TfWM is unaware of any breach of regulatory limits for particulate matter in Birmingham. Similarly, TfWM is unaware of any current mapping of particulate matter in Birmingham. However, it is understood that current regulatory limits of very fine particulate matter (PM2.5) are higher than those recommended in World Health Organisation (WHO) and in addition, WHO concedes that even though they have produced recommended limits, there is no "safe limit" for particulate matter from a public health perspective.

2) How do these rates compare to other comparable major cities in the UK and Europe?

In order to compare areas it is advisable to ensure that areas have been assessed using the same methods given the variation in methods used for modelling and monitoring air quality.

National Comparison

¹ <https://uk-air.defra.gov.uk>

² http://cms.walsall.gov.uk/low_emissions_towns_and_cities_programme

For this reason TfWM has compiled an analysis of DEFRA's air quality assessment³ of the UK's 38 (out of 43) zones that required an air quality action plan to reduce nitrogen dioxide in 2015 (Appendix 1). The "West Midlands Urban Area" is the relevant zone for Birmingham (however, it also contains other surrounding urban areas including the Black Country).

This analysis showed that the West Midlands Urban Area ranked:

- Second for total road length exceeding the national air quality objective for nitrogen dioxide. Only the Greater London Urban Area had more road length exceeding the air quality objective.
- Second for the road length per square kilometre exceeding the national air quality objective for nitrogen dioxide. Only the Greater London Urban Area had more road length per square kilometre exceeding the air quality objective.
- Fourth for proportion of assessed roads exceeding the national air quality objective for nitrogen dioxide, exceeded only by the Greater London Urban Area, Kingston-Upon-Hull, and Coventry and Bedworth zones.
- Equal fourth for the maximum modelled annual mean (which occurred on the A4400 near to the Mailbox), exceeded only by the Greater London Urban Area, West Yorkshire Urban Area, North West and Merseyside, and the Eastern zones.

European Comparison

At a European level the best available data to compare areas is produced by monitoring stations across the region (given the different approaches to modelling that are used). This data is published by both the European Environment Agency⁴ and World Health Organisation⁵.

TfWM is aware of national⁶, European⁷ and global⁸ reports that include levels of assessment of exposure and health impacts.

Many other European member states are experiencing difficulty with achieving compliance with the limit levels for nitrogen dioxide set out in European legislation with 14 out of 28 member states being non-compliant with the annual average mean requirements.

Compliance with the limits set for particulate matter is more widely achieved across Europe. Exceedances of the limits related to coarser particulate matter (PM₁₀) are strongly grouped around Czech Republic, Italy, Poland, Slovakia and the western Balkan cooperating countries.

Whilst Birmingham is currently compliant with annual mean limits for particulate matter it should be recognized that current levels still represent a health risk.

3) What are the main types of air pollution that affect people's health, where do they come from, what is that health impact, and who is likely to suffer the effects?

UK and EU air quality regulation includes limit values for a number of pollutant species given their effects on health (Appendix 2). In addition the WHO produces guidelines that include

³ <https://www.gov.uk/government/collections/air-quality-plan-for-nitrogen-dioxide-no2-in-uk-2015>

⁴ <http://www.eea.europa.eu/themes/air/air-quality/map/airbase/air-quality-statistics-at-reporting-stations>

⁵ <http://maps.who.int/airpollution/>

⁶ <https://www.gov.uk/government/publications/estimating-local-mortality-burdens-associated-with-particulate-air-pollution>

⁷ <http://www.eea.europa.eu/publications/air-quality-in-europe-2016>

⁸ <http://www.who.int/phe/publications/air-pollution-global-assessment/en/>

recommended limit values for concentrations of different air pollution species that people may be exposed to in order to protect their health (Appendix 3). Even though legislation and guidance express mandatory and suggested limit levels for air pollution, it is generally acknowledged that there is no safe level of nitrogen dioxide and particulate matter in that both pollutants continue to have impacts on health even below the limit values.⁹

The primary pollutants that are of concern in Birmingham currently are:

- Nitrogen Dioxide
- Particulate Matter (particularly fine particulate matter – PM2.5)

The following is a summary of information available from the National Atmospheric Emissions Inventory and gives a brief summary of pollutants, their sources and their health effects.¹⁰

Air pollution is harmful to everyone. However, some people suffer more than others because they:

- Live in deprived areas, which often have higher levels of air pollution;
- Live, learn or work near busy roads (including street cleaners, freight drivers, taxi/PHV drivers, traffic police and bus drivers); and
- Are more vulnerable because of their age or existing medical conditions.

These vulnerabilities are heightened among those living in the most deprived communities. This is due to poor housing and indoor air quality, the stress of living on a low income, and limited access to healthy food and/or green spaces. Moving away from an area of high outdoor air pollution may be unaffordable for local residents. Some people may not want to leave their homes either.

4) Are there any trends which can be identified in relation to air quality and public health in the city?

The LETCP's West Midlands Low Emission Zones: Technical Feasibility Study included health assessments for air pollution across the West Midlands including Birmingham. This included estimates of projected health impacts based on assumed improvements to air quality between 2011 and 2026. However, this was based on health outcome modelling as opposed to the observance of real life trends in the city.

TfWM is unaware of any studies of trends between actual observed changes in public health outcomes in Birmingham and air pollution monitoring and/or modelling. TfWM would welcome working with Birmingham City Council and the other constituent authorities of the West Midlands Combined Authority (WMCA) in order to improve insight in this area.

5) For each air pollution related health problem, what is the likely nature and scale of impact on the City's health care system, and what are the likely social and economic costs of this?

⁹<http://www.euro.who.int/en/what-we-do/health-topics/environment-and-health/air-quality/publications/pre2009/air-quality-guidelines.-global-update-2005.-particulate-matter,-ozone,-nitrogen-dioxide-and-sulfur-dioxide>

¹⁰ <http://naei.defra.gov.uk/overview/ap-overview>

The LETCP's West Midlands Low Emission Zones: Technical Feasibility Study¹¹ included health impact assessment for air pollution across the West Midlands including Birmingham. It included estimates of:

- Nitrogen dioxide health impacts
 - Deaths per year attributable to nitrogen dioxide air pollution
 - Prevalence of chronic bronchitis in asthmatic children
 - Respiratory hospital admissions per year
 - Particulate matter health impacts
- Annual deaths per year attributable to particulate air pollution
 - Life years lost per year attributable to particulate air pollution
 - Hospital admissions for cardiovascular diseases
 - Hospital admissions for respiratory diseases
 - Restricted activity days
 - Workdays lost

TfWM is not aware of any assessment of the economic cost of air pollution in Birmingham. However, an assessment from Every Breath We Take¹², a report on the impact of poor air quality in the UK, estimated that the monetised impact of air pollution on the UK as a result of costs to society, business, health services and people is £20bn every year.

Additionally, in its 2009 report, COMEAP expressed the view that the best estimate of chronic health impacts of particulate matter exposure was a 6% increase in death rates per 10 µg m⁻³ increase in PM_{2.5} concentration.¹³ Furthermore, in DEFRA's 2015 report "Valuing impacts on air quality: Updates in valuing changes in emissions of Oxides of Nitrogen (NOX) and concentrations of Nitrogen Dioxide (NO₂)", it was recommended that for each 10 µg m⁻³ change in exposure to nitrogen dioxide the mortality of the exposed population be reduced 2.5% within a range of 1% and 4%.¹⁴

6) Birmingham has been ordered by the Government to impose charges in 'clean air zones' to cut pollution. What types of vehicle, driving mode, local and fuel system most contribute to the health impacts of road traffic, and what would be the most effective ways of implementing and operating a 'clean air zone' so as to minimise these burdens?

Types of vehicle

When considering the emissions from individual vehicles, general trends show that larger, heavier vehicles with higher engine capacity tend to emit more pollutants. This can be seen in the

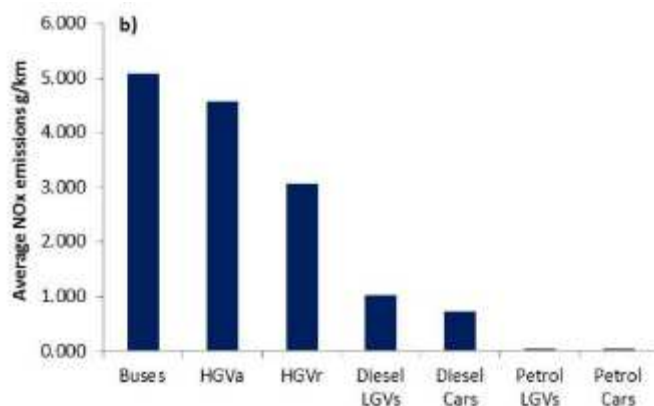
¹¹http://cms.walsall.gov.uk/west_midlands_letcp_low_emission_zones_-_technical_feasibility_study_wp2_economic_and_health_impacts-2.pdf

¹² <https://www.rcplondon.ac.uk/projects/outputs/every-breath-we-take-lifelong-impact-air-pollution>

¹³ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/304641/COMEAP_mortality_effects_of_long_term_exposure.pdf

¹⁴ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/460401/air-quality-econanalysis-nitrogen-interim-guidance.pdf

figure below extracted from DEFRA's Air quality plan for NO₂ in UK.¹⁵ The figure shows average vehicle emissions per kilometre emitted by Euro 5/V vehicle type.



However, in its comparison DEFRA gave no information on how the many other variables that impact emissions. Assumed driving conditions would be important to know in interpreting this information. It is also important to consider how efficient different vehicles are in terms of delivering their respective payloads. Whilst a single larger vehicle may emit more pollution, more pollution might be emitted if a number of smaller vehicles were required to deliver the same payload.

It is also useful to consider how much different vehicle types contribute to air pollution in terms of the overall contribution from each vehicle class to roadside emissions.

Driving modes

Driving style and conditions have a large influence on emissions from vehicles. In general driving in a way that causes a vehicle's engine to work harder (i.e. driving up-hill, carrying a heavy load, aggressive acceleration deceleration, stop-start congestion driving) will cause higher emissions rates.¹⁶

Driver behaviour can be changed both by the encouragement of eco-driving techniques and traffic management.

Fuel Systems

The worst fuel system for air pollution is the diesel engine. Unfortunately, diesel fuel is the most widely consumed fuel for road transport¹⁷ this is because of its ubiquitous use in heavy-duty vehicles and light commercial vehicles, and its popularity in new car sales (accounting for approximately 50% market share).

What would be the most effective ways of implementing a 'clean air zone' so as to minimise these burdens?

As a minimum measure of success, Birmingham's Clean Air Zone must ensure that levels of nitrogen dioxide in the city are reduced to below regulatory limit values as soon as possible. The implementation of the Clean Air Zone must make use of a combination of transport focused

¹⁵ https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/486636/aq-plan-2015-overview-document.pdf

¹⁶ http://www.racfoundation.org/assets/rac_foundation/content/downloadables/racf_ricardo_aea_air_quality_report_hitchcock_et_al_june_2014.pdf

¹⁷ <https://www.gov.uk/government/statistical-data-sets/env01-fuel-consumption>

incentives and disincentives in order to ensure that people make better decisions about the way that people and goods are transported.

In addition, the final design of the Clean Air Zone must strike a balance between the other competing priorities of the city whilst meeting its minimum measure of success (compliance with air quality regulation). This will require thorough assessment of wider impacts of the Clean Air Zone on the city within the design process.

Collaboration is also required between Birmingham City Council, its neighbouring authorities and TfWM to ensure that implementation of the Clean Air Zone does not result in large scale displacement of air pollution to other areas, thereby creating air pollution problems elsewhere.

Below are a number of initiatives that will complement the implementation and success of the Clean Air Zone. We welcome working with Birmingham City Council to understand how collaboration on these measures and more could form part of the implementation of a successful CAZ through the application of additional measures.

Movement for Growth

The West Midlands Strategic Transport Plan "Movement for Growth" has been adopted and sets out our long term ambitions for transport in our area. This ambition is now being developed and delivered by Transport for West Midlands (TfWM), the transport arm of the Combined Authority. TfWM acknowledges the negative impacts of poor air quality and supports the Government's efforts to promote clean air. Clean Air Zones are a positive step forward.

Therefore, making progress to provide clean air and tackling poor air quality are also key objectives, as outside of London, the West Midlands suffers from the most extensive exceedances of the EU annual Limit Value for nitrogen dioxide in the UK. Road transport emissions from exposure to fine particles account for around 1,460 premature deaths in the West Midlands¹⁸.

Promoting clean air and improving public health are at the heart of our vision as stated in "Movement for Growth":

"We will make great progress for a Midlands economic 'Engine for Growth', clean air, improved health and quality of life for the people of the West Midlands."

We have also outlined key policy objectives to tackle poor air quality;

- Policy 9 - To significantly improve the quality of the local environment;
- Policy 10 - To help tackle climate change by ensuring a large decrease in greenhouse gases from the West Midlands Metropolitan Area's transport system; and
- Policy 11 - To significantly reduce diabetes, obesity, respiratory and cardio-vascular problems through reduced transport emissions and increased active travel.

To promote clean air, TfWM are in the process of delivering our ambitious fully integrated rail and rapid transit networks that connects main centres and new opportunities such as HS2 and UK Central. This is a key strand of the West Midlands Devolution Deal.

HS2 Connectivity Package

¹⁸ <https://www.gov.uk/government/publications/estimating-local-mortality-burdens-associated-with-particulate-air-pollution>

Through delivering the HS2 Local Connectivity Package, it is intended the impact of transport on the environment will be reduced, this will help to improve air quality, especially around the proposed Clean Air Zone in Birmingham. The resulting transport network will enable more efficient movement of goods freight and allow for improved walking and cycling networks.

The Connectivity Package will ensure that the West Midlands harness the unrivalled connectivity and investment of HS2 to unlock significant new sustainable growth and radically improve local connectivity for the whole region. This improved access will accelerate growth, improve access to jobs and promote the competitiveness of the region.

However, it should be noted that the delivery of much of the HS2 Connectivity Package is scheduled beyond the implementation of the CAZ in Birmingham.

The West Midlands Low Emission Bus Delivery Plan

The West Midlands Low Emission Bus Delivery Plan¹⁹ was published in July 2016. The plan articulates ambitions for delivering low emission buses to help address the region's significant air quality problems. It highlights areas where deployment of low emission buses should be prioritised and sets out a timeline for achieving a reduction in nitrogen oxides emissions by over 90% by 2035.

TfWM working with Bus Operators and Constituent Authorities over a number of years have secured investment for:

- 49 electric-diesel hybrids and 3 electric buses operating
- 210 buses being retrofitted to Euro VI standard by NXWM, funded by Clean Bus Technology Fund
- OLEV funding for 10 new hybrid and 19 electric buses
- OLEV funding for 22 new Hydrogen buses (TfWM working BCC and NXWM)
- NXWM have committed to 300 new buses by 2020 as part of the West Midlands Bus Alliance

West Midlands Freight Strategy

Freight and logistics are vital to our economic activity and development. They support people and businesses in their daily activities, ranging from deliveries to homes and shops through transferring goods to and from factories or getting supplies to offices.

The approved West Midlands Freight Strategy and Implementation plan helps to provide TfWM with the tools to work together with businesses, and a programme to deliver a West Midlands that shines as a beacon for best practice in urban logistics management, providing:

- Improved access to the West Midlands by road and rail;
- New ways of managing deliveries which provide businesses and residents with high quality access to goods and services;
- A range of techniques to reduce emissions, noise, and congestion caused by goods vehicles;

¹⁹ https://westmidlandscombinedauthority.org.uk/media/1289/west-midlands-low-emission-delivery-plan_elementenergy-for-transport-for-west-midlands_july2016.pdf

- Support for the introduction of very low emissions or zero emissions delivery systems; and
- Commitment to deliver these improvements through a partnership with businesses and government.

The Devolution Deal also provides new powers to support policies and actions across all modes and all transport users. Efficient logistics is recognised as being a key issue for TfWM.

West Midlands Low Emissions Framework

At West Midlands Constituent Authority level it has been to further progress measures previously agreed by the West Midlands Integrated Transport Authority. These measure include:

- Developing and adopting agreed metropolitan wide policies and targets towards the accelerated uptake and adoption of Ultra Low Emissions Vehicles and associated infrastructure including hydrogen and gas refueling opportunities.
- Developing and adopting agreed metropolitan wide policies and actions for Low Emission Zones or Clean Air Zones - in specific and suitable locations;
- Accelerated timescales to clean up buses, through the West Midlands Bus Alliance and the West Midlands Low Emissions Bus Delivery Plan;
- Making traffic management and coordination smarter through a West Midlands Key Route Network (WM-KRN);
- Developing and adopting Metropolitan policies and targets for the cleaning of public and commercial fleets;
- Developing and adopting specific policies to encourage the wider roll out of Car Clubs and active travel measures – through a Shared Transport approach;
- Further development of the Metropolitan Strategic Cycle Network – supporting the West Midlands Cycle Charter;
- Developing targeted policies toward zero emissions taxi and private hire fleets;
- Exploring the development of Green Travel Districts (GTD); and
- Developing an agreed funding, development and delivery framework.

TfWM are working with LETCP and Constituent Authorities to progress these areas further.

LETCP's Low Emission Vehicle Strategy

The LETCP has recently published a draft Low Emission Vehicle Strategy²⁰. This is a high level, evidence based strategy, developed in partnership with TfWM and Constituent Authorities, and will be complimentary to the Low Emissions Framework – Implementation Plan. It sets out a plan to deliver many of the programmes to improve air quality.

Opportunities through Devolution

²⁰ http://cms.walsall.gov.uk/proposed_west_midlands_low_emissions_vehicle_strategy_-_october_2016.pdf

TfWM supports a continued trend of devolution, which avoids national competitive bidding process. This shift will help local decision makers to invest in cities more sustainably and over a longer term.

- M6 Toll

TfWM is of the view that in order to ascertain wider environmental, air quality and economic benefits, the M6 Toll needs to be better utilised and better integrated into wider highway network.

As stated in the adopted West Midlands Strategic Transport Plan "Movement for Growth", making better use of the M6 Toll and its improved integration into the wider Strategic Highway Network, are of critical importance to the West Midlands.

Independent assessments have demonstrated that if the existing 10,000 strategic HGV trips which occur on the M6 daily (defined to be those which start and finish outside the WMCA Constituent area) were removed off the M6 and onto the M6 Toll, then operational benefits of Smart Motorways e.g. more reliable and free flowing conditions could be extended by at least ten years. Such traffic conditions are more suitable to better air quality.

- Traffic Management Optimisation

The WMCA are seeking the ability from Government to enforce moving traffic offences (Part 6 of the 2004 Traffic Management Act - England), in order to tackle local air quality issues caused by congestion. Our economy relies on the efficient movement of traffic for distribution of goods and services and we must facilitate the ambition of our world class manufacturing companies.

These powers have been specifically highlighted as part of our independent Network Resilience work and through the development of the West Midlands Key Route Network (WM-KRN). These additional powers are evidenced on securing user benefits to all roads user and not on revenue raising. These proposed powers will be a joint power with the Constituent Authorities.

In addition, TfWM are continuing to explore opportunities for improved traffic management through Urban Traffic Management and Control. There are opportunities to explore how current systems can be optimised to the benefit of traffic flows and air quality.

7) What are the potential barriers to clean air zones being implemented widely in the city?

National Action Required

TfWM believe that DEFRA's "Implementing Clean Air Zones in England" consultation are a real missed opportunity to fully promote clean air, as indicted in the recent consultation response. Greater national action from Government is required in order to help improve air quality. This additional action is highlighted below:

- National Strategic Highway Network

The West Midlands motorways are a principal source of exceedances affecting the WMCA Constituent Area, with the vast majority of the traffic undertaking non-local trips.

The M6 motorway in the West Midlands has sections which carry 130,000 vehicles per day of which approximately 40,000 are freight vehicles and 90,000 cars or other road users. Of these the West Midlands estimates that as many as 60% of all these trips are undertaking strategic journeys which either pass through the West Midlands or have a destination origin outside the West Midlands.

The ability of the West Midlands to influence or induce behavioural change to these trips is limited as is the ability to mitigate the air quality emissions. As a consequence, the M6 is one of the major sources of air quality emissions in the West Midlands.

As we approach 2020, Highways England and the Department for Transport should play a far stronger role and responsibility towards air quality exceedance on the Strategic Highway network. Local Highway Authorities cannot be responsible for motorway sourced air quality emissions.

- **Increasing Local Rail Capacity**

To ensure that our transport network provides the capacity for people to make sustainable journeys which have a positive impact on air quality, Government needs to work more collaboratively with TfWM and West Midlands Rail. This is to ensure future service improvements and infrastructure enhancements (such as the Midlands Rail Hub) are delivered as a matter of urgency to cope with the existing increase in rail patronage but to offer credible alternatives to single occupancy private car trips.

Over 40,000 per day use the local and regional rail network to get into Birmingham city centre for example.

- **Fiscal and Tax measures**

The Government also needs to adopt national policies to support local areas including the adoption of a national old diesel scrappage schemes and use of the tax system including Vehicle Exercise Duty (VED) and Fuel Duty to begin a transition away from the use of older diesel cars. All of these measures will generate significant benefits, with funds generated being used to potentially cover the cost of any schemes.

TfWM is disappointed that the Government have not outlined any such change to national policy so far and has recommended that immediate action is required against the continued use and purchase of diesel vehicles, particularly cars.

TfWM and Birmingham City Council in collaboration with Core Cities and Urban Transport Group has pledged to work with Government and HM Treasury regarding these possible policy opportunities.

8) Are there other measures which can be taken such as, for example, the planting of urban trees to absorb airborne pollutants and improve air quality and are there any plans in relation to these?

General

The Urban Transport Group's Air Quality Toolkit²¹ advises that there are a range of options available to local authorities to tackle air quality through transport measures. The toolkit contains a comprehensive list of transport focussed schemes that can be implemented in order to improve air quality.

Birmingham Air Quality Action Plan contains a list of actions that are being taken locally to improve air quality, many of these correlate to the guidance provided in the Urban Transport Group's Air Quality Toolkit. It is the understanding of TfWM that Birmingham City Council is currently in the process of updating the air quality action plan and a new version will be published in 2017.

Other National Action Required

²¹ <http://www.urbantransportgroup.org/resources/types/reports/air-quality-city-regions-transport-toolkit>

- Promoting Shared Transport

There is a real opportunity for Government to support the West Midlands in delivering a fundamental change on how people we consume and use transport. This could include the accelerated roll out of Mobility as a Service trials, promoting car clubs and car sharing, fostering innovation throughout disruptive technology and the further promotion of Connected & Autonomous Vehicles (CAVs) in our city regions.

- Data Sharing

Government needs to put in place clearer and collaborative arrangements for data sharing, so Authorities can access DVLA and other Government data more easily. This will assist local authorities to develop improved local insight on vehicle fleet mixes (vehicle categories, age, euro standard) in order to make better decisions on how to target action to curb transport emissions.

- Accelerated adoption of alternative fuels

In line with the success of the awarding winning 'West Midlands Low Emission Bus Delivery Plan' and the 'Birmingham Blueprint for Low Carbon Fuel Infrastructure', TfWM called on the Government to further accelerate and relax the rules around the adoption of alternative fuels such as Hydrogen. Birmingham has the ambition to be the leading city for the adoption of alternative fuel opportunities.

TfWM agreed with Government that the public sector should lead the effort to change the way people use vehicles and the types of vehicles that are used in our cities. Not only will this be an opportunity to influence others through leading by example, there are also opportunities to stimulate local markets and supply chains given the size of fleets that the local authorities have influence over.

- Additional funding to encourage ULEV take-up

TfWM welcomed further funding commitments made in the 2016 Autumn Statement but asked Government to consider prioritising investment in ULEV technology in cities and city regions (such as the West Midlands) where it can be demonstrated that the investment would help to problems.

- Improved national industrial strategy to build ULEV markets

TfWM believe that the forthcoming national industrial strategy must be strengthened to transform the UK's vehicle manufacturing industry from outputting diesel vehicles to ULEVs rapidly to support local requirements in cities requiring air quality improvement. WMCA/TfWM has pledged to work with Government and our local OEMs to take this forward.

- Improved support for bus and freight operators

Whilst current efforts to improve the profile of our bus fleets in the West Midlands is a step forward, it is a concern that there is an anticipated gap between projected improvements based on the Low Emissions Bus Strategy and the requirements of Clean Air Zones. Bus operators are making considerable investments already to improve fleets and to go further may require further incentives or cheaper alternatives.

There is a concern that Government has underestimated the effect that creating Clean Air Zones will have on the supply and demand of large Euro VI vehicles. Simply put, industry is concerned that the vehicles that they will require in order to meet the standards of CAZs will be in short supply and prices will start to reflect this.

One possibility of a quicker and cheaper way to improve bus emissions is through the implementation of accredited retrofitting solutions to improve existing vehicles. Whilst Government have indicated that such schemes will exist as an option for bus operators to achieve compliance with CAZ standards, Government are yet to identify which technologies are certain to be accredited and how accreditation will work. This has left bus operators in an extremely difficult position as they are unable to make the best decisions around how they should be investing in their fleets. These concerns are echoed amongst freight operators.

APPENDIX 1

Analysis of DEFRA's Pollution Climate Mapping model outputs for nitrogen dioxide exceedances published for the 2015 Air Quality Plan for Nitrogen Dioxide

Agglomeration/Zone Name	Area (km ²)	Population	Population Density (km ⁻²)	Total road length assessed (km)	Total road length exceeding NO2 limit (km)	Total road length exceeding NO2 limit (rank)	Density of roads exceeding NO2 limit (km/km ²)	Density of roads exceeding NO2 limit (rank)	Percentage of roads assessed in exceedance of NO2 limit	Percentage of roads assessed in exceedance of NO2 limit (rank)	Maximum modelled annual mean (µg/m ³)	Maximum modelled annual mean (rank)
Greater London Urban Area	1618	8921189	5513.713844	1883	1078.5	1	0.67	1	57.3%	1	126	1
West Midlands Urban Area	605	2295744	3794.618182	529	189.9	2	0.31	2	35.9%	4	70	=4
Greater Manchester Urban Area	554	2078782	3752.314079	638	170.3	3	0.31	3	26.7%	=6	61	9
West Yorkshire Urban Area	352	1308189	3716.446023	402	82.7	5	0.23	6	20.6%	13	74	2
Tyneside	221	770536	3486.588235	195	47.2	=11	0.21	12	24.2%	8	65	=7
Liverpool Urban Area	198	744225	3758.712121	210	38.6	14	0.19	15	18.4%	=14	57	=13
Sheffield Urban Area	163	577551	3543.257669	150	34.9	15	0.21	11	23.3%	10	57	=13
Nottingham Urban Area	155	599524	3867.896774	126	33.6	16	0.22	10	26.7%	=6	65	=7
Bristol Urban Area	139	536979	3863.158273	121	18.3	24	0.13	17	15.1%	16	53	=17
Brighton/Worthing/Littlehampton	94	420590	4474.361702	85	0.8	36	0.01	26	0.9%	31	41	24
Leicester Urban Area	101	432018	4277.405941	82	19.4	=23	0.19	16	23.7%	9	53	=17
Portsmouth Urban Area	96	399206	4158.395833	73	10	27	0.10	19	13.7%	=18	53	=17
Teesside urban area	119	315067	2647.621849	69	9.7	28	0.08	22	14.1%	17	65	=7
The Potteries	91	285366	3135.89011	126	19.9	21	0.22	9	15.8%	=15	58	12
Bournemouth urban area	121	378544	3128.46281	71	11.2	26	0.09	20	15.8%	=15	49	=21
Reading and Wokingham urban area	82	300142	3660.268293	68	6.9	33	0.08	21	10.1%	19	49	=21
Coventry and Bedworth	76	304515	4006.776316	38	15	25	0.20	14	39.5%	3	52	=18
Kingston upon Hull	85	278695	3278.764706	52	21.1	20	0.25	4	40.6%	2	54	=16
Southampton urban area	79	298793	3782.189873	73	18.4	=23	0.23	7	25.2%	7	68	=5
Birkenhead urban area	97	284975	2937.886598	76	5.3	34	0.05	24	7.0%	25	47	23
Southend urban area	67	243360	3632.238806	52	7.1	32	0.11	18	13.7%	=18	56	14
Glasgow urban area	367	1105095	3011.158038	340	76.2	6	0.21	13	22.4%	12	68	=5
Edinburgh urban area	134	468399	3495.514925	99	8.8	29	0.07	23	8.9%	21	50	20
Cardiff urban area	86	327129	3803.825581	62	19.8	22	0.23	8	31.9%	5	54	=16
Swansea urban area	83	210269	2533.361446	63	2.7	35	0.03	25	4.3%	29	48	22
Belfast Metropolitan urban area	216	545493	2525.430556	227	51.8	9	0.24	5	22.8%	11	64	=8
Eastern	19498	5364958	275.1542722	789	39.9	13	0.00	35	5.1%	=27	70	=4
South West	24396	4396528	180.2151172	649	31.8	17	0.00	36	4.9%	28	52	=18
South East	19108	6682607	349.728229	1301	107.4	4	0.01	28	8.3%	=23	59	11
East Midlands	15458	3503120	226.6218139	654	65.3	7	0.00	30	10.0%	=20	64	=8
North West and Merseyside	13507	3501924	259.2673429	858	60.7	8	0.00	29	7.1%	24	72	3
Yorkshire and Humberside	15019	3120522	207.7716226	587	49.8	10	0.00	32	8.5%	22	57	=13
West Midlands	12221	2713684	222.050896	523	43.3	12	0.00	31	8.3%	=23	60	10
North East	8377	1510704	180.339501	257	47.2	=11	0.01	27	18.4%	=14	65	=7
Central Scotland	9984	1942272	194.5384615	353	21.4	19	0.00	34	6.1%	26	51	19
North East Scotland	19024	1121019	58.92656644	233	7.9	30	0.00	38	3.4%	30	52	=18
South Wales	12645	1772244	140.1537367	302	30.3	18	0.00	33	10.0%	=20	66	6
North Wales	8747	749704	85.70984337	152	7.7	31	0.00	37	5.1%	=27	55	15

APPENDIX 2

Air Quality Objectives Contained in the Air Quality (England) Regulations 2000 (2002 as Amended)

Pollutant	Objective	Averaging Period	Obligation
Nitrogen dioxide (NO ₂)	200µg/m ³ not to be exceeded more than 18 times a year	1-hour mean	All local authorities
	40µg/m ³	Annual mean	All local authorities
Particulate Matter (PM ₁₀)	50µg/m ³ not to be exceeded more than 35 times a year	24-hour mean	All local authorities
	50µg/m ³ not to be exceeded more than 7 times a year	24-hour mean	Scotland only
	40µg/m ³	Annual mean	All local authorities
	18µg/m ³	Annual mean	Scotland only
Particulate Matter (PM _{2.5})	Work towards reducing emissions/concentrations of fine particulate matter (PM _{2.5})	Annual mean	England only
	10µg/m ³	Annual mean	Scotland only
Sulphur dioxide (SO ₂)	266µg/m ³ not to be exceeded more than 35 times a year	15-minute mean	All local authorities
	350µg/m ³ not to be exceeded more than 24 times a year	1-hour mean	All local authorities
	125µg/m ³ not to be exceeded more than 3 times a year	24-hour mean	All local authorities
Benzene (C ₆ H ₆)	16.25µg/m ³	Running annual mean	All local authorities
	5µg/m ³	Annual mean	England and Wales only
	3.25µg/m ³	Running annual mean	Scotland and Northern Ireland only
1,3-Butadiene (C ₄ H ₆)	2.25µg/m ³	Running annual mean	All local authorities
Carbon Monoxide (CO)	10mg/m ³	Maximum daily running 8-hour mean	England, Wales and Northern Ireland only
	10mg/m ³	Running 8-hour mean	Scotland only
Lead (Pb)	0.5µg/m ³	Annual mean	All local authorities
	0.25µg/m ³	Annual mean	All local authorities

APPENDIX 3

World Health Organisation (WHO) Guidelines for Air Quality Limits as found in WHO Air quality guidelines for particulate matter, ozone, nitrogen dioxide and sulfur dioxide - Global update 2005

WHO Air quality guidelines (AQGs), 2005

Outdoor Air pollutants	WHO Guideline values
PM_{2.5}	10 µg/m ³ annual mean 25 µg/m ³ 24-hour mean
PM₁₀	20 µg/m ³ annual mean 50 µg/m ³ 24-hour mean
O₃	100 µg/m ³ 8-hour mean
NO₂	40 µg/m ³ annual mean 200 µg/m ³ 1-hour mean
(SO₂)	20 µg/m ³ 24-hour mean 500 µg/m ³ 10-minute mean