

● BRIGHTON & HOVE: ● THE CLEAN AIR CITY

A BLUEPRINT FOR THE ROLE OF SUSTAINABLE PUBLIC TRANSPORT



2018

1. OBJECTIVE

OUR AMBITION...

In this report we intend to set out a blueprint for the role of a bus service as sustainable transport in the context of a long-term vision for Brighton & Hove that has the potential to deliver the city of the future.



2. THE CONTEXT



THE VISION

The Brighton & Hove of the future has become synonymous with a healthy city, a walking city, a cycling city, a mass transport city, a congestion-free city, a 'where you go to take the air' city, but above all, it is known as a clean air city - and a leader in the field.

This vision of the city is holistic and encompasses a new way of thinking that embeds the imperative for clean air into every aspect of growing, running and maintaining a great city - freeing growth from pollution and spurring innovation in productivity, pay and quality of work. And though the vision is long, progress to a low-emissions economy can and should be accelerated - starting right now.

Brighton & Hove: the clean-air city is a proposition that requires a multi-pronged and multi-agency public-private approach with the appropriate political will, policy backing, technology, infrastructure, public procurement, education, lifestyle and behavioural changes.

This Brighton & Hove will clean up on all air quality standards by exalting the city to the level of European exemplar for clean air living. This city will exceed WHO guidelines and UK/EU directives. This city will help set the standards of the future.

The residents of the clean air Brighton & Hove will be healthy and happy and the envy of citizens throughout the country.

THE JOURNEY

This report has been put together to help inform officers working on sustainable transport strategies and members with important decisions to make. It takes into account - and contributes to - the vision for the city being developed by the Brighton & Hove Economic Partnership, Brighton Connected and Brighton & Hove City Council.

This paper lays out how the city's main bus operator (alongside other operators), the city council and other partners can together deliver a sustainable transport system for the future.

To follow is a sustainable transport journey plan that outlines the sort of action needed to take us into the Brighton & Hove of the future, the clean air city.

2. THE CONTEXT

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THE POLITICAL AGENDA

Air pollution has not been such a hot topic since the week-long 'great smog' of December 1952 when the number of deaths from bronchitis rose nine-fold and resulted in the Clean Air Act passed in 1956.

Today air quality has catapulted back up the political agenda following the ongoing car manufacturer diesel emissions scandals that exploded a few years ago. Almost simultaneously air pollution campaigners' voices began to be heard and suddenly we were all sitting up and listening to alarming figures around the number of deaths and everyday diseases and conditions being attributed to toxic air such as heart disease, asthma and even birth defects. These days, half of all new cars are diesel and are high polluters.

In 2016 MPs declared it a public health emergency. Locally, Caroline Lucas, Brighton Pavilion MP and the country's first Green parliamentarian, is unequivocal. "We must be open to contemplating a rejection of the received wisdom which puts the motor car at the centre of cities' development."

Transport Minister Nusrat Ghani, in her speech at the UK Bus Summit, said: "We have to hammer home our message: that rather than contributing to the problem of nose-to-tail traffic and harmful pollution, buses and coaches are a part of the solution."

And Labour MP for Hove and Portslade Peter Kyle says: "It is extremely disappointing that the Government's air quality plans have been ruled illegal by the courts for the third time, but I am pleased that we are working hard locally to provide the leadership and urgency this issue needs."

His Party colleague MP for Kemp Town Lloyd Russell-Moyle says: "It's absolutely crucial for the health of our children and our planet that we improve the quality of the air we breathe."

THE HEALTH SCANDAL

Attributing deaths to air quality is tricky and based on complex methodology. The most cited statistics come from a report by the Royal College of Physicians published in 2016. It says: "The annual mortality burden in the UK from exposure to outdoor air pollution is equivalent to around 40,000 deaths."

The study combines two figures: 29,000 deaths that are attributed to particulate (PM) pollution and 11,000 attributed to nitrogen dioxide (NO₂). The 29,000 number comes from a report, published in 2010, by the Committee on the Medical Effects of Air Pollution (COMEAP), a group of experts that advises the government. The report was government-funded and produced with the Institute of Occupational Medicine.

While RCP uses the word 'equivalent', COMEAP talks in terms of 'attributable' deaths. According to Greenpeace news platform *Unearthed*, to understand what this means, it's more accurate to speak in terms of lives shortened, rather than deaths caused.

In 2015, Defra issued guidance that attributed 23,500 deaths in the UK to NO₂ pollution. But this combines NO₂ and particulates. The RCP reviewed government and other available evidence and estimated the figure for NO₂ should be 11,000, making the total overall figure 40,000. COMEAP also revised its figures in 2015 to an approx total of 40,000 deaths in the UK due to long-term exposure to air pollution.

It's now widely quoted that the air quality issue is said to be the largest environmental risk to public health the world has ever known with one in 20 deaths in adults over 30.

In short, we need to take serious action to improve the air we breathe if we are to improve our health.



2. THE CONTEXT

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THE SCIENCE BIT

Pollutants in the air we breathe come from a multitude of sources: industry, agriculture, transport, domestic heating and bonfires, plus natural factors such as dust and sea salt may be exacerbating the problem.

Particulate matter refers to pollutants in the air that we can inhale and that penetrate deep into our lungs. Their size varies - the finer the particles, the more harmful it's considered to be. The coarser PM₁₀ is usually caused by brake, tyre and road wear and the microscopic PM_{2.5} that travels long distances is likely to be a soup caused by a plethora of things - anything from a car pulling away to a log fire.

NO₂ is nitrogen dioxide but in the air quality debate, you'll frequently hear talk of NO_x which is a combination of nitrogen monoxide (NO) and nitrogen dioxide (NO₂) formed during fuel combustion. It can be an easier shorthand because in the past it's been difficult to assess the direct effects of NO₂ because it's volatile and plays a role in the formation of PM pollutants.

AIR QUALITY DEBATE

As just stated, the quality of the air we breathe is the product of industry, agriculture, transport, domestic heating and bonfires - in short, our contemporary way of life. For the purposes of this report, we're interested in the impact of road transport on air quality. And more specifically, when we talk about emissions, we principally mean those that come out of the exhaust pipe - but that's not to say that we're not aware of the widening debate around microscopic fragments such as brake dust. But the science around nano-particles or ultra-fine particles is still developing and as such so is the conversation around how to tackle the problem. In the meantime, we do have tangible, workable ways to eradicate tailpipe emissions so that is our focus in this report.

GOVERNMENT'S PLEDGE 2017

The government has pledged this to be the first generation to leave the environment in a better state than we inherited it. Their Air Quality Plan outlines how the government intends to reduce roadside nitrogen dioxide (NO₂) concentrations. The plan marks a shift to ultra-low and zero emissions vehicles.

Headline news last year was that Government is banning the sale of all petrol and diesel cars and vans from the year 2040. And by 2050 almost every car and van on the road will be a zero-emission vehicle.

Government has committed £2.7 billion to air quality and cleaner transport which includes grants for new buses and

retrofits and for ultra-low emissions vehicles, grants for local authorities to improve air quality, a Green Bus fund for low carbon buses, a clean bus and vehicle technology fund, investment in cycling and walking and money for Highways England to improve the air quality on its road network.

FURTHER GOVERNMENT STRATEGIES

A Clean Growth Plan was published by the Dept for Business Energy and Industrial Strategy in October 2017 setting out a comprehensive set of policies and proposals that aim to accelerate the pace of 'clean growth', i.e. deliver increased economic growth and decreased emissions.

Another government strategy will follow on the pathway to zero emission transport for all road vehicles in March 2018.

A wider Clean Air Strategy on how we'll meet our international commitments to significantly reduce five damaging air pollutants by 2020 and 2030 will also be published in 2018.

LOCAL SOLUTIONS FOR LOCAL PROBLEMS

Air pollutant NO₂ (the main source of which is diesel vehicles) builds up locally and as such the government has entrusted the task of tackling it to local government with a £255 million grant - £40 million of which is for doing it in the shortest time possible.

Government has also established a Clean Air Fund for LAs to bid for money to support measures to improve air quality - including money to support local bus fleets, infrastructure changes and sustainable modes of transport. There's also a £100 million fund for retrofitting and new low-emission buses. The message from the government is clear: buses are part of the solution.

DELIVERING CLEANER AIR IN THE SHORTEST TIMESCALE

Some local authorities have been shortlisted by the government for more stringent air quality plans and given a deadline of March 2018 to produce their initial plan of action - to be finalised by December 2018. Where there are no other viable options, these LAs must consider Clean Air Zones. (Brighton & Hove is not among these.)

3. LOCAL AIR QUALITY: FACTORS AT PLAY

The concentration of pollutants in the atmosphere is influenced by many factors from how easily the toxins can be dispersed such as by wind (i.e. the weather) to how built-up an area is with the adverse effect of restricting air flow. Temperature too is a factor: the colder it is the worse pollution becomes (but this can be exacerbated by more people lighting fires, increased use of central heating, more use of vehicles and so on). Congestion is a big factor: emissions peak when vehicles pull away and accelerate a few hundred meters away from where they've been stuck in traffic, producing not just a safety hazard but, when it happens in a confined space, pollutants that can't be dispersed.



4. WHAT'S HAPPENING ELSEWHERE

A SAMPLE

The Scottish Government has teamed up with the European Regional Development Fund to create a fund of up to £60 million (announced Jan 2018) for businesses and organisations to pay for infrastructure that would advance ultra-low emission vehicles. They're offering financial support of up to 50 per cent of the total capital value of a project to a maximum of £10 million per project.

The European Investment Bank has agreed (Jan 2018) to provide a €30 million (£26.3m) loan to replace buses in Palma de Mallorca with less polluting gas-powered models. The money will help transport firm Empresa Municipal de Transportes swap its existing diesel-powered vehicles for newer, safer and cleaner compressed natural gas (CNG) versions.

New York has come up with a visionary, holistic, unified strategy to combat air quality called OneNYC which will bolster economic development, improve the environment, fight inequality and better the quality of life for all New Yorkers. The plan sets the ambitious goal to 'achieve the cleanest air quality of any big U.S. city'. by the year 2030.

£60m

fund planned for businesses and organisations to pay for infrastructure that would advance ultra-low emission vehicles

5. THE JOURNEY FOR BRIGHTON & HOVE SO FAR

2008 AIR QUALITY DIRECTIVE

Brighton & Hove was included among 40 zones in the UK in 2008 that exceeded the mean annual limit of NO₂ (as set out in the EU's Air Quality Directive) and would not comply by the 2010 deadline. (Though less than one per cent of the city's land area has an air quality issue.) The city has had an Air Quality Action Plan since 2006 which has been revised since then and aims to target traffic emissions that mostly happen in high density retail and residential areas with limited land and space and that contribute to the most NO₂ along transport corridors.

In 2015 Public Health England estimated whole population exposure to particulate air pollution across Brighton & Hove contributed 4.9 percent towards annual mortality for adults over the age of 30 (in its report *Estimates of Mortality in Local Authority Areas Associated with Air Pollution*).

BRIGHTON & HOVE CITY COUNCIL TAKES ACTION

(see appendix for timeline of past council action)

AQMAS

Brighton & Hove City Council's Air Quality Action Plan was revised to meet a new Air Quality Directive deadline of 2015. This included designating hotspots for excessive NO₂ which led to two Air Quality Management Areas - Brighton & Hove and Portslade and in Rottingdean.

THE LEZ

As part of these measures, the council introduced one of the UK's first Low Emission Zones (LEZ) in January 2015. The council considered targeting buses, HEVs and taxis and concluded that its good working relationship with bus companies would make the zone highly workable if it targeted buses specifically. The LEZ covers Castle Square, North Street and Western Road as far as Palmeira Square, encompassing about 98 per cent of all buses. Bus operators were given five years to bring their entire fleet up to meet the LEZ standard.

Emissions in the LEZ are monitored by three sensors on North Street, two on a building façade six meters away from the roadside and one kerbside above the pavement.

To enter the LEZ a bus must comply with the following (excluding a few exemptions for socially essential services):

- Meet the emissions target - at least the European standard known as Euro 5 (the bus is likely to be no older than 2008)
- Switch off the engine when stationary for more than one minute
- Retrofits for buses (see appendix for detailed list)

The Air Quality Action Plan also included a policy to help secure funding for retrofitting buses so they were LEZ compliant.



BRIGHTON & HOVE LEZ

5. THE JOURNEY FOR BRIGHTON & HOVE SO FAR

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QUALITY BUS PARTNERSHIP

The Quality Bus Partnership model was introduced by the Local Transport Act 2000 and enhanced in the 2008 Act encouraging local authorities to invest in bus-related facilities including bus stop Real Time Information boards and priority bus lanes while operators improved the quality of their services. The partnership has worked well in the city and includes all those who operate a bus service in Brighton & Hove.

Improvements - as a direct result - include the following successful joint funding bids:

- LSTF, DfT funding - Lewes Road bus lane to promote bus and cycle use along the student corridor
- Better Bus Area, DfT - Edward Street bus lanes project
- CiViTaS (EU) Smart ticketing
- Green Bus Fund - setting up the LEZ
- DfT - multi-operator smart and mobile ticketing

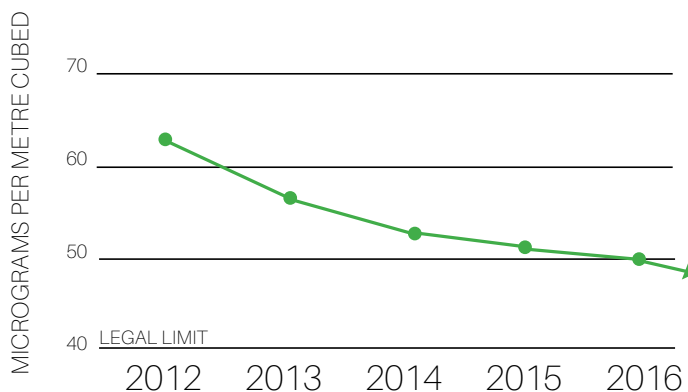
IMPACT OF BUSES ON AIR QUALITY

2017 University of Brighton Sussex region air quality data shows NO₂ levels spiking at the weekend, in summer and during non-peak hours. This strongly points to vehicles other than buses as the cause as bus services remain more or less constant.

This data comes from a state-of-the-art £250,000 advanced air pollution monitoring station based at its campus in Falmer, part of the EU's Joint Air Quality Initiative and the only one of its kind in the UK. The data belongs to research into ultra-fine particles passing through lung alveoli and their effect on organs including the brain being carried out by Dr Kirsty Smallbone, Head of the University of Brighton's School of Environment and Technology and a lead researcher on air pollution, and her colleague lecturer Dr Kevin Wyche.

And according to the Council's monitoring data for North Street in Brighton, lower emissions buses have had a sizeable and pleasing effect over the last five years on the quality of the air we breathe - bringing us ever closer to the legal limit. See graph to follow:

NORTH STREET FIVE YEAR POLLUTION TREND



B&H BUSES TAKES ACTION

(see appendix for timeline of bus company action)

The bus service is the most sustainable form of mass transit inside the city as one full double decker can take up to 75 cars off the road (Professor David Begg, *Greener Journeys: Improving Air Quality in Towns and Cities*). Buses have been real-world tested for years and lower emissions-technology has far out-stripped the car manufacturing industry. Today's brand new state-of-the-art Mycro Hybrid buses are nearly emissions free.

Brighton & Hove Buses carries the largest number of passengers per head of population outside London and continues to buck the national trend by increasing patronage year on year.

The company works closely and well with B&H City Council and is wholly committed to operating in a safe, socially and environmentally-responsible way. We're members of the Low Carbon Vehicle Partnership and the Green Growth Fund. We're looking to attain ISO14001 and ISO50001 standards for our environmental footprint at each of our sites.

B&H Buses consistently wins the highest industry accolades for running an excellent bus service and is the current holder of the National Transport Awards' Bus Operator of the Year and the UK Bus Awards' City Operator of the Year.

Since 2014 the new Euro 6 standard buses have made it possible to produce buses with low emissions of NO₂. Brighton & Hove Buses has invested millions into accelerating its programme towards a zero-emissions fleet. The company has bought scores of new buses - at a cost of around £200,000 each - and significantly improved the efficiency of engines as well as markedly reducing the carbon impact of fuel. These measures have put the company one year ahead of LEZ objectives with a seismic reduction in NO₂ emissions. (All Euro rated buses are classified and certified by the industry-recognised Millbrook testing system.)

5. THE JOURNEY FOR BRIGHTON & HOVE SO FAR

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B&H BUSES FAST-TRACKED ACTION INCLUDES...

(see appendix for detailed list)

B&H Buses has a fleet of **250**
mostly high-capacity double
deck buses

82 nearly-emissions-free buses
on the road (new generation Euro 6
Micro Hybrids increasingly powered
from regenerative energy)

231 (nearly 90%) of fleet is LEZ
standard, above or better.

11 fully electric vans replacing diesel
for driver transfers

13 hybrid electric buses that
operate in both electric and
diesel mode

76 buses retro-fitted to comply
with LEZ target with help of
£1.25 million award from the
Department for Transport's Clean
Bus Transport Fund

Introduced MiX **Telematics** (data
analytics measuring duration
of journey and driving profile)
for better engine performance
and to foster driving techniques
that are low impact on the
environment

Commissioned internationally-
renowned **Ricardo Engineering**
to real world test bus emissions
on North Street

Phased out all lower standard
buses (known as Euro 3)

Trialled **electric buses** measured
against range, passenger volume
and level of service

B&H Buses offers to part-fund
continued **air quality monitoring**

69
more buses to be upgraded to
Euro 6 subject to joint council bid
for government funding

5. THE JOURNEY FOR BRIGHTON & HOVE SO FAR

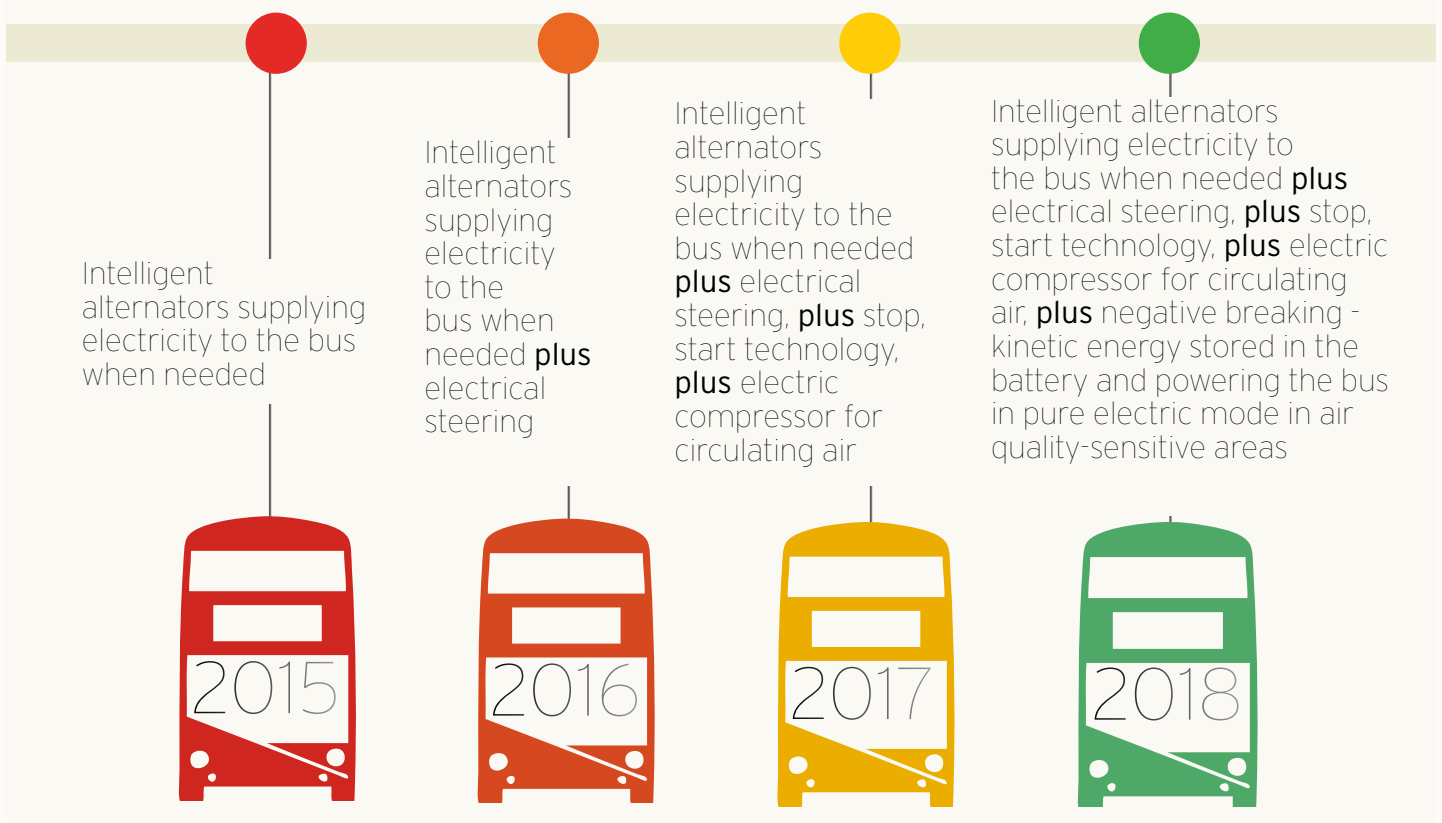
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GAME-CHANGING BUS TECHNOLOGY

The air quality debate is nothing short of a game changer in the bus industry. Despite the industry leading the way on cleaner diesel engines and real-world testing for some years now, the buses that are coming onto the market now - evolving technologically at a head-spinning rate from just three years ago - are nothing short of nearly emissions-free. In layman's terms - not all diesel engines are bad. These buses - known as Micro-hybrids - are so technologi-

cally advanced, so 'intelligent' in how they run, so revolutionary in how they reuse and convert energy, and are emitting such negligible amounts of pollutants that they not only deserve our admiration but our attention. They are already delivering seismic reductions in emissions. This is a very good place to be in the interim while we work our way towards an emissions-free future, embracing fully electric and hydrogen fuel cell buses.

THE EXTRAORDINARY MICRO HYBRID BUS: THE FUTURE IS HERE

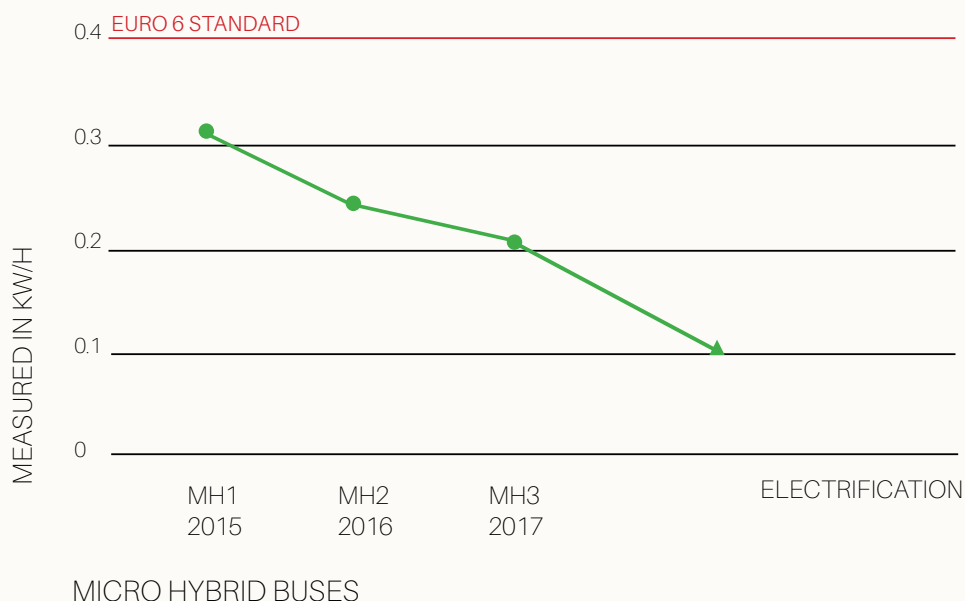


5. THE JOURNEY FOR BRIGHTON & HOVE SO FAR

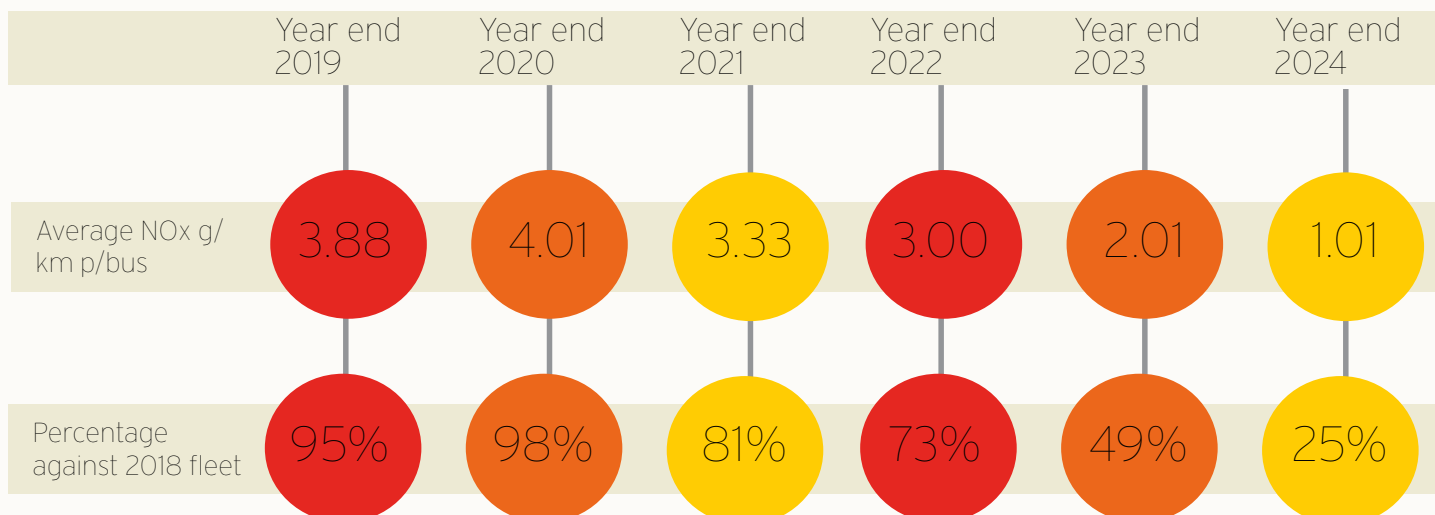
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■ One third of our current fleet – so far – is made up of Micro-Hybrid nearly emissions-free buses

NOx EMISSIONS FROM NEARLY EMISSIONS-FREE MICRO HYBRID BUSES



NOx REDUCTION IN OUR FLEET OVER THE NEXT FIVE YEARS



5. THE JOURNEY FOR BRIGHTON & HOVE

SO FAR

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PARTNERS TRAVELLING TOGETHER

The city council and Brighton & Hove Buses have worked closely and well together in partnership to deliver a multi-award-winning bus service in the city. Close working has resulted in successful joint bids: from retrofitting older buses, to higher standard models, and to introducing bus lanes. Most recently the council has taken a series of very positive steps towards measures that will mitigate against delays to bus services such as introducing bus lanes associated with Valley Gardens and a host of very welcome measures around the Preston Barracks development. And some great progress has been made towards implementing quick wins such as the resources for Red Routes, potential funding for Bus Network action and a dedicated person

to look into improving traffic flow at the Clock Tower. The city council is to be congratulated for its impetus to action.

Brighton & Hove Buses pledges to continue with its programme to tackle congestion by investing in buses with dual doors, pushing more cash into IT and marketing to encourage pre-purchased tickets, and by expanding the multi-operator scheme. We'll also continue with our two bus-focused policing and parking enforcement initiatives. We'll also keep smartening up our operational responses - with the help of technology - to intervene where disruption occurs (or is expected to occur) to minimise disruption, keep passengers moving and prevent emissions fuelled by slow-moving traffic. The company will keep working with the council to jointly resolve anticipated problems and the challenges of new developments as they arise.

6. BREATHING FRESH AIR INTO A CONGESTED CITY

A REMINDER OF WHERE WE'RE HEADING AND THE TASK THAT LIES AHEAD

(see appendix for suggested timeline of action towards a clean air city)

Brighton & Hove: the clean air city has come about as a result of a seismic, sustainable movement of change that went beyond anything that had gone before, that nurtured new ways of thinking, behaving and being and that accepted early and quickly that the solution was multi-faceted, multi-organisational and that a new blueprint was required.

- This city is an eco-system where every aspect of life and policy here supports clean air
- It has been designed with air clearance dynamics in mind
- Our carbon footprint is measured from procurement to manufacture and finally to usage
- Countless millions have been spent on the infrastructure to sustainably source the extra electricity/energy required for transport

- Technology has advanced to a point where emissions from vehicles are zero or negligible. Fossil fuels are no longer in use
- Single-occupancy vehicles have all but gone from the city centre as a result of societal changes, sustained lifestyle psychology-of-behaviour change campaigns, as well as through policy and legislation
- Zero-emissions high-capacity mass transport that efficiently, cleanly, quietly and sustainably moves citizens around is the norm - among the rich and the poor



6. BREATHING FRESH AIR INTO A CONGESTED CITY

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TRANSPORTING PEOPLE IN THE FUTURE - THE SPACE FOR CHANGE

Space inside towns and cities - in the future - is highly likely to remain as contested as it is today (in the latest TomTom Traffic Index, Brighton was cited as the fifth worst city for traffic congestion.) If autonomous and electric cars merely replace their diesel and petrol counterparts, then congestion will be as prevalent as ever. And perhaps more so as electric cars will need to be parked up charging for potentially lengthy periods of time and Artificial Intelligence will make cars more accessible to greater numbers of people. And as long as this is the case and people need to move around in large numbers into and out of and within this space, there will be a requirement for doing so in a way that transports them around in greater numbers and more sustainably than is possible in cars. Sustainably-powered, technologically advanced buses will become more relevant than ever to provide the essential travel our city needs.

Buses have been around in some form to answer this very need historically for a couple of hundred years already - from horse-drawn carriages to steam buses, then electric trolleybuses to the advent of motorised ones in 1895. And far from being a thing of the past, it is central to a bold, urban future. Today the bus is going through its very own technological revolution and has one foot firmly planted in the future. Electric and alternative fuel buses are in sight. The bus is irrevocably changing and a new era has dawned.

JOURNEY INTO THE FUTURE - THE CASE FOR SUSTAINABLE LOW-EMISSION MASS TRANSPORT

Even today, despite heavy lobbying by the car industry, there's really no legitimate, valid, common sense argument for any form of inter-city transport that is not low-emission and mass transport. The quality of air we breathe in the city is not the fault of buses. The Bus Services Act 2017 acknowledges greater usage of the bus for improving air quality and reducing toxic emissions. And more than 3.5 million people in the UK vote with their feet by travelling to work by bus every day with an additional million using it as their main backup mode of transport when their car fails.

Buses are part of the solution. For many years now, clean bus technology has far outstripped that of cars - an equivalent Euro 6 diesel car emits 10 times more per passenger. What's more buses have been real-world tested

for years. Even now according to the media cars are failing real world emissions tests imposed following the car manufacturers scandal that exposed nearly all diesel cars emitted far more toxic fumes than in official lab-based tests. Since September 1, new models of cars must be tested on real roads but the data from Emissions Analytics - a respected testing firm commissioned by Greenpeace - shows even these figures are unreliable.

The bus is also a vital cog in the wheel of the economy, facilitating access to jobs, education, shops and recreation. Buses democratise travel by improving access to education and training, especially access from deprived areas. Buses support the vitality of urban centres giving access to employment, shopping and leisure facilities. In a piece of research looking at what the bus service does for the urban economy, the University of Leeds' Institute for Transport Studies identified at least £1 billion of wider economic benefits other than direct user benefits or congestion relief and environmental impacts. The same study noted that out of five billion bus journeys per year (twice the number of rail and underground trips), over one billion are commutes to and from work. On top of that a further one million use the bus as back up to get to work.

Shaking citizens out of their car habit is the gateway to the future. And behaviour change is critical to this. It requires bold and ambitious action on the part of the council, partners and bus operators.

3.5m
people in the UK
travel to work by
bus every day

7. NEARLY EMISSIONS FREE... THE TRANSITION

THE COUNCIL AND BUS COMPANIES TRAVEL TOGETHER

(See appendix for suggested timeline of proposed action for transition period)

Dealing with the effects of road transport on air quality will take a multi-agency approach from central to local government, planners to highway authorities, and vehicle manufacturers and public transport providers. It will require radical legislative steps and new approaches.

Key drivers for change are technology, transport management (reducing the need to accelerate and decelerate caused by congestion will greatly improve air quality where dispersal of the air is an issue) and societal change. (We're on the right track: the council is already thinking big such as its work on a freight strategy for the centre of the city.)

Brighton & Hove Buses will continue to take immediate action to accelerate progress towards an emissions-free bus service as fast as technology can deliver buses that can operate at a high volume and across the distance required with zero emissions - something that is definitively not yet the case.

The fastest route to the future will involve a transition period and joint action from both the council and the bus company.

Current bus technology means the difference between a nearly-emissions-free bus and an emissions-free bus is negligible in terms of NO₂ pollution - and increasingly so

as 'intelligent' technology powers the bus in sustainable ways we never thought possible. In comparison the price of an emissions-free bus capable of meeting the city's needs is a significant obstacle in the short term - at least double the price - and therefore halving the bus company's ability to accelerate progress. The move to an emissions-free fleet cannot happen in the very short term without drastically reducing the number of buses in operation, increasing the number of cars on the road, worsening congestion and damaging the city economy and the environment.

Worse, if congestion in the city deteriorates further and there's no change in bus flows, Brighton & Hove Buses' ability to invest in emissions-free vehicles will reduce because passenger numbers will fall and the cost-to-emissions-benefit ratio between the two types of bus could become too great and result in slowing down the progress towards an emissions-free fleet.

To help us to get onto the road to an emissions-free future faster, we'll need help from the city council. We'll need a bus priority and congestion strategy that facilitates investment in the next generation of wholly emissions-free buses. With the help of a plan and strategy - and perhaps even stakeholder boards to monitor delivery - the council will be best placed to convene delivery partners to facilitate reliable emissions-free infrastructure so that it becomes possible to invest in clean energy supplies in a less volatile environment than is currently the case. Only then can mass-transit fleets be replaced wholesale.



7. NEARLY EMISSIONS FREE... THE TRANSITION

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TACKLING CONGESTION

Brighton & Hove's Air Quality Action Plan repeatedly makes the point that 'it is a challenge to provide truly low emission diesels in the slowest urban drive conditions'. There is no stronger argument to keep traffic moving and avoid congestion wherever possible.

Volume of traffic leads to congestion, which leads to high emissions, which leads to toxic air, illness and death. The biggest trigger of high emissions in the city is congestion. According to Professor Begg of Greener Journeys, tackling air quality is two-pronged: reduction of older, polluting vehicles and reducing the number of general vehicles in congested, urban areas.

Tailpipe emissions from nose-to-tail traffic are four times greater than in free-flowing traffic. (Idling draws in the ambient air and cools down the exhaust which stops the abatement system from working and so increases pollution.)

At Brighton & Hove Buses we've had to increase our resources - number of buses and drivers - by six per cent over the last six years to combat congestion just to maintain the same level of service.

What's more the duration of bus journeys has increased in the city over the last eight years by an average of two per cent each year. Some popular journey times have increased by staggering amounts such as the number 7 taking 30 per cent longer, the number 23 and 49 nearly 20 per cent, the 50 almost 16 per cent and the 2 and 22 slower by 15 per cent to get passengers to their destination.

In a 2014 study from INRIX, a leading international provider of real-time traffic information, and the Centre for Economics and Business Research, the annual cost of congestion in the UK was predicted to rise by 63 per cent by 2030 - to £21.4 billion.

On the other hand, bus priority measures don't just reduce journey times but can lower emissions by 75 per cent too. On a recent survey of the Coast Road bus lane, we demonstrated that almost half the people travelling into the city (48 per cent) were on board just two per cent of the vehicles - that is, buses.

Tailpipe emissions in congested traffic are four times greater

A ROADMAP FOR THE TRANSITION PERIOD

(See appendix for proposed timeline)

It is likely Brighton & Hove City Council will want to be ambitious with its plans around air quality for the city.

The great progress made on air quality in the AQMA fringe areas of the city would naturally suggest it's time to pay greater attention to the city centre. Reducing emissions further in the hotspots would improve the air quality in the city overall. This seems like a very good place to start.

Brighton & Hove Buses proposes the following changes to the LEZ:

- Renew the LEZ to start January 2021 with a higher threshold for environmental performance
- Raise the LEZ threshold to Euro 6
- Review exemptions approach to reflect overall fleet performance profile with appropriate validation regime
- Plan towards an LEZ with an extended geography for the future
- Consider the potential for a longer-term plan for a CAZ
- Reduce the need for AQMAs in line with progress

At the same time, we would urge further action on the ground including the following:

- Redesign the Clock Tower junctions to smooth the flow of buses (proposals already on the table)
- Reduce car parking spaces on all new developments
- Integrate the Quality Bus Partnership in the planning and design of access on all major development projects
- Bring in city-centre congestion-busting measures such as changes to the movements and stopping of general traffic and introducing a loading management strategy
- Implement emerging plans for bus lanes
- Erect more visible emissions-free zone signs to raise awareness of air quality measures

7. NEARLY EMISSIONS FREE... THE TRANSITION

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PROPOSAL FOR BEHAVIOUR CHANGE

A public health-driven communications campaign over a sustained period could support the sort of behaviour change we need to deliver a clean air city. For example, the council could launch a lengthy multi-stakeholder clean air campaign. The campaign could be based on known psychology for behaviour change - to re-think the habit of relying on a car and encourage the use of public transport. The campaign could consider promoting active and sustainable transport choices. It could conjoin health campaigns with air quality measures such as getting off the bus one stop early and walking the rest of the way.

Re-think the habit of relying on a car and encourage use of public transport

PROPOSAL FOR AN AMBITIOUS NEW VISION FOR THE CITY

(See appendix for suggested timeline and proposals)

We would encourage the council and its partners to develop an ambitious vision to be one of Europe's leading cities for clean air living. It would be a multi-agency, public/private approach and would have community, connectivity and sustainability at its heart.

The vision would phase in an emissions-free infrastructure and funding for new technology and a whole new way of thinking and being that decouples growth from pollution.

It takes the city through the transition phase and into a future that by 2050 could be emissions free.



7. NEARLY EMISSIONS FREE... THE TRANSITION

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The bus company would expect to be running a zero-emissions bus service by no later than 2030

THE BUS COMPANY'S PLEDGE

(See appendix for suggested timeline and proposals)

Brighton & Hove Buses will continue to replace older model buses with latest generation 'regenerative braking' nearly emissions-free buses in the short term and, has started exploring new generation advanced nearly emissions-free buses that drive in pure electric mode in air quality-sensitive areas. All older buses will either be taken out of service or retro-fitted to Euro 6 standard in partnership with the council and government funding.

The company is intensively exploring zero-emissions technology such as electric and hydrogen fuel cells, phasing them in from 2020 and as technology becomes available. The bus company will also invest in new fuels infrastructure at bus depots in the city.

The bus company is working on the launch of a public transport Innovation Lab with rail sector and local partners that will involve the whole city as a national innovator on sustainable public transport and mobility as a service (developing seamless, joined-up transport).

The bus company would move investment from nearly emissions free to emissions free electric and hydrogen fuel cell buses beginning no later than 2023.

The company would expect to be running a zero-emissions bus service by no later than 2030.

8. A BREATH OF FRESH AIR WILL GET US THERE

Operators, agencies, policy-makers and residents are on this journey together. We all know where we want to go and we know where we are right now. We need to agree the fastest, most pragmatic route to get there.

But it does require some bold decisions on the part of policy-makers, a change of habits on the part of many residents and a lot of facilitation and investment on the part of the council, government and mass-transit providers. To make it all come together we can share - collectively - in this vision of a clean air city and use it as a blueprint to get us there.



APPENDIX

In the timeline below, past action is represented in blue, the current day in green and amber represents the more forward-looking future based on B&H Buses' proposition for a clean air city. Actions attributed to BHCC in the future are proposals based on our vision and view of the wider strategy and infrastructure required in the city to deliver an emissions-free bus service. They do not purport to represent the views of any parties, members or officers of the council.

SUSTAINABLE TRANSPORT TIMELINE	B&H CITY COUNCIL	B&H BUSES
2008 Air Quality Directive ■ B&H exceeds annual NO ₂ limit ■ Not expected to comply to 2010 EU deadline. New deadline for EU compliance on NO ₂ set for 2015		
2011-2013		Purchased new buses (including bendies) and invested in efficient driving performance technology: ■ 92 Euro 5s including 13 Hybrid electric buses ■ Mix telematics - engine and driver analytics
2014	Successful joint bid (Council and B&H Buses) for 50 SCRT conversions of Euro 3 buses to Euro 5 standard	1. Successful joint bid (Council and B&H Buses) for 50 *SCRT conversions of Euro 3 buses to Euro 5 standard 2. Began phasing out Euro 3 buses 3. Purchased four Euro 4 bendies
2015	1. 2X AQMAs created between B&H and Portslade and in Rottingdean 2. Bus-only LEZ covering 98 per cent of all bus movements Jan 1, 2020 deadline set for Euro 5 standard (buses no older than 2008) Anti-idling measures 3. City-wide 20mph speed limit 4. Quality Bus Partnership relaunched with all main operators and users. ■ Successful partnership funding bids: ■ Smart ticketing - CiViTaS (EU), DfT ■ Bus lane on Lewes Rd - LSTF, DfT ■ Edward Street project - BBA, DfT ■ Setting up LEZ, Green Bus Fund, DfT ■ Multi-operator ticketing, DfT 5. Real-time passenger info upgraded to GPRS in partnership with B&H Buses	1. Purchased 24 nearly emissions-free Micro Hybrid buses powered by electricity when needed for the Coaster route. 2. Two per cent patronage increase year on year 3. Consistently over 90 per cent customer satisfaction 4. Successfully advocated for all operator membership, political involvement and user reps in the Quality Bus Partnership 5. Increasing congestion worsens air quality, slows journeys, increasing need for greater number of buses on road. Two per cent increase on all journey times on average per year. Number 7 bus average journey time increased by 30% over previous eight years 6. Back office technology and expertise provided to enable all operators to participate in multi-operator system on smartcards, mobile tickets and scratch cards 7. Joint marketing and promotion: one full bus takes 75 cars off road 8. Breeze up to the Downs bus to promote sustainable transport with healthy living 9. Commissioned internationally-renowned Ricardo Engineering to do real-world emissions testing on buses travelling along North Street. Proposed reducing air quality issues in North Street by improving flow and pedestrian environment at Clock Tower junctions.

APPENDIX

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SUSTAINABLE TRANSPORT TIMELINE	B&H CITY COUNCIL	B&H BUSES
<p>2016</p>	<p>Second successful joint bid for DfT funding for retrofitting buses with SCRT equipment.</p>	<ol style="list-style-type: none"> 1. Funding for retrofitting 26 Euro 3 and 4 buses helps bring total of Euro 5 and Euro 5 + buses to 183 (70% of B&H fleet) 2. Purchased 24 more nearly emissions-free Micro Hybrid buses <ol style="list-style-type: none"> a. Newer generation greater power from regenerative energy b. Double door feature to reduce emissions from speeded up boarding 3. Completed phasing out of all Euro 3 Buses 4. Overall: 87% fleet Euro 5, 5+ or 6 (230 buses) 5. Introduced 60-min multi-operator ticket ahead of London to encourage modal shift and boarding speeds. 6. Two per cent patronage increase year on year 7. Consistently over 90 per cent customer satisfaction
<p>2017 University of Brighton air quality data demonstrates high levels of NO₂ caused by vehicles other than buses at Brighton and Sussex level</p>	<ol style="list-style-type: none"> 1. Anti-Idling measures go public for all vehicles stationary for longer than a minute (already in place for buses) 2. Joint multi-operator bid with the Big Lemon to Defra for funding for three electric minibuses. 3. Council working on air quality improvements to Clock Tower and improved flow for buses and pedestrians 	<ol style="list-style-type: none"> 1. Purchased three new Euro 6 Coaster buses. 2. Purchased 31 more nearly emissions-free Micro Hybrid buses servicing routes 7 and 49. <ol style="list-style-type: none"> a. Newer generation greater power from regenerative energy b. Double door feature to reduce emissions from speeded up boarding c. Stop start technology feature (engine cutting off when doors open - 12% of fleet) d. A total of 82 Micro Hybrids to date. 3. Purchased two Euro 5 bendies 4. Series of electric bus trials run on Brighton routes but they fail to meet city's need for range, passenger volume and level of service 5. Purchase of 11 emissions-free fully-electric vans replacing diesel vans used for driver transfers 6. Serious talks with suppliers exploring Hydrogen fuel cell substitute for diesel and funding streams 7. Research new fuels infrastructure for bus depots in the city 8. Joint bid with BHCC for Defra funding to retrofit 69 buses to Euro 6 9. B&H Buses offers to part-fund continued air quality monitoring to help with LA funding constraints

APPENDIX

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The middle column attributed to B&H Council is not a delivery plan, merely a set of speculative proposals and timeline based on the bus company's views and vision

SUSTAINABLE TRANSPORT TIMELINE	B&H CITY COUNCIL	B&H BUSES
<p>SHORT TERM FUTURE: QUICK WINS</p>	<ol style="list-style-type: none"> 1. Renew the LEZ to start January 2021 <ul style="list-style-type: none"> ■ Raise the LEZ threshold to Euro 6 ■ Review exemptions to reflect fleet performance profile ■ Plan towards extended geography for the future ■ Consider longer-term CAZ ■ Reduce AQMAs 2. Further action proposals: <ul style="list-style-type: none"> ■ Clock Tower redesign gives buses priority and improves pedestrian environment ■ Reduce car parking space on current developments ■ QBP part of access planning and design of all development projects e.g. Churchill Square ■ Air quality assessments as part of new developments ■ City centre congestion-busting measures e.g. restrict access to cars; restrict stopping of selected vehicles in North Street; traffic light countdown system to encourage engine switch-off ■ Develop plans for more bus lanes on A23, A259 ■ More visible emissions-free zone signs 3. Develop funding plan for emissions-free infrastructure and technology <ul style="list-style-type: none"> ■ Phase in funding streams 4. Develop ambitious vision for clean air city and emissions-free living. Multi-agency, public/private approach Start to develop plan - inclusive of emissions-free transport infrastructure 5. Actively promote mass transport as sustainable transport alongside walking and cycling 6. Lengthy multi-stakeholder clean air campaign 	<ol style="list-style-type: none"> 1. Continue to replace older model buses with latest generation 'regenerative braking' nearly emissions-free Micro Hybrid buses with double doors. (Dispose of final seven Euro 4 buses.) 2. Research new fuels infrastructure at bus depots 3. Develop hydrogen fuel alternative 4. QBP talks on infrastructure needs and funding requirements 5. QBP start to play role in new development access designs 6. Explore options to reduce number of buses stopping on North Street that may become viable as a result of the Waterfront development. 7. Develop public transport Innovation Lab concept with rail partners and local partners <ul style="list-style-type: none"> ■ Whole city as national innovator on sustainable public transport trialling and spearheading emissions-free, congestion-busting options to make public transport more attractive 8. Continue plan to reduce average annual NOx emissions p/bus from 2018 figure: 4.08 g/km

APPENDIX

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The middle column attributed to B&H Council is not a delivery plan, merely a set of speculative proposals and timeline based on the bus company's views and vision.

SUSTAINABLE TRANSPORT TIMELINE	B&H CITY COUNCIL	B&H BUSES
MID TERM FUTURE	<ol style="list-style-type: none"> 1. Complete 15-year plan for clean air city 2. Start to implement plan for clean air city in every aspect of city living 3. Further progress on sustainable transport subject to vision and plan for clean air city <ul style="list-style-type: none"> ■ Extend LEZ boundary ■ Increase number of bus lanes ■ Phase in emissions-free infrastructure (e.g. sustainable electricity supply) and roll out funding for technology ■ More emissions-free zone signs ■ Car restricting measures at key points in city centre ■ Extend congestion-busting measures to hotspots ■ Promote sustainable journeys (inclusive of bus travel) and run campaigns highlighting congestion causes poor air quality ■ QBP part of all access planning and design thinking 4. Introduce charging CAZ - extending to other vehicles 5. Joint hydrogen supply with bus company to power City Clean fleet 	<ol style="list-style-type: none"> 1. Continue to replace buses with double-door nearly-emissions free new generation Micro Hybrid Euro 6 buses with greater power from regenerative energy 2. Research new fuels infrastructure at bus depots 3. Phase in advanced Micro Hybrid Euro 6 buses powering the bus in pure electric mode in air quality-sensitive areas 4. Further trials of high capacity, high range double deck electric buses 5. Develop plans for hydrogen fuel cell alternative 6. As part of QBP, continue to play role in informing new development access design with transport solutions 7. Innovation Lab technology and infrastructure concepts trialled 8. Invest in infrastructure at depot 9. Start to phase in zero emissions buses 10. QBP part of all planning, design and transport solution thinking 11. Continue phasing in zero emissions buses

APPENDIX

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SUSTAINABLE TRANSPORT TIMELINE	B&H CITY COUNCIL	B&H BUSES
LONGER-TERM FUTURE	<ol style="list-style-type: none"> 1. Continue implementing visionary plan for clean air city in every aspect of city living 2. Further progress on sustainable transport subject to vision and plan for clean air city <ul style="list-style-type: none"> ■ Complete emissions-free infrastructure; ■ Complete rolling out technology funding 	<ol style="list-style-type: none"> 1. Complete phasing in zero emissions buses 2. Complete infrastructure at depots 3. QBP part of all access planning and design thinking
2030	Vision for clean air city on course	Fleet NOx emissions p/passenger - zero

*The Low Carbon Vehicle Partnership (of which we're a member) has launched the Clean Vehicle Retrofit Accreditation Scheme providing independent evidence that the vehicle retrofit technology will deliver the expected emissions reductions.

 BRIGHTON & HOVE:
THE CLEAN AIR CITY

A BLUEPRINT FOR THE ROLE

OF SUSTAINABLE PUBLIC TRANSPORT

2018