IPPR

LONDON
GLOBAL GREEN CITY

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BOLD IDEAS
for CHANGE

CONTENTS

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SUMMARY

The mayor of London elected in May 2016 will face formidable environmental challenges. London's air pollution is lethal and illegal, responsible for more illness and premature deaths than alcohol or obesity. Traffic congestion is rising. Greenhouse gas emissions are not on track to meet current targets, and around a million people live in fuel poverty. Green space is being lost to development. Recycling levels are the poorest in the country.

This report sets out a plan for the new mayor to address these challenges. It calls on the mayor to commit to making London a 'global green city', in which environmental goals are prioritised as central to the city's vision of economic and social development.

The mayor should:
- Mandate Transport for London to assess the feasibility of an **expanded road-pricing scheme** that simultaneously tackles air pollution, congestion and CO_2 emissions, and raises revenue for public transport, cycling and walking.
- Establish a city energy company, **Energy for London**, to supply electricity, gas and energy-efficiency services to Londoners and increase investment in solar power and renewable heating.
- Integrate environmental objectives into London's **planning, economy and community development strategies**, including the establishment of London as a national park city and the appointment of a green infrastructure commissioner to promote the protection and enhancement of nature and greater public access to it.

Key challenges
- **Air pollution** in London was responsible for as many as 141,000 life years lost, or the equivalent of around 9,400 deaths, in 2010. This came at an economic cost of up to £3.7 billion. Driven primarily by emissions from transport, its impacts fall disproportionally on lower-income groups and children: nearly 25 per cent of school children are exposed to levels of air pollution that break EU and WHO legal and health limits.
- Without new policies to manage increased **traffic demand**, there will be an estimated 43 per cent increase in passenger vehicle miles between 2013 and 2030. The resulting congestion will decrease average road speeds, from 21mph today to an estimated 16mph by 2030, with speeds in central London significantly below this. Slower speeds mean greater delays and unpredictability in journey times, leading to higher economic costs.
- In 2013, around 10 per cent of households in London were classified as fuel poor, with an average **fuel poverty** gap of £304 per annum. London has some of the most energy inefficient housing in Europe, the highest average gas bills in the UK, and among the lowest rates of gas and electricity consumer switching.
- London must almost completely **decarbonise** by the middle of the century as part of the global effort to reduce net greenhouse gas emissions to zero beyond 2050, as set out in the Paris Agreement on climate change concluded in December 2015. However, London's emissions reductions are currently off the pace required to meet the existing mayoral targets, which are themselves only part of the journey to full decarbonisation.

- Nearly 2 million Londoners live more than 1 kilometre from **open green space**, with a third of London families visiting natural spaces fewer than six times a year. The number of visits continues to decline, and at a higher rate among low-income and in some ethnic and minority groups. Between 2009 and 2012, more than 215 hectares of green space disappeared in London, an area equivalent to the size of Hyde Park and Battersea Park combined.
- Over 160,000 people already work in an **environmental sector** that saw over £25 billion of sales in 2011/12.
- London's **population** is forecast to grow from around 8.5 million today to more than 10 million by 2031, and perhaps as much as 13 million by 2050, increasing demand for housing, transport, energy, water and other resources, with significant consequences for congestion, economic costs, public health, and the sense of space and social cohesion.

Key recommendations

The next mayor of London should aim to make London a 'global green city', in which environmental goals are prioritised as central to the city's vision of economic and social development. The mayor should:

- Tackle London's air pollution and congestion problems by:
  – Mandating Transport for London to assess the feasibility of an **expanded road-pricing scheme** bringing together the current congestion charging and ultra-low-emissions zones. Such a scheme, potentially covering the areas inside the north and south circular roads, would simultaneously tackle air pollution, congestion and CO_2 emissions. It would raise revenue to reinvest in public transport, cycling and walking, to support the expansion of electric vehicles and car-sharing schemes, and to provide assistance to adversely affected small businesses.
  – Ensuring the TfL **bus fleet** meets air pollution standards by 2019.
  – Continuing strong investment in **cycling** and **walking infrastructure**, with a particular emphasis on safety.
  – Expanding the **electric vehicles** charging network.
  – Promoting **car-sharing schemes**, including the introduction of uniform on-street parking permits for car-sharing schemes across London.

- Reduce fuel poverty and support renewable and decentralised energy by:
  – Establishing **Energy for London**, a fully licensed electricity and gas supplier, energy services company, and energy manager for the Greater London Authority and Transport for London.
  – Developing a **dedicated solar strategy** with a target to increase solar capacity to at least 750MW by 2025.
  – Developing a dedicated **efficiency and heat strategy** to capture wasted heat and retrofit London's homes and workplaces.

- Integrate environmental goals within London's planning, economic and community development strategies by:
  – Establishing London as a **national park city** to provide an overarching vision and framework for the conservation and improvement of green space and biodiversity in the capital, encouraging wide public education and participation.
  – Appointing a **green infrastructure commissioner** to promote the protection and enhancement of nature in London, with a long-term strategy to ensure everyone lives within 1 kilometre of open green space.

– Amending the London Plan to ensure **housing intensification** becomes a key characteristic of spatial development throughout London.

– Developing a feasibility and delivery plan for **pedestrianisation** across the city, building on the existing Mini-Hollands scheme.

– Promoting London's **green and low-carbon economic sectors**, and working towards increasing London's recycling and reducing its waste.

– Ensuring that London's environmental policies draw on the expertise and engagement of London's **communities and civic organisations**.

– Working with other cities and local authorities to **establish UK100**, a convening organisation that would help UK cities to fulfil their environmental ambitions.

1.
INTRODUCTION

London has always responded to the great natural and man-made forces of the day. The Victorian era epitomises this, as a time when these pressures were most acute and were met with equal vigour. During this time, London experienced profound economic and social change, becoming the world's foremost political and economic centre, as its population expanded from 1.8 million in 1831 to 6.5 million in 1901 (ONS 2014).

A growing population was both the cause and effect of increased economic prosperity, as technological change and the spoils of empire drove the productive potential of the city (Ball and Sunderland 2001). People flocked to London from home and abroad to improve their lot, but soon found that the capital's wealth did not trickle down. Millions of Londoners lived in abject poverty, subsisting in overcrowded, unsanitary slums that fed the great flows of biological and industrial effluent running into the Thames. As a result, London was constantly in the grip of acute public health and social crises that eroded the quality of life of all citizens.

The Victorians responded with a vigorous programme of municipal action that drew on the city's strengths and pursued innovative solutions, thrusting new technologies and governance models into use. The railways and underground network were built, clearing slums and driving urbanisation; municipal utilities provided key services, such as water and gas; and parks were created, building on a new understanding of how green and public spaces benefitted everything from public health to community cohesion (Jordan 1994). In doing so, the Victorians made significant progress on health, social and economic issues and built a foundation on which future advances were made possible – a legacy that remains to this day.

London in 2016

London has come a long way since then. Major sanitary diseases have been eradicated; the slums have been cleared; about 50 per cent of the capital is now covered by either green space or water; and London boasts one of the best urban transport systems on the planet (GITF 2015). In doing so, it has maintained its global leadership in a changing world.

But in spite of this, or because of it, the London of 2016 finds itself in a situation analogous to that faced by the Victorians, where future prosperity depends on its response to a set of familiar, inter-related challenges:

- **The needs of a growing population:** London's population is forecast to grow from around 8.5 million today to over 10 million by 2031, and perhaps as much as 13 million by 2050, increasing demand for everything from housing to transport, with consequences for congestion, public health and social cohesion, among other things (GLA 2014a).

- **The imperative of environmental sustainability:** London must almost completely decarbonise by the middle of the century as part of the global effort to reduce net greenhouse gas emissions to zero beyond 2050, as set out in the Paris Agreement on climate change concluded in December 2015 (UNFCCC 2015). Meanwhile air pollution, biodiversity loss and resource scarcity will have an increasing impact on London and its citizens, with environmental, socioeconomic and public health consequences (Climate UK 2012).

- **The effect of new technologies and business models:** Digital and automated technologies are already transforming London's workplaces and homes, and are likely to further disrupt existing economic models and open up new business opportunities. They also have unprecedented potential both to overcome existing socioeconomic problems and to create new ones.

The following two chapters each identify and address a number of these issues in two key areas. Chapter 2 focuses on London's transport sector and makes recommendations on how the London mayor can address the twin problems of air pollution and traffic congestion. Chapter 3 focuses on the energy sector and proposes solutions to address the dysfunctionality of the energy market, the twin problems of fuel poverty and inefficient buildings, and the need to realise the potential of London's untapped renewables resource.

Reducing air pollution and carbon emissions will naturally form the core of the next mayor's environmental agenda, but should not exhaust it. Environmental problems arise as a result of development imperatives, and so their solutions must be integrated into the city's core strategies. Chapter 4 focuses on how an integrated approach to meeting environmental challenges can improve London's economic competitiveness, public health and social wellbeing. In doing so, we show there is much a new mayor can do to build a foundation upon which London can become a world leader in delivering a rapid and prosperous green transition – a global green city.

In the 1800s, the Victorians understood the need to invest in the determinants of social, economic and environmental wellbeing. In 2016, with greater knowledge, data and awareness of the whole nature of the city, the next mayor can draw on their example to reinvigorate the city and ensure it is fit for the 21st century.

2.
NO DELAY: TRANSPORT PRIORITIES FOR THE NEW MAYOR

For hundreds of years, thick, polluted fogs were a fact of life for Londoners. Worst among them was the Great Smog of 1952, which killed as many as 12,000 people over one weekend (Bell et al 2004). In response, Britain and London led the world in implementing the Clean Air Acts of 1956 and 1968, banishing smog to the past. But the deadly spectre of air pollution has risen once again in the form of invisible pollutants such as nitrogen dioxide and particulate matter.

This is a public health problem of the highest order, and once again, as in 1952, London sits on the frontline. In 2010, air pollution in London was responsible for as many as 141,000 life years lost, or the equivalent of around 9,400 deaths, and an economic cost of up to £3.7 billion (Walton et al 2015).

Air pollution in the city is driven primarily by emissions from transport. Oxford Street may have the highest annual concentration of nitrogen dioxide and the most hourly exceedances of safe levels in the world – and possibly the most in history (Carslaw 2014). In response, London has been threatened with fines and legal action by the European Commission (EC 2010, PA 2016), and has seen its position in 'liveability' rankings drop behind other major cities – many of which have already banned the most-polluting vehicles (Collinson 2016).

This all comes at a time when London's population is forecast to rise to over 10 million, which could mean an extra 1 million trips a day, amplifying the problems of air pollution, congestion and carbon pollution. London stands at a crossroads, and nothing short of a world-leading transport programme is required.

2.1 Transport: London in 2016

Good transport is vital for citizens and businesses, and has significant consequences for the health of the environment and the economy as a whole. This fact sits at the heart of many modern transport debates, from Crossrail to Heathrow. But there is one vital area of transport policy that does not receive its fair share of attention: the road network. Roads are one of London's most valuable forms of infrastructure, supporting up to 80 per cent of passenger journeys and 90 per cent of all freight (LF 2014). However, the way in which London's road network is being used is increasingly uneconomical and unsustainable. There are three main reasons for this.

Road usage is driving air pollution

The most significant cause of London's air pollution is its road traffic. This is because the vast majority of the vehicles on London's roads are fuelled by either petrol or diesel, which emit a number of harmful air pollutants, such as particulate matter (PM) and nitrogen oxides (NOx and NO_2).

Table 2.1
Fuel sources of public and private road vehicles, 2015

	Petrol	Diesel	Cleaner alternatives
TfL bus (central London)	0%	89%	11%
Taxi	0	100%	0%
Private car / Private hire vehicle (PHV)	42%	57%	1%
Light goods vehicle (LGV)	2%	97%	1%
Heavy goods vehicle (HGV)	0	100%	0

Source: Provided by TfL in correspondence with IPPR, January 2016.

For many years London's air quality has failed to adhere to the legal limits for PM and nitrogen oxides set by the European Commission and the Air Quality Standards Regulations of 2010:[1]

- **NO_2 concentrations** throughout central London remain above the legal limit of 40 μg/m^3. The average NO_2 concentration at Oxford Street in the 12 months to August 2015 was more than 150 μg/m^3, almost four times the legal limit (Howard 2015). London is not expected to comply with NO_2 standards until after 2030 (Defra 2014).

- **Levels of PM10 and PM2.5**[2] have improved over the same period and now sit within EU legal limits. However, according to the World Health Organization (WHO) this is one of the few areas where EU limits do not reflect safe levels: some 88 per cent of London has PM10 levels above WHO recommended levels (Howard 2015).

- **London ranks 15th out of 36 major global cities** in terms of overall air quality, with similar levels of NO_2 to Shanghai and Beijing (AMEC 2014).

Figure 2.1
The largest share of NOx emissions comes from road transport in greater London (left) and central London (right)
NOx emissions by source, 2010
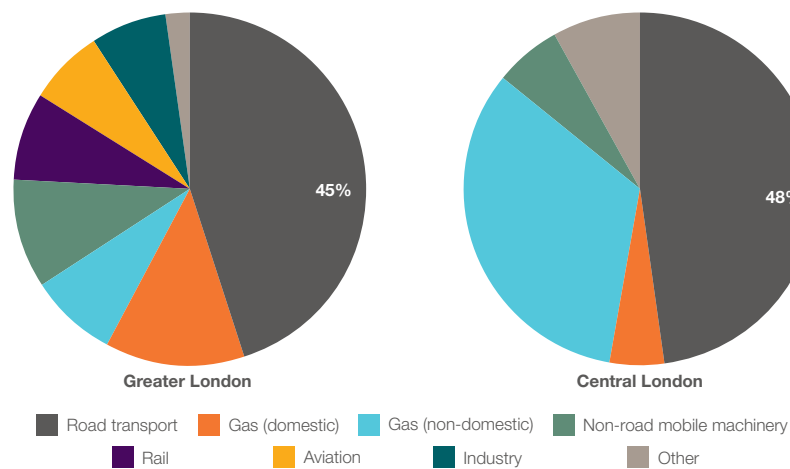
Source: Howard 2015

1   The Air Quality Standards Regulations 2010 (2010/1001): http://www.legislation.gov.uk/uksi/2010/1001/contents/made

2   PM10 and PM2.5 describe particulates of different sizes, approximately equal to their diameter in micrometres (μm).

Figure 2.2
The largest share of PM10 emissions comes from road transport in greater London
(left) and central London (right)
PM10 emissions by source, 2010

Greater London   **Central London**

48%   54%

- Road transport
- Rail
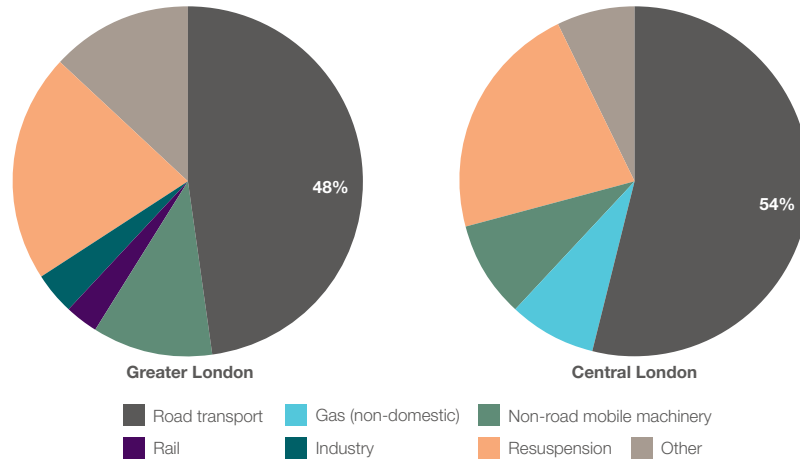- Gas (non-domestic)
- Industry
- Non-road mobile machinery
- Resuspension
- Other

Source: Howard 2015

These emissions are having a significant impact on health in the capital, increasing the prevalence of respiratory, cardiovascular and oncological conditions, shortening life expectancy, and imposing additional cost and capacity burdens on health services that are already under strain (WHO 2014). According to one estimate, in 2010, PM2.5 pollution had a mortality burden of 53,000 life-years lost, equivalent to 3,500 deaths, and NO_2 cost 88,000 life-years, equivalent to 5,900 deaths (Walton et al 2015) – for a total impact, as noted above, of 141,000 life-years or 9,400 deaths. This makes air pollution the second most significant determinant of ill-health in London, outranking alcohol abuse and obesity and following only smoking (LAEC 2015).

Furthermore, the impacts of air pollution fall disproportionally on children. Nearly 25 per cent of school children in the capital are exposed to levels of air pollution that break legal and health limits (Howard 2015). As a result, air pollution has become a major cause of concern for Londoners: according to one poll, it is ranked by the public as the top priority for local government, ahead of better public transport or improved access to healthcare (WSP-PB 2016).

Congestion is a drag on prosperity

The use of London's roads has increased significantly over the last decade as its population has grown – a trend that is set to continue. Assuming no policies are put in place to manage increased demand, it is estimated that total passenger vehicle miles travelled will increase by 43 per cent between 2013 and 2030 (CEBR 2014) – which is more than most other major cities around the world – and that every five years the transport system will need to cater for more than a million extra trips per day (TfL 2014a).

The resulting congestion will decrease average road speeds, from 21mph today – already one of the lowest speeds in a major city – to an estimated 16mph by 2030, with speeds in central London significantly lower still. Slower speeds mean greater delays and unpredictability in journey times, leading to higher economic costs (CEBR 2014).

Table 2.2
Estimated total direct and indirect costs of congestion to households per year (£bn)

	2013	2020	2025	2030	Change to 2030
Direct costs*	3.03	3.94	4.69	5.44	80%
Indirect costs**	2.96	3.58	4.18	4.77	61%
Total	5.99	7.52	8.87	10.21	70%

Source: CEBR 2014
Notes: * fuel and time wasted; ** increased costs of doing business. Original figures were stated in US$ and were converted to GBP on 22 March 2015 using the Google Currency Converter.

On the flipside, reducing congestion can drive economic growth and prosperity by reducing business costs (BCC 2008), increasing labour market flexibility and attracting new firms, and by increasing innovation and productivity through stronger agglomeration effects (Chatman and Noland 2013).

London's transport must be decarbonised
Around 22 per cent of London's CO_2 emissions come from transport, compared to 42 per cent from industry and commercial sources and 36 per cent from homes, according to 2013 data (GLA 2015a). Transport has been growing as a share of London's emissions, with its emissions set to rise by 4 per cent to 26 per cent of emissions by 2020 (TfL 2015a).

Figure 2.3
Transport is responsible for the fastest growing share of CO_2 emissions
Components of total London CO_2 emissions, 2000 vs 2011 (% of total)
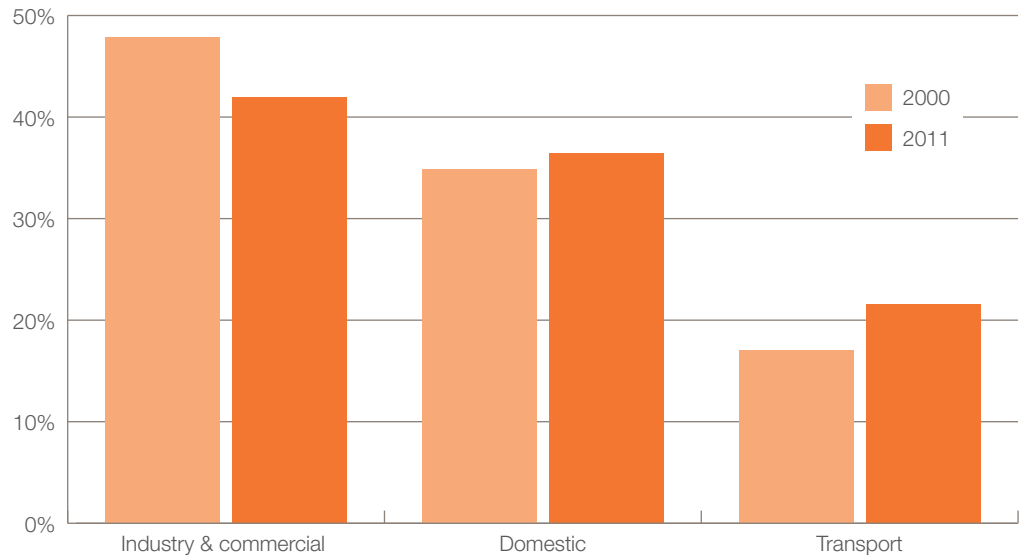
Source: GLA 2015a

Within this, road usage makes up 73 per cent of total transport emissions (GLA 2015a), resulting from a high prevalence of petrol and diesel cars and heavy vehicles (see table 2.1).

Figure 2.4
Road transport makes up by far the largest share of transport-related CO_2 emissions
Components of total London transport-related CO_2 emissions, 2013 (%)

73%

- ■ Road transport
- ■ Aviation
- ■ Rail (electric)
- ■ Rail (diesel)

Source: GLA 2015a

2.2 Transport: a progress report

The mayor has a number of policies in place to combat air pollution, congestion and carbon emissions. Of these, the London Assembly's environment committee has concluded that the 'major mayoral success has been in traffic reduction' (LAEC 2014). Although 2013 saw a slight increase, congestion had previously been falling in London, with traffic levels in 2012 recorded at 11 per cent lower than in 2000, despite a rising population.
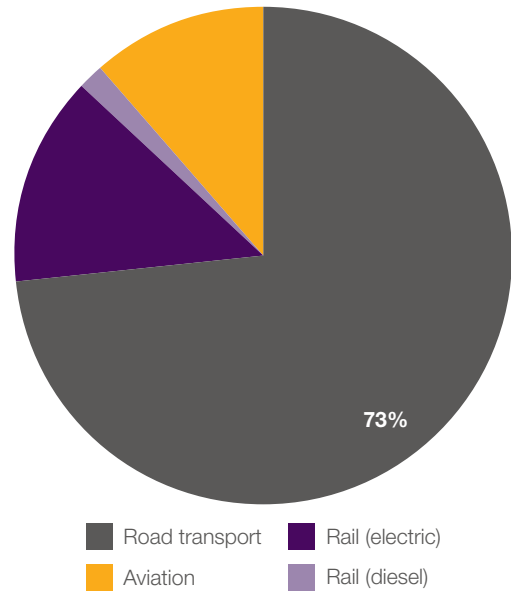
This is partly a result of the world-leading congestion charge zone (CCZ), which covers approximately 22 km² in the centre of London, where congestion is most acute. Introduced in 2003, the scheme initially led to a decrease in congestion, increasing average speeds between 2003 and 2006 (TfL 2008). However, as London's population grew – and up to 25 per cent of road space was reallocated to cycling, walking and buses – speeds have fallen again (TfL 2011). On the plus side, this reallocation has facilitated a significant 'modal shift' in the type of transport people are using: between 2001 and 2011 the number of cycling trips increased by 66.6 per cent, bus by 59.7 per cent and overground rail by 41.9 per cent (TfL 2012). Wider benefits include reductions in cycling and pedestrian deaths (Green et al 2016), and small decreases in air pollution (the congestion zone being too small to have produced major improvements) (Kelly et al 2011).

Progress on phasing out vehicles that fail to meet modern, high air pollution standards is set to be accelerated with the introduction of an ultra-low-emission zone (ULEZ) in 2020, an intensification of 2008's low-emission zone (LEZ), which is a charge on the most polluting vehicles and is the first such scheme in the world. Within the ULEZ, which will cover the same area as the current

congestion charge, vehicles that do not meet EU exhaust standards will be fined. New taxis will be required to meet these standards by 2018, buses by 2020.

The ULEZ is projected to at least halve emissions of NOx and PM10 from vehicle exhausts, primarily in central London. Because the majority of traffic entering the ULEZ will come from outside the zone,[3] reducing this flow is expected to produce significant reductions in the number of people living in areas of poor air quality: by 74 per cent in central London, 51 per cent in inner London and 43 per cent in outer London (TfL 2015a). This is due to both an increased replacement rate of high-emissions vehicles and a reduction in the total number of car journeys within the zone, which are predicted to fall by 5 per cent by 2025 (Jacobs 2014). Critically, however, the ULEZ will not immediately bring London into compliance with legal limits – it will only bring forward the expected date of compliance, to 2025 (TfL 2015b).

In terms of CO_2, the mayor's transport emissions reductions are on track: the target for 2010 was met and the 2015 target looks set to be achieved (LAEC 2014). However, the London Assembly environment committee concluded that this progress has been secured primarily as a result of national and European policies, and that the ambition could be higher: the 2015 target for transport emissions represents a 13-per-cent reduction on 1990 levels, compared with a 21-per-cent reduction for homes and a 23-per-cent for workplaces.

In summary, although London is making progress on reducing congestion and decarbonising its transport system, these measures could be more ambitious. At the same time, action on air pollution remains dangerously inadequate. Given the likely scale of population growth, the status quo is not sustainable. Therefore, the next mayor should target the root causes of these problems, with particular emphasis on roads policy.

2.3 Addressing London's transport issues: recommendations

Action on London's road network should look to ensure that air pollution levels are legally compliant and to reduce congestion and CO_2 emissions through two fundamental shifts in road usage:

1. from petrol and diesel fuels towards greener and cleaner alternatives for private and public vehicles
2. a continuation of the modal shift away from private motorised vehicle use and towards walking, cycling and public transport.

These shifts will require large and sustained investment in London's public transport, cycling and walking infrastructure, for which past and planned policies provide a strong foundation. However, though necessary, investment in sustainable transport will not be sufficient to drive behaviour change on the scale required, and the next mayor will have to consider a suite of new policy initiatives.

Foremost among them is the proposal to extend road pricing across London, to charge road users for their contribution to air pollution and/or congestion. Proponents for this idea include green groups (CBT et al 2016), motor groups (Walker 2011), engineers (RAE 2015) and business (LF 2014).

Road pricing is widely believed to be unpopular, but in fact surveys show that Londoners do not oppose road pricing as such. In its ULEZ consultation, TfL found that 58 per cent supported the introduction of the zone and 52 per cent agreed with the idea of a future ULEZ extension, seeing the benefits of the scheme both in terms of air pollution reductions and revenue reinvestment (TfL 2015a). Although no plans to expand charging across London exist, TFL's Road Transport Strategy does

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3   96 per cent of ULEZ traffic is expected to originate outside the zone (Kelly et al 2011).

ask the mayor to consider 'the wider use of smarter charging in the longer-term as a means to manage demand and make more efficient use of road space' (TfL 2013). Furthermore, the ULEZ consultation and the London Assembly environment committee have both called for a strengthening and expansion of the planned zone, with the latter advising that its implementation should be brought forward to ensure air pollution compliance is reached at an earlier date (TfL 2015a, LAEC 2015).

While it is clear that an expanded road pricing scheme would drive significant progress in terms of reducing air pollution, congestion and CO_2 emissions (as set out in the previous section), many complex factors would have to be considered in the development of a successful scheme, and to be effective the implementation process would need to adequately prepare London's drivers and infrastructure alike. Providing a definitive set of recommendations based upon a reasoned analysis of these many factors is beyond the scope of this report; indeed, the task can only be properly undertaken by TfL, which alone possesses the necessary resources, modelling capability and expertise to assess, develop and implement an expanded road pricing scheme.

For this reason, we recommend that **the next mayor should mandate TfL to assess the feasibility of an expanded road-pricing scheme** that considers:

1. **integrating** the CCZ, LEZ and ULEZ to create a single road-pricing zone, distinguishing between vehicles based on both the level of congestion they cause and the amount of pollution and CO_2 they emit

2. **expanding** this zone across the whole of inner London in order to maximise its impact, with charging bands within the zones that vary in price according to the pollution and congestion profile across different locations and times of day

3. **implementing** the zone by 2019, with all taxis and buses to be fully compliant by this date also.

The optimal boundary for an extended zone is likely to encapsulate inner London, extending out to the north and south circular roads. Extending beyond the circular roads, into greater London, would impose large costs: a more disparate public transport would need to be upgraded and the monitoring network would have to be extended. It would also have a more regressive effect on outer London drivers, who exhibit different commuting behaviour to those travelling to and within inner London.[4] Our view is that a final decision cannot be made until the feasibility study is completed.

A scheme like this would bring in significant revenues, which TfL could use to pay for the scheme's setup and then to invest into public transport, cycling, walking, car-sharing, and support schemes for drivers and businesses. Future revenues could also be used to compensate for the loss of TfL's general grant from central government.[5]

In order for these benefits to be realised, a new, expanded road-pricing scheme would require an **implementation process** that ensures it is both efficient and equitable. Roll-out of the scheme should seek to ensure that:

- **Road users are well-informed** of the arguments for the scheme, its benefits, implementation timeline, the actions required by drivers and transport alternatives, and, crucially, how revenues will be reinvested.

- **Regressive outcomes are minimised**. The overall impact on low-income groups must be assessed, weighing the cost of any new charges against the resulting reductions in air pollution and congestion and the value of increasingly targeted investment.

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4   In outer London, 51 per cent of commuting trips are made by car, 17 per cent on foot, 16 per cent by bus and 11 per cent by rail (GLA 2014a).

5   It is notable that London is now the only city in Europe without such a subsidy (see Edwards 2015).

- **Support for specific interests is provided**, including, for example, financial and practical assistance to enable small and specialised businesses within the zone to achieve compliance, and support for freight supply chains to develop strategies to spread delivery times throughout the day rather than during the morning peak.
- **Adequate monitoring and compliance mechanisms are put in place**, such as personalised accounts for drivers. These could allow for charging schedules based on vehicle type and journey, with charging levied via number plate recognition by an extended camera network.
- **Revenue is recycled to support alternative transport options.** These should be widely publicised, as part of a wider strategy of ensuring the scheme's benefits are evident to the public. This should include clear communication of reductions in air pollution and congestion, and about benefits and support for drivers, such as financial rewards or incentives on Oyster fares and, potentially, diesel vehicle scrappage schemes.

The provision of alternative, sustainable transport options is integral to the success of such a scheme, and will, in turn, benefit from it, as road-pricing revenues are reinvested and congestion is alleviated. History provides a good guide here: the greatest cost incurred in establishing the CCZ lay in upgrading the public transport network (TfL 2005), but since then around 80 per cent of the resultant revenues have been invested in the bus network alone (TfL 2014b).

However, it is also important to recognise that road pricing is not a panacea for London's transport ills. Wider sustainable transport investments, building on the strong foundations that exist already, should continue to be made.

- **Public transport:** TfL's network remains the most resource-efficient means of moving London's population, particularly at peak times. The existing, significant level of forward investment in the network should continue in line with demographic and behavioural changes, with particular emphasis on enhancing the contribution of the bus network and ensuring fleet compliance with air pollution standards – as we recommend above, by 2019. Furthermore, app-based 'personal mobility platforms', such as Uber, are changing the way people travel and how they interact with public transport, and so the current and future effects of these technologies on the network need to be explored (PT 2016).
- **Cycling and walking:** Cycling investment is providing clear gains, with the number of cyclists having tripled since 2000 (TfL 2015c). This investment should continue, with a renewed emphasis on safety, including further investigation of the scope for segregated routes and cycle bridges. Walking has also increased in popularity, and investments in dedicated routes and workplace schemes should continue as part of a broader process of urban development that encourages walking through the renewal of public spaces.
- **Shared and electric transport:** A shift to greater use of electric vehicles (EVs) and various forms of car-sharing can reduce congestion and emissions (CCC 2015). Indeed, car-share clubs are already changing driving behaviours and bringing with them socioeconomic benefits – for example, they help to mitigate the financial burden associated with driving by sharing depreciation, insurance and other ownership costs (ibid). To realise the potential of these shifts, the mayor should focus on**:**
  - **Electric vehicle charging:** Electric vehicle rollout is stalling: London is only 3 per cent of the way towards its 2020 target of 100,000 vehicles (LAEC 2014). One factor contributing to this slow growth is the inadequacy of the charging network, with a high failure rate of charging points and negative press stories focusing on the complexities of the organisation of the network. In response, the next mayor should work with key stakeholders to ensure that barriers to accessibility for private and car-share users are reduced.

- **Car-share parking:** TfL should work with the boroughs through the Car Club Coalition to introduce a uniform on-street parking permit for car-sharing schemes that works for both existing providers and local authorities. This process should also seek to identify suitable off-street parking opportunities.
- **Visibility:** The car-share industry is growing, but is yet to realise its latent potential. To encourage increased use of car-sharing, the mayor should commission advertising and informational content to increase public awareness and promote best practice, working through the GLA Group and with boroughs, building on existing schemes such as the partnership between Croydon Council and Zipcar (see Carplus 2014). Furthermore, the mayor should work with market incumbents and a non-commercial third party, such as Carplus, to develop a system of data-sharing with TfL. This data could be shared with the public via journey planner platforms, enabling them to include real-time information on locally available shared transport options.

These recommendations do not exhaust the transport agenda for the next mayoral term. But by acting on them, the next mayor can begin to tackle the interrelated transport issues that impact on all Londoners' lives.

3.
POWER TO THE PEOPLE: ENERGY PRIORITIES FOR THE NEW MAYOR

London faces the prospect of recurrent energy crises, as the demands of a growing population threaten to outstrip supply and prices rise at a time when the energy system must decarbonise (GLA 2014a). A paradigm shift is required. Fortunately, the seeds of this have already been sown, as new technologies expand the potential for low-carbon and decentralised energy, helping to reduce demand and increase the security of London's supply. The capital stands ready to exploit a new era of technological and economic change, but, as London continues to fall behind, success is by no means guaranteed.

3.1 Energy: London in 2016
The UK energy system is faced by a trilemma of energy issues as it tries to balance affordability with security of supply in a decarbonising world.

A dysfunctional energy market negatively affects Londoners
The resilience of London's energy supply is largely determined by the state of the national supply market, which has become ever more dysfunctional. Low levels of competition have pushed up energy bills for consumers: firms have failed to reduce retail prices in line with falls in the wholesale energy price, overcharged existing customers, and imposed complex pricing structures that make comparison difficult (Platt et al 2014). This creates a vicious cycle, whereby low trust among consumers actually reduces competitive pressure to pass on savings (Citizens Advice 2015), and has led to the recent referral of the entire industry to the Competition and Markets Authority (CMA) for full investigation.[6] The CMA's recent recommendations, while going some way to addressing the issues resulting from a lack of competition, by no means solve all of the problems faced by Londoners (CMA 2016).

The vicious spiral of overpricing and mistrust is both the cause and effect of low customer switching rates, along with the unfounded assumption that customers could and would engage actively and 'rationally' with markets (DECC 2016a). London has the lowest levels of switching of all regions in the UK for gas and is below the national average for electricity (DECC 2015a). Furthermore, while direct debit is the cheapest method of bill payment – producing an average combined saving of £87 in 2015 – London has the lowest levels of direct debit payment for gas and the second lowest for electricity (ibid).

These factors help to drive up energy bills, with London experiencing the highest average gas bills in the UK (DECC 2015b). In addition, these cost increases have come during a period of recession and slow recovery, accompanied by stagnation in wage growth, which has led to higher levels of fuel poverty.[7] In 2013, around 10 per cent of households were classified as fuel poor, with highs of up to 15 per cent in some boroughs (DECC 2015c) and an average fuel poverty gap of £304 (DECC 2015d).

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6   For more information, see: https://www.gov.uk/cma-cases/energy-market-investigation
7   The government defines a household as fuel poor if: (a) it has required fuel costs that are above average (the national median level) and (b) if it was to spend that amount, they would be left with a residual income below the official poverty line. The difference between higher and average costs, or the amount that a household is pushed below the poverty line, is referred to as the 'fuel poverty gap' (DECC 2015d).

And those in private rented accommodation, who make up a large proportion of Londoners, have the highest levels of fuel poverty, on account of the limited incentives under current regulations for landlords to increase energy efficiency (ibid). This is a particular problem because London has some of the least energy-efficient housing in Europe (GLA 2014a), because so much of its housing is older stock. And this is set to continue: as much as 80 per cent of London's existing housing stock will still be in use by 2050 (GLA 2015b).

All this comes at a large social and economic cost: fuel poverty and cold, energy-inefficient homes negatively affect physical and mental health, drive up mortality rates, reduce development and education attainment in children, and impair economic outcomes later in life (MRT 2011). The annual cost to the NHS of treating diseases related to cold housing exceeds £800 billion, and it is estimated that the NHS saves 42p for every £1 invested in keeping homes warm (DH 2010).

London must decarbonise its energy supply as its population increases
Regressive energy outcomes will be compounded by climate change, which is set to increase the frequency and severity of flooding, overheating and water shortages, and threaten the stability of the regional and global economy upon which London's prosperity is founded (LAEC 2014, Carney 2015). Furthermore, these impacts are likely to fall disproportionally on lower-income and vulnerable groups (Climate UK 2012). Meeting national decarbonisation targets would be hard enough without population growth, which has led the London Infrastructure Commission to forecast 'up to a 20 per cent increase in overall energy demand in the city', which, with the anticipated shift away from gas for heating and towards electric vehicles, 'is likely to mean a doubling of demand for electricity by 2050' (GLA 2014a). This will require an estimated £148 billion of capital expenditure on London's energy infrastructure (ibid), without which the security of London's energy will be threatened, as demand outstrips supply.

The green transition is an opportunity for London
Meeting increased demand while decarbonising supply is both achievable and beneficial (GCEC 2014). In general, it is estimated that as much as £2.90 in value is returned for every £1 invested in renewable energy, with 17 jobs created per million pounds invested (APSE 2015a).

The capital has an enormous latent potential for renewable energy generation. For example, London's solar potential is around 9GW, which, if fully exploited, would supply about 20 per cent of its current energy consumption (Ahmed 2016). However, as of late 2015, the deployment rate was one of the lowest in the country, at 54MW (DECC 2016b), equivalent to just 0.13 per cent of London's electricity use in 2014 (DECC 2015e). Accordingly, London has been ranked as the worst-performing city in England and Wales for renewables generation (GA 2016).

On the other hand, technological and financial innovation are accelerating the rise of decentralised energy and demand management, with innovative public and private business models springing up throughout the UK, enabling communities to exploit the socioeconomic benefits of the green transition (Platt et al 2014).

3.2 Energy: a progress report
The new energy landscape – of more decentralised and renewable energy supply and increased management of demand – will primarily be created by technological change and policy developments at the national and international level. But London has huge potential to respond in a way that meets its own needs. Energy supply makes up around 78 per cent of London's carbon emissions, and so if the city is going to play its part in the global drive to tackle climate change then it must introduce strategies that fill the gaps left by national energy policy which, by themselves, are unlikely to be sufficient to meet London's challenges.

The mayor already has a number of strategies to decarbonise London's energy supply, drive the growth of decentralised generation, and improve the efficiency of buildings (GLA 2011) – but progress has been slow.

Figure 3.1
London runs a serious risk of failing to meet its 2025 emissions reduction target for homes
Actual performance versus trend to target, MtCO$_2$e, 2000–2025
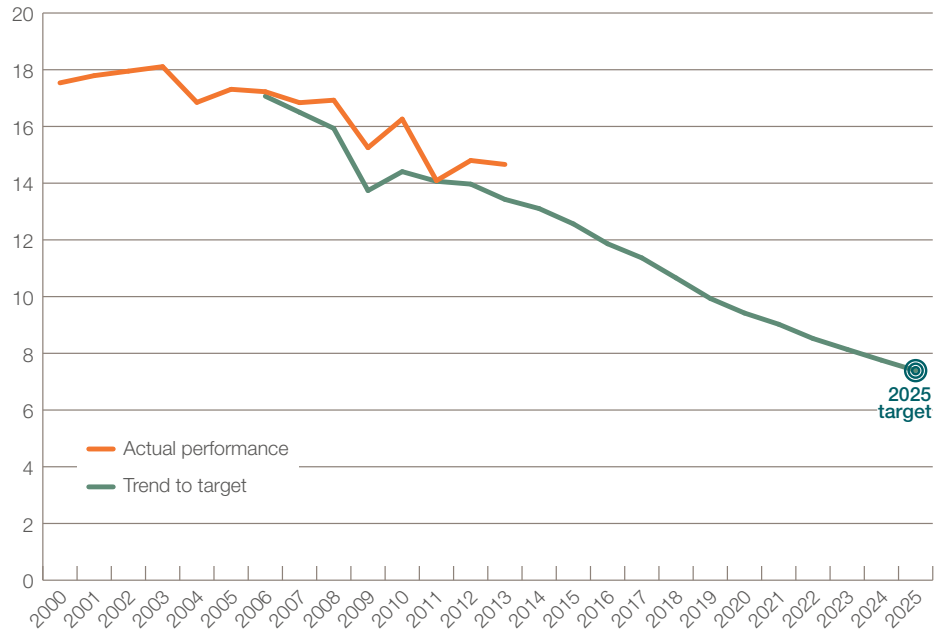
Source: LAEC 2014

Figure 3.2
London runs a serious risk of failing to meet its 2025 emissions reduction target for workplaces
Actual performance versus trend to target, MtCO$_2$e, 2000–2025
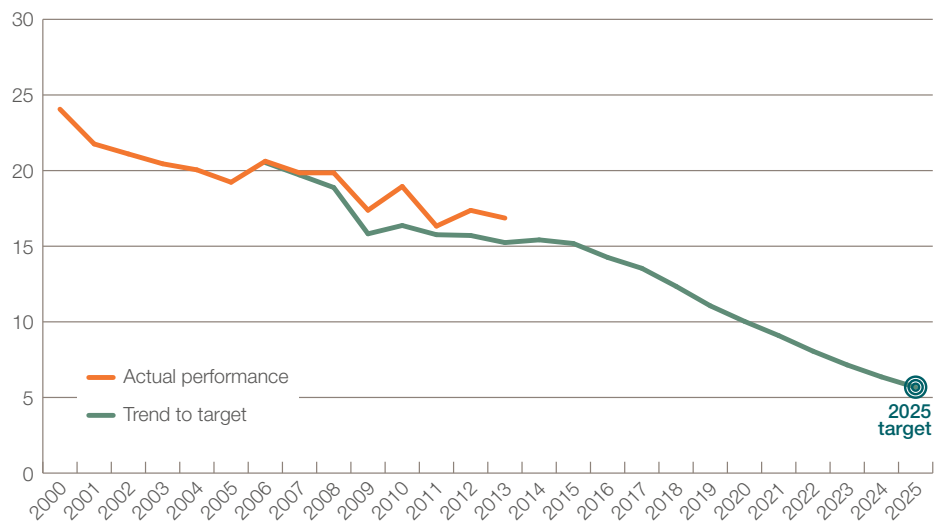

Source: LAEC 2014

In particular, the mayor has a target to generate 25 per cent of the city's heat and power from local sources by 2025. Progress has been made – with some notable community ventures emerging, such as Repowering London[8] – but this belies a poor overall picture: the 2015 target is set to be missed and the low number of projects in the works suggests the 2025 target is at risk too (LAEC 2014). Solar has been a particular failure, with low take-up levels compounded by the withdrawal of public subsidy in 2015, which led to the cancellation of £1.6 million of solar photovoltaic (PV) projects in the capital (GLA 2015c). This has contributed to a general failure to meet emissions reduction targets in homes and workplaces.

In an effort to increase take-up of decentralised energy, the GLA has been developing the Licence Lite scheme, which is designed to bring down barriers to market entry for local generators by offering more favourable power purchase agreements (PPA) than those provided by the supply market. Under this arrangement, the GLA forms a partnership with an existing supplier – in this case nPower – to purchase energy from local bodies and sell it on, at advantageous prices, to TfL (GLA 2016a). However, doubts exist over Licence Lite's ability to lower barriers to market entry for small generators (APSE 2015b). At the same time, in seeking to supply energy only to TfL, it has no scope to address fuel poverty, the failure of energy market incumbents or the lack of energy efficiency investment in London (LA 2015).

Indeed, energy efficiency lies at the heart of London's capacity to reduce emissions and fuel poverty. To this end, the mayor has targets both for ensuring high efficiency standards in new builds and for retrofitting existing buildings. While the targets for new-build efficiency are being met, the domestic and workplace retrofit schemes (RE:NEW and RE:FIT) are lagging behind their targets – and thus lag far behind the level of ambition required – with homes being retrofitted at less than half the rate needed to reach the target of 2.9 million homes retrofitted by 2025 (LAEC 2014).

In short, the potential of decentralised energy, demand management and renewable energy technologies are not being exploited, while fuel poverty and inefficient housing continue to blight the lives of Londoners. In turn, it seems that the GLA has little control over how it can respond to and exploit the profound shifts shaping London's energy future – as the failure to meet many of its energy targets suggest. The national policy environment precludes the devolution of effective policymaking powers and responsibilities, and so London's energy and efficiency outcomes can only be impacted through direct intervention by the GLA and its assets or through the purview of limited, often indirect market interventions. Often, these interventions offer subsidies and expert advice but ultimately provide little reward at high cost, as in the case of the retrofitting schemes.

Our view, therefore, is that the city must devise a way of gaining greater autonomy over its energy future, so it can be insulated from wider trends and benefit from the huge opportunities presented by new energy technologies and business models.

The city needs the services that do not generate sufficient revenue and so are not currently being delivered by the market incumbents. For this reason, we argue that an energy supply company should be introduced that could provide a solid platform to generate revenue for the mayor's wider energy strategy.

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8   See: http://www.repowering.org.uk/

3.3 Addressing London's energy issues: recommendations

In developing an effective energy strategy for a first term, the next mayor should focus their efforts on three interrelated objectives:

- significantly reducing **fuel poverty**
- **accelerating decarbonisation** of London's energy supply through the development of decentralised energy
- expanding **demand management** technologies throughout homes and workplaces.

It is clear from the outlook the new mayor will inherit that these objectives cannot be realised by London's energy system in its current form, and that a new approach is required. Indeed, many local authorities find themselves in a similar position and are looking for innovative ways in which to exploit the devolution agenda to increase their own capacities and capabilities within the current regulatory environment. As such, councils are increasingly exploring options for greater autonomy, including through the establishment of fully licensed, not-for-profit energy companies (Platt et al 2014). These companies allow local authorities to raise revenues and leverage public-sector borrowing to create the means of supporting low-income residents, driving green investment and encouraging demand management (Platt et al 2014).

Foremost among them are companies run by local councils in Bristol and Nottingham. Since launching in September 2015, Nottingham's Robin Hood Energy has become one of the cheapest suppliers in the East Midlands, with all tariffs falling by an average of £78 as the region's price competitiveness has improved (RHE 2016). Bristol Energy forecasts a 12 per cent return on investment by year five, up to 35 per cent in year 10 (Bristol CC 2015), with customers expected to save an average of more than £276 per year when switching to its one-year fixed tariff (Bristol Energy 2016).

Furthermore, these companies offer the means by which to break from the conflict of interest faced by market incumbents whose business model disincentivises them from promoting demand management. Indeed, both Bristol and Nottingham have made it clear that their companies seek to realise objectives other than simple revenue maximisation, focusing instead on social justice and sustainability.[9]

Energy for London

In London, Transport for London performs an analogous function, using its economic and political power to manage demand and drive transport behaviours while recycling its revenues into strategic infrastructure investment and the running of its services. The next mayor should draw on this model and the success of other councils by **establishing Energy for London (EfL), a fully licensed electricity and gas supplier** that aims to meet the three objectives of reducing fuel poverty, accelerating decarbonisation and expanding demand management. Such a company would allow the mayor to accrue revenues, leverage the asset base of the GLA, and increase democratic control over energy policy and provision, all of which would provide the economic and political power to make space within the national policy environment to meet London's energy interests.

It could do this by fulfilling the following roles:

- **Supplier to London customers of both gas and electricity**, driving competitiveness within the supply market and offering targeted support to vulnerable groups to tackle fuel poverty.
- **Energy service company for homes and small business**, providing expertise and financial support, including loan schemes, to support households and

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9   See BCC 2015 and: https://www.robinhoodenergy.co.uk/about-us

SMEs in the assessment and installation of a range of solutions to improve energy efficiency, cut fuel bills and reduce fuel poverty.

- **Developer and promoter of solar, district heating and demand-side management** through dedicated strategies (detailed below) and the bulk purchasing of green energy.
- **Energy manager for the GLA Group** to promote decarbonisation and the productive use of assets, including TfL land and buildings.
- **Champion for community energy enterprises**, providing expertise, favourable PPAs and financing options, and political leadership, and offering schemes that enable all citizens to share in the socioeconomic benefits of local community projects.

Setting up an energy company is a complex and expensive process. In determining the most appropriate approach, the next mayor must consider a number of factors:

- **The cost of setup:** 'Supplier in a box' solutions exist, whereby the GLA could purchase a pre-accredited supply company. Estimated at around £2 million, the cost is around 0.02 per cent of the GLA's total revenue in 2014/15 (GLA 2015d), with the outlay likely to be recouped after a stable customer base has been built up.

- **Company structure:** Consumers tend to have higher levels of trust in local authorities than in energy companies, which means that the GLA is well placed to establish its own energy company (Platt et al 2014). EfL must ensure it builds on this foundation and maximises the potential a municipal company has for expanding democratic control over energy by exploring different board representation and community engagement models. Furthermore, while some councils have chosen to take full ownership of private companies, there are other models – such as a community benefit society with an asset lock, as in the case of Our Power in Scotland[10] – which offer the means by which to ensure long-term community interest outcomes (BIS 2014).

- **Raising investment:** The company should provide direct investment and financial support for generation and heat and efficiency networks. Funding sources include leveraging GLA assets and access to other public borrowing sources; the issuance of green bonds; the London Pension Fund Authority; new, local levies, such as a proposed London feed-in tariff;[11] the private sector; and crowdfunding platforms.[12] Furthermore, EfL should use the GLA's new London Energy Plan tool[13] and work with London's district network operator to identify where local energy generation can be encouraged through the RIIO framework.[14]

- **Measuring success:** Success must be measured – including all available metrics, such as fuel poverty levels, revenue, decarbonisation and quantified measures of social benefit, among others – which requires the capability to capture and analyse the relevant data.

Setting up EfL is something that the next mayor can do in their first term as an important early step towards ensuring London's long-term energy resilience, as part of an iterative process that responds to changing local and national priorities.

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10 See: http://our-power.co.uk
11 See for example STA 2015.
12 See for example: https://www.abundanceinvestment.com
13 See: https://www.london.gov.uk/what-we-do/environment/energy/scenarios-2050-london-energy-plan
14 The RIIO (revenue = incentives + innovation + outputs) is Ofgem's new price control framework for network companies. It seeks to ensure that distribution network operators (DNOs) 'invest efficiently to ensure continued safe and reliable service' and do their bit 'in delivering a low-carbon economy and wider environmental objectives', among other objectives. For more information see: https://www.ofgem.gov.uk/network-regulation-riio-model

However, the challenges inherent in establishing a municipal energy company cannot be allowed to impede immediate efforts to reduce fuel poverty, decarbonise and decentralise London's energy supply, and support demand management. So while EfL is under development, the next mayor must continue to work with existing schemes and key stakeholders, including central government, to develop solar and efficiency and heat strategies. Eventually these complementary strategies should be subsumed into EfL's operations, but in the meantime they should focus on restarting the stalled progress on renewable energy and energy efficiency retrofitting, thus enabling the new mayor to achieve immediate progress while building a foundation for the long term.

Solar strategy

The next mayor should work with the existing Decentralised Energy Programme Delivery Unit (DEPDU) to drive solar take-up across London, aiming for **a target of at least 750MW by 2025**, a 10-fold increase on current levels (Ahmed 2016).

This would be achieved by:

- Maximising solar deployment across the GLA estate, including 5,700 acres of TfL land and trackside spaces (TfL 2015d).
- Ensuring that mapping data and tools are available for data crowdsourcing platforms, to complement existing GLA efforts to map street-by-street potential, and to feed data into new planning decisions to ensure set levels of PV take-up.
- Working with universities, industry, SMEs and community groups to provide innovative financing and local levies, expertise and planning assistance to new and existing PV projects, drawing on the successful model of New York's Solar Partnership.[15]
- Using the mayor's platform to communicate the socioeconomic and environmental benefits of local solar energy projects, including through community engagement and education programmes.

Efficiency and heat strategy

The retrofitting of London's housing stock should be seen as a pressing infra-structure priority, and the mayor must reinvigorate faltering efforts. However, there are other priorities here too. Over 75 per cent of London's total heat demand could be captured from secondary sources, but the expansion of district heat networks[16] throughout the city has been slow because they are expensive to develop (GLA 2013).

An efficiency and heat networks strategy is needed to drive efficiency standards in London through retrofit, district heating and demand management measures, including:

- The GLA and EfL working with existing schemes, suppliers and local authorities to target key neighbourhoods for efficiency and heat measures, as part of the strategic development of district networks. In this, they could draw on the example of Freiberg, Germany, by integrating decentralised energy schemes were feasible (Williams 2015).
- The GLA and EfL providing the overall, city-wide vision for its network and drawing on private-sector expertise in both development and implementation. In doing so, EfL could overcome the cost barrier to district heating schemes by driving investment, linking community groups with public assets, and assuming associated risks.
- Accelerating the rollout of smart meters.

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15 See: http://www.cuny.edu/about/resources/sustainability/solar-america/partners.html
16 A district heat network distributes thermal energy from a source of production to multiple buildings for use in heating and other applications.

- Promoting energy efficiency programmes for homes and buildings through GLA and borough planning and housing policies. The next mayor should look to raise energy efficiency standards for new homes above national standards, including exploring the possibility of reestablishing the zero-carbon homes guidelines.

There are profound changes occurring in the UK energy sector, as new technologies disrupt the status quo and the system moves towards decarbonisation. These changes present both challenges and opportunities for London. Our recommendations, if acted upon, could transform the energy services that Londoners receive, reducing the day-to-day costs of living and keeping more energy industry profits in the hands of local people.

4.
LONDON TOMORROW: TOWARDS A GLOBAL GREEN CITY

Reducing air pollution and carbon emissions will naturally sit at the centre of the next mayor's environmental agenda, but they are not the whole story. London's green spaces are an integral part of its character, and the quality of life of its citizens depends on a great network of waterways, trees, parks, commons and wild spaces. At the same time, London's economy is a major user of material resources and generator of waste. And, by being built on a flood plain, the capital is particularly vulnerable to the rising impacts of climate change.

Historically, all these environmental issues have tended to be seen as separate from or subordinate to the city's core imperatives of meeting housing, development and transport demand (GITF 2015). But this distinction is no longer tenable. Indeed, global experience now shows that addressing the green agenda is a way of improving cities' economic competitiveness, public health and social wellbeing.

For it is not only London that is faced with these challenges: cities the world over are seeking a sustainable future, and many have surpassed London in their ambition and achievements. Already, the most successful cities are those whose development models integrate environmental, social and economic sustainability, and understand how green investment supports competitiveness. As the Global Commission on the Economy and Climate has shown, the adoption of 'more compact, connected and efficient forms of urban development' by cities can 'stimulate economic activity, attract investment, improve air quality and public health, enhance safety, help to reduce poverty and avoid substantial costs associated with sprawl – all while making a significant contribution to global climate change mitigation' (Gouldson at al 2015).

This is becoming a global movement, and examples are proliferating. Vancouver has a plan to become the 'greenest city in the world' by 2020, encompassing everything from the local food system to modal shifts in transport (City of Vancouver 2012). In Australia, Sydney is aiming to ensure all residents live within a 250 metre walk of continuous green links that span the city (CoS 2011). San Francisco, already a sustainability leader in the US, plans to become zero waste by 2020.[17]

This presents the next mayor of London with both a challenge and an opportunity. We believe the next mayor – capturing the spirit of the Victorians – should commit to making London a 'global green city': a world leader in developing an integrated approach to improving the city's economy, environment, public health and quality of life.

In addition to transport and energy policy, this will involve integrating environmental objectives into three core areas of the mayor's strategy:

- London's **planning strategy** must prioritise the city's green and blue infrastructure alongside housing and built development, with 'liveability' as a core objective.
- London's **economic strategy** should seek to reduce its environmental impact across the full range of environmental factors – including water and materials use, waste and pollution – and to harness the economic development and job creation opportunities of emerging green and low-carbon sectors.

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17   See: http://sfenvironment.org/zero-waste

- At the same time environmental policies must be founded on support for London's **communities**, to ensure that they strengthen, and do not undermine, equality, social cohesion and civic engagement.

4.1 Planning and liveability

London must invest in both the built and the natural environment if its citizens are to have a high quality of life. As the current mayor's Green Infrastructure Task Force has put it, 'green' and 'blue' (water-based) infrastructure now needs to be seen as an: 'integral part of the urban environment alongside the roads, railways, cables and pipes upon which the prosperity and viability of the city depends' (GITF 2015).

While the next mayor will inherit a city in which 47 per cent of its area is already covered by green or blue infrastructure (ibid), they will also have to face up to the increased encroachment of new developments, declining public spending on maintenance and protection, and falling rates of public access.

Nearly 2 million Londoners live further than 1 kilometre from open green space (GLA 2012), with a third of London families visiting natural spaces fewer than six times a year. The number of visits continues to decline, and at a higher rate in low-income and in some ethnic and minority groups (GLA 2011). Furthermore, natural spaces are being lost to development as London grapples with a prolonged housing crisis: between 2009 and 2012, over 215 hectares disappeared, an area equivalent to the size of Hyde Park and Battersea Park combined (CPRE 2014).

This is a social as well as environmental problem. Green space supports positive physical and mental health outcomes, through improved air quality, facilitation of physical activity, and its aesthetic qualities, and builds resilience against climate change and biodiversity loss through carbon capture and support for new and existing species (CPRE 2013). Furthermore, these spaces and their 'ecosystem services' provide part of the foundation upon which London's material prosperity depends, and directly contribute to employment, through jobs in maintenance and development, and indirectly, by contributing to the city's quality of life and aesthetic appeal (ibid, LF and LEP 2015).

The next mayor should therefore integrate blue and green infrastructure priorities into housing and planning policy, ensuring urban development becomes greener and more intensified.

A green and healthy environment

The mayor should work with public, private and civic bodies to expand London's green and blue infrastructure and increase the equity of Londoners' access to it. The Green Infrastructure Taskforce has already provided a suite of ideas for such a programme (GITF 2015), and its thinking provides a strong foundation for the new mayor to build on.

In particular, we support the taskforce's recommendation that the next mayor should appoint a **green infrastructure commissioner** with a remit and the powers to coordinate and promote the protection and enhancement of blue and green infrastructure in London's planning policies and their delivery. One of the priorities for the commissioner should then be to work with the mayor to establish London as the first **national park city**.[18] This proposal, which has won wide backing over the last few years, is aimed at providing an overarching vision and framework for the conservation and improvement of green space and biodiversity in the capital, encouraging wide public education and participation.

To ensure the priority of increasing public access to and use of green spaces, we recommend that the mayor adopts a long-term strategy geared towards ensuring all Londoners **live within 1 kilometre of open green space**.

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18 See: www.nationalparkcity.london

Among policies which could support the achievement of this target, we recommend:

- Provision of **advice and resourcing to social housing providers** to develop and enhance green spaces on their estates, building on existing schemes, such as the London Wildlife Trust's Natural Estates partnership.[19]
- The **greening and cooling of London's streets and roofs** through the installation of reflective surfaces (including solar panels), fountains, tree planting and upkeep, and 'green walling'.[20] London has 24,000 hectares of potential green roof space. Greening and cooling can reduce damaging urban heat island effects and evenly distribute environmental resilience throughout the city (GLA 2008).
- **Investment in community wild trails**, such as the Parkland Walk and Peckham Coal Line, restoring rivers and creating more wetlands (CBT et al 2016).
- **Establishing a Parks Commission** to work with local authorities and the Royal Parks to develop new financing models for London's parks, ensuring their long-term financial viability while keeping their public character and promoting their cause within government and across the city (Nesta 2016).

Green investment is particularly vulnerable to overall reductions in public and private spending, while a poor understanding of the value of green assets in both public and private sectors acts as a barrier to innovative financing (GITF 2015). As such, a key role for the green infrastructure commissioner should be to ensure **existing funding streams are maintained while exploring new financing options** which can be leveraged through a greater understanding of the benefits provided by blue and green infrastructure.

Intensification

The London Housing Commission estimates that by 2030 London will need to house 1.5 million more people, and needs to build 50,000 new homes per year in order to do so (LHC 2016). Part of the solution lies in the more efficient use of space and the design of policy to realise the potential of increased housing intensification. The GLA estimates that doubling the density of 10 per cent of outer London's semidetached housing would provide an additional 400,000 homes (HTA Design 2014), while Savills contends that extending transport connectivity to low-density areas could support nearly 1.4 million new homes (LF & Savills 2015). Furthermore, higher intensification can reduce emissions, drive sustainable growth and transport behaviours (GLA 2014b), and improve social cohesion (Beunderman et al 2009). As such, the mayor should develop amendments to the London Plan that **ensure intensification becomes a key characteristic of spatial development throughout London**, enabling a process that promotes local decision-making and delivery of urban renewal.

Pedestrianisation

Half of London's car journeys are less than 2km long, and so there is great scope for Londoners to increase the amount of walking they do, with attendant benefits to health, environment and economy (TfL 2016). The pedestrianisation and redevelopment of road space is one element of urban intensification which can help support a modal shift toward walking and other sustainable and shared transport, creating more accessible and enjoyable public spaces for all. TfL's 'Mini-Hollands' programme[21] has kicked off this process, providing three outer London boroughs with funding to develop cycling hubs through their town centres. The next mayor should expand the scheme as part of a **feasibility and delivery plan for pedestrianisation across the city**, ensuring that newly created spaces are kept in public hands. Having already garnered much public support (Hill 2016), the pedestrianisation of Oxford Street could be part of such a plan, providing a symbolic next step on the journey to a more liveable urban environment.

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19   See: http://www.neighbourhoodsgreen.org.uk/about/naturalestates
20   Planting on both inside and outside walls reduces temperatures, reuses water, and improves aesthetics.
21   See: https://tfl.gov.uk/travel-information/improvements-and-projects/cycle-mini-hollands

4.2 The green economy

To ensure the continued sustainability of water, food and other key resources, and to keep up the pressure on emissions reductions, the next mayor must integrate environmental policies into the city's overall economic strategy.

The development of London's green economy presents an enormous opportunity. Over 160,000 people work in the capital's environmental sector, which saw over £25 billion of sales in 2011/12 (GLA 2016b). Part of this growth is already being driven by mayoral policy, which focuses on driving green job opportunities through the GLA energy schemes described in chapter 3.

But we think the next mayor could do more. Growth in the green economy could be accelerated by the creation of Energy for London, which, along with targeted energy strategies, could drive investment in renewables, energy efficiency and heat networks, creating jobs and ensuring the benefits remain in London's communities. Furthermore, as we recommended in chapter 2, investment in sustainable transport could boost growth, providing job opportunities and expanding London's technology and manufacturing sectors, while an inner London road pricing scheme would reduce air pollution and congestion, and the associated economic costs.

The next mayor should also focus their attention on London's resource efficiency. London's economy remains reliant on largely linear patterns of production and consumption, in which resources are converted into non-recycled wastes. This is ultimately both environmentally and economically unsustainable (EMF 2012, LWARB 2015). Regulations and incentives are needed to support an increasingly 'circular' economy, driving demand for reused and recovered materials and ensuring that wastes are put to new economic use, and in turn stimulating new business models and growth opportunities. The London Waste and Recycling Board (LWARB) estimates that this would deliver around £7 billion of benefits per year by 2036, including the creation of around 12,000 jobs (ibid).

Realising these benefits is a long-run ambition, but progress is stalling, with London having some of the lowest recycling rates in the country (Defra 2015) and supply of recycled materials falling short of manufacturing demand (CBT et al 2016). In response, the next mayor should **accelerate the development of London's circular economy,** providing the LWARB with the necessary resources, expertise and powers to complete and implement the 'circular economy route map', as mandated by the current mayor.

4.3 Community

The journey to becoming a global green city will affect the ways in which Londoners live. Choices will have to be made – including behaviour changes and infrastructure development – that will affect London's diverse communities in different ways. In turn, these communities are best placed to develop and implement many of these changes, utilising local expertise, resources and information. Already many of London's greatest green innovations have come from local community organisations and enterprise.

It is therefore vital that the next mayor ensures communities are able to feed into decision-making on the green transition and to benefit from it, grasping this unique opportunity to improve social cohesion and renew the public realm. We see London's development into a global green city as one in which the mayor facilitates bottom-up empowerment rather than the top-down imposition of a centralised agenda. For this reason, **community engagement and participation need to be fully integrated into the overall green strategy**. Many boroughs already have schemes that engage constituents on a neighbourhood level.[22]

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22   See, for example: http://www.hillingdon.gov.uk/article/8877/Get-involved-in-local-democracy

We believe that these could be enhanced by drawing on new models of democratic engagement, including that of the parish, which exists in law and provides an efficient means by which to devolve decision-making to the neighbourhood level.

4.4 Conclusion

On 6 May 2016, the next mayor of London will inherit a city that has made considerable strides in becoming cleaner, greener and more prosperous. But they will also inherit a city in which rising congestion and dirty vehicles produce illegal levels of air pollution, shortening the lives of thousands of people each year; a city that is failing to reach emissions targets, as the rollout of renewables is stalled by an energy market that keeps around a million people in fuel poverty; and a city where green spaces are being lost and recycling levels are the poorest in the country.

These challenges occur against the backdrop of a rapidly growing population, the global imperatives of decarbonisation and environmental sustainability, and the increasing disruption caused by new technologies and business models. London once again faces 'the great forces of the day', and the next mayor must respond with an unprecedented programme of action.

This report draws together policies and programmes designed to overcome London's specific transport, energy and environmental problems, and to do so as part of a holistic programme to establish London as the global leader in an integrated approach to enhancing its built, natural and social environments.

But this is not a task for London alone. Although particularly acute in the capital, the challenges set out here are also faced by cities throughout the UK. And many city governments have already taken the lead in responding – such as Bristol and Nottingham, which have established municipal energy companies; Swindon Council, which has created the UK's first local authority solar energy bond (Timperley 2016); and those local councils that have made collective pledges to decarbonise their energy supplies by 2050 (Mason 2015). In London and across the country, the government's drive towards the devolution of resources and powers opens up new possibilities for local environmental efforts.

As such, we believe the next mayor of London should foster links between cities across the UK by helping to create the **UK100**, a convening organisation that would help cities to fulfil their environmental ambitions by providing consultation and facilitating cooperation. Working in concert with other major local authorities, the devolved administrations and central government, the mayor should help to found the group, building on the partnership model pioneered by the C40 global city network.[23]

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If the next London mayor wins a second term, they will be in power for just under a quarter of the time remaining until 2050, the world's decarbonisation deadline. This is an enormous responsibility, but one that affords the new mayor a unique opportunity to turn London into one of the cleanest, greenest, most prosperous cities in the world – a global green city. In doing so, London can maintain a long tradition of rising to the great environmental, economic and social challenges of the day; by being the next in a long line of city leaders, reformers and rebuilders, the next mayor will lay the foundations upon which London can remain the greatest city on earth.

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23   See: http://www.c40.org/history

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