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4. WHAT CAN BE DONE? AIR QUALITY MEASURES AND THEIR IMPACT

CHAPTER SUMMARY

- There is much to be learned from the bold initiatives taken in cities all around the world. In almost all cases these have involved strong leadership from a mayor or national political leader.
- There is a wide range of measures that could be introduced to mitigate air pollution in Greater Manchester, ranging from: Charging Clean Air Zones and other restrictions on road transport; to changes to vehicle types to reduce emissions; to secondary measures such as encouraging the use of public transport and other public awareness campaigns.
- Despite the lack of hard evidence for the impact of any particular primary or secondary measures, it is estimated that the measures currently being considered in Greater Manchester Air Quality Plan are unlikely to reduce air pollution by much more than 10 per cent. This will barely achieve legal compliance let alone the level of reductions necessary to significantly improve public health.
- Greater Manchester's bus fleet is a particular cause for concern with nearly 40 per cent of the worst polluting types (compred with 10 per cent in London) and with less than 1 per cent of buses conforming to Euro 6 or electric vehicle standards (compared with nearly 40 per cent in London).
- If Greater Manchester is to take seriously its air pollution crisis and seek to halve its current emissions then it will need to introduce a Charging Clean Air Zone and other more radical measures.

4.1 APPROACHES FROM ELSEWHERE

There is much to be learned about tackling air pollution from cities around the world that have recognised the scale of their problems and started to take action to reduce its impact. This section highlights a few notable examples.

London – a comprehensive, mayor-led approach

London has been the primary focus of commentary and initiatives focused on reducing human exposure to air pollution. Air pollution is certainly better understood in London than in other parts of the UK, including Greater Manchester. Monitoring, and live resident-focused reporting is dramatically better in the capital, with an associated package of measures owned by the mayor and being delivered by City Hall. These measures include:

- from 2018, all new double ducker buses will be hybrid, hydrogen or electric the entire bus fleet will be emission free by 2037
- from 2019, 12 new low emission bus zones and the world's first Ultra Low Emission Zone
- a new Toxicity ('T') Charge of £10 for the most polluting vehicles
- a massive rollout of cycling and walking infrastructure

- initiatives to help Londoners make better choices, including a Cleaner Vehicle Checker for those buying new cars and a Clean Air Route Planner to help find residents find the least-polluted journeys
- London is also working with Siemens to use 150 new monitoring sites across the city as a smart forecasting tool, providing residents with early warnings for periods of up to three days with an error range of less than 10 per cent.

Paris – changing transport

Paris bans cars in many historic central districts at weekends, imposes odd-even bans on vehicles, makes public transport free during major pollution events and encourages car- and bike-sharing programmes. A long section of the Right Bank of the river Seine is now car-free and a monthly ban on cars has come into force along the Champs-Elysées.

Copenhagen – active transport

Copenhagen prioritises bikes over cars and now has more cycles than people. The city calculates that one mile on a bike is worth 27p (\$0.42) to society, while one mile in a car is a 15p (\$0.20) loss. Large parts of the Danish capital have been closed to vehicles for decades and the city plans to become carbon neutral by 2025.

Beijing - rapid transition

Beijing has a long way to go, but a four-year, \$120 billion drive has reduced air pollution in the Chinese capital by as much as 40 per cent.¹⁵ This is a reduction three or four times faster than measures in the United States under the 1970 Clean Air Act. Shifting from coal to natural gas in industrial and domestic settings has been a major driver of progress.

New York City – clean heat

A 2008 study found that oil-based heating systems in buildings across New York created more dangerous air pollution than the combined number of cars and trucks. The NYC Clean Heat programme helped 2,700 buildings convert to cleaner fuels. As a result, over 250 tons of particulate matter (PM_{2.5}) has been removed from New York City's air since fall 2011, which is the equivalent of removing over 800,000 vehicles from the road for an entire year. The NYC Department of Health and Mental Hygene estimates that these save 780 lives per year and prevent 1,600 emergency room visits each year. This is a 25 per cent reduction in all health incidents attributed to air pollution.

There are good case studies from cities and regions all over the world. The common denominator in delivering progress on reducing air pollution in different places has been that decisions that are owned at the highest political levels shape strategies and initiatives that are based on good quality data. In London, Paris and New York, mayors have become activists – prioritising progress of a hidden killer, placing information in the hands of citizens, putting in place ambitious and imaginative solutions, and making themselves accountable for progress. In China, the president is the figurehead of the country's 'war on pollution'. Greater Manchester can learn from these examples of activist leaders. In order for progress to be sustainable, it is vital that the Greater Manchester mayor recognises this and has a unique opportunity to bring all sections of society together with urgency to tackle a problem that harms us all.

¹⁵ See <u>http://www.greenpeace.org/eastasia/campaigns/air-pollution/solutions/</u>

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4.2 MEASURES FOR TACKLING AIR POLLUTION IN CITIES

Section 3.1 set out the legislative and policy responses by both the European Commission and by national government. Alongside these, the EU has introduced emissions standards known as 'Euro Standards' to regulate emissions from new petrol, diesel and gas vehicles with a progressive tightening of limits for emissions of both PM₁₀ and NO_x. The highest standards (Euro 6 for cars and Euro VI for heavy-duty vehicles) were intended to help bring emissions within legal limits and represent a key reason why there is a predicted fall in concentrations of NO₂ and PM₁₀. But the switch to diesel vehicles since 2001, together with manipulation of emissions testing by vehicle manufacturers, means that vehicle emissions standards have been systematically undermined. King's College London has demonstrated that Euro 5 diesel cars in practice emit more than five times the Euro 5 emissions limit and more even than the Euro 1 limit (Howard 2015).

At the local level, there is a wide range of measures that can be taken to tackle air pollution including both primary and secondary measures. Table 4.1 sets out some of the most commonly cited interventions.

TABLE 4.1

Primary measures		
Clean Air Zones (a defined area for targeted action to reduce air pollution) and parking charges		
Charging Clean Air Zone	 Vehicles are charged for entering a particular zone through automatic number plate recognition (ANPR). Levels of charging are determined locally, but government has proposed a framework for different types of zone with restrictions on different types of vehicle as follows: Class A – Buses, coaches, taxis and private hire vehicles (PHVs) Class B – Buses, coaches, taxis, PHVs and heavy goods vehicles (HGVs) Class C – Buses, coaches, taxis, PHVs, HGVs and light goods vehicles (LGVs) Class D – Buses, coaches, taxis, PHVs, HGVs, LGVs and cars 	
Non-charging Clean Air Zone/ Low Emissions Neighbourhoods	These tend to be areas where there is a focus for action in a designated area in order to raise local awareness and introduce other primary and secondary actions set out below. Specific schemes can include campaigns for parking and charging infrastructure; car pooling schemes; specific grants for innovative projects; and geofencing (zone which activates the electric mode of hybrid vehicles).	
Parking Charges	These can range from differential charges for different vehicle types or at different times of the day through to an extensive workplace parking levy (WPL) scheme whereby businesses are charged for the number of parking places they provide to employees. A successful WPL scheme has been introduced in Nottingham.	
Vehicle Interventions		
Retrofitting and replacing vehicles	 Measures can be taken to replace or retrofit the most polluting vehicles with cleaner alternatives. From a public policy perspective there are three obvious targets for such an approach: bus fleets - replacing or retrofitting older vehicles with hybrid and fully-electric buses through setting stringent targets for emissions standards in the contractor. 	
	 taxis and private hire vehicles – again, replacement or retrofitting can be enacted through tightening licensing, but also through promotions, grants and other incentive schemes 	
	 public sector vehicle fleets – the public sector (police, NHS, local authority) can lead by example in replacing its own vehicles and potentially making requirements on sub-contractors to sign up to local accreditation schemes (see below). 	

Primary and secondary interventions to reduce air pollution

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Depot fuelling	There are a number of lower-emission fuel types, including electricity, hydrogen, gas and liquid air, where fuelling infrastructure could be provided in strategic locations particularly for commercial and public sector vehicle fleets
Incentivising electric vehicles	 Alongside the retrofitting measure above, there is a range of measures that can encourage the uptake of electric vehicles: EV charging infrastructure is vital to support public adoption of EVs and requires strategic investment and coordination EV car sharing clubs can also transform car usage and reduce the amount of driving as well as overall car ownership Diesel scrappage schemes - providing grants to motorists to replace diesel vehicles with lower-emission alternatives - can provide a powerful incentive but may be best exercised at a national scale.
Secondary Measures	
Traffic management	
Road capacity/ junction improvements/flow optimisation	This involves changing road space allocation, junction operations or traffic signal timing in order to suppress latent demand and reduce congestion in particular hotspots.
Access restrictions	This very simply involves reducing or prohibiting access to particular roads or areas through time-limited closures, pedestrianisation, yellow and red lines, or through other forms of restriction.
Travel choices	
Use of public transport	The provision of better public transport is key to reducing dependency on private vehicles. Measures to increase public transport usage might include improvements to services; subsidised fares; bus stop and station accessibility improvements; and a public awareness campaign.
Active travel options (walking & cycling)	As with public transport, active travel can be increased by improvements to cycling and walking infrastructure and public campaigns to promote healthy travel options.
Smarter driving	Emissions can be reduced by 'smarter driving' – for example, to reduce engine idling or excessive acceleration or braking. Such schemes can be introduced as part of training for fleet drivers but also as part of public awareness campaigns.
Freight and delivery campaigns	Voluntary recognition schemes can be run to encourage freight operators to seek the most clean and efficient routes and vehicles. Such schemes could also incentivise out-of-hours deliveries which can involve win-win gains for local businesses.

4.3 MODELLING THE IMPACT OF POLLUTION REDUCTION MEASURES

There have been very few studies which have attempted to model the effectiveness of local measures to reduce air pollution in the UK. Most have focused on the impact of the Ultra Low Emission Zone (ULEZ) – London's name for a clean air zone. Transport for London has published estimates of NO_x reductions delivered through other measures (TfL 2014). These vary for different parts of the city and are summarised in table 4.2.

TABLE 4.2

Estimated reductions in NOx emissions in London

	Per cent NOx reduction		
Measure	Central	Inner	Outer
Existing ULEZ (equivalent to Class A CCAZ)	51	16	10
Future LEZ (Class A plus)	0	1	0
Smarter traffic management and regulation	1	2	2
Behaviour change campaigns	Captured in smarter traffic measures above		
Driving the uptake of low emission vehicles	1	2	2
Transforming the bus fleet	0	6	5
Zero-emissions taxi fleet	Captured in ULEZ calculations		
Zero-emissions public vehicle fleet Captured in ULEZ calculations			
Low emission neighbourhoods	1	1	1

Source: Adapted from TfL 2014

To date, however, there is very little systematic methodology in the UK for calculating the impact of different measures on reducing air pollution and the government is expecting that those authorities developing Clean Air Plans will each carry out local modelling as they develop their 'outline business cases' later this year.

4.4 MEASURES FOR GREATER MANCHESTER

In the Greater Manchester Air Quality Action Plan 2016–21 there is a very comprehensive list of 'Air Quality Actions' including:

- · development control and planning regulations
- car, bus and freight interventions
- travel choices and cycling initiatives
- information and resources.

Many of these are commendable and will deliver significant benefits in the medium-long term; very few, however, will have the urgent, transformational effect required to tackle the immediate air pollution crisis.

For this reason, the Greater Manchester Air Quality Plan strategic outline case (SOC) has shortlisted a more limited list of measures focused upon reducing roadside emissions of NO₂. There is as yet no modelling in the public domain concerning the impact that any of these measures will have; although based on the work carried out by Transport for London it is possible to put very rough estimates on many of the measures. It is also important to note that with some measures the benefits are likely to be captured by others.

TABLE 4.3

Estimated impact of emissions reduction measures in Greater Manchester

SOC measure	Туре	Estimated emission reductions in worst-affected areas
Differential parking charges	Primary	1%
Retrofit/upgrade of public transport fleet	Primary	2%
Increased capacity of public transport	Secondary	1%*
Depot fuelling stations (gas to liquid fuels)	Primary	Captured by SOC measures 2 and 6
Electric vehicle charging points	Primary	1%
Improve local authority fleet	Secondary	<0.5%
Congestion plan – traffic management including signal optimisation	Secondary	1%*
Taxi incentives to change to EV/ULEV	Primary	0.5%*
LPG refuelling infrastructure for taxis	Secondary	Captured by SOC measure 8
Communications campaign	Secondary	Captured by SOC measures 1, 3 and 12
Travel choices/active travel programme	Secondary	Captured by SOC measures 1, 3 and 12
Active travel infrastructure	Primary	0.5%*
TOTAL IMPACT		7.5%

Note: *There are significant questions as to how quickly these benefits could be achieved.

Source: Adapated from Transport for London, Transport Emissions Roadmap (TfL 2014) with authors' estimations

Greater Manchester's bus fleet

Greater Manchester has one of the most polluting bus fleets of any city in the UK. According to TfGM data gathered by Manchester Friends of the Earth, GM's bus fleet comprises vehicles with the following diesel engine standards:

Engine Standard	Number of Buses	Percentage of GM bus fleet (2017)	Equivalent percentage for London bus fleet (2017)
Euro 2–3	887	20.0	11.8
Euro 4	344	17.6	16.5
Euro 5	946	52.0	35.2
Euro 6 & eev	15	10.4	36.5

Since 2013, new buses have been required to have engines that meet the Euro 6 standard. This has a nitrogen oxide (NO_x) limit 80 per cent lower than for Euro 5 engines and is therefore better for air quality. However, in 2016, only 10 per cent of the Greater Manchester bus fleet were fitted with Euro 6 engines with just three buses being fully electric compared with over 500 in London.

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Our informed estimate then of the sum total of these measures is that they are likely to reduce NO_x emissions by a meagre 8 per cent. This could possibly ameliorate air pollution in the two problematic 'PCM Link' routes, but it is unlikely to mitigate air pollution across Greater Manchester and may even fail to comply with any new 'target determination' likely to be applied by Defra later in the year.

For this reason, Greater Manchester must consider a range of other measures to go further and faster. Table 4.4 sets out a series of more radical proposals together with a further estimation of their potential impact.

TABLE 4.4

Measure	Description	Ambition for NOx emissions reduction measures in Greater Manchester (central – outer areas)	
Charging Clean Air Zones			
Class A	Buses, coaches, taxis and private hire vehicles (PHVs)	15%–10%	
Class B	Buses, coaches, taxis, PHVs and heavy goods vehicles (HGVs)	20%–15%	
Class C	Buses, coaches, taxis, PHVs, HGVs and light goods vehicles (LGVs)	30%–20%	
Class D	Buses, coaches, taxis, PHVs, HGVs, LGVs and cars	40%-30%	
Bespoke GM CCAZ	Based upon known vehicle movements in and out of the city centre and/or other zones	40%-30%	
Other more radical measures			
Car-free Manchester days	A ban on private cars entering the city centre on weekends and/or high- pollution days and/or particular days of the week – linked to free/subsidised public transport on such days	15%–10%	
Temporary access restrictions	For example, closing Deansgate or Portland Street from 7–10am and from 4–7pm. Each local authority could consider its own local hotspots.	15%–15%	
Cycle-only streets	Extending Oxford-Road type pedestrianisation & cycle schemes into other parts of the city centre and/ or other local authority hotspots.	10–5%	
Car-free streets/ neighbourhoods	Scheme offering free public transport passes, cycles and 'nearby' car parking facilities to a whole street or neighbourhood prepared to forego on-street parking	5–5%	
Workplace parking levy	Additional levy for businesses with 5 or more parking places in city centre and other parts of the city region	10–5%	

Further proposals for NOx emissions reduction measures in Greater Manchester

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