

Urban Transport and the Environment, London, UK

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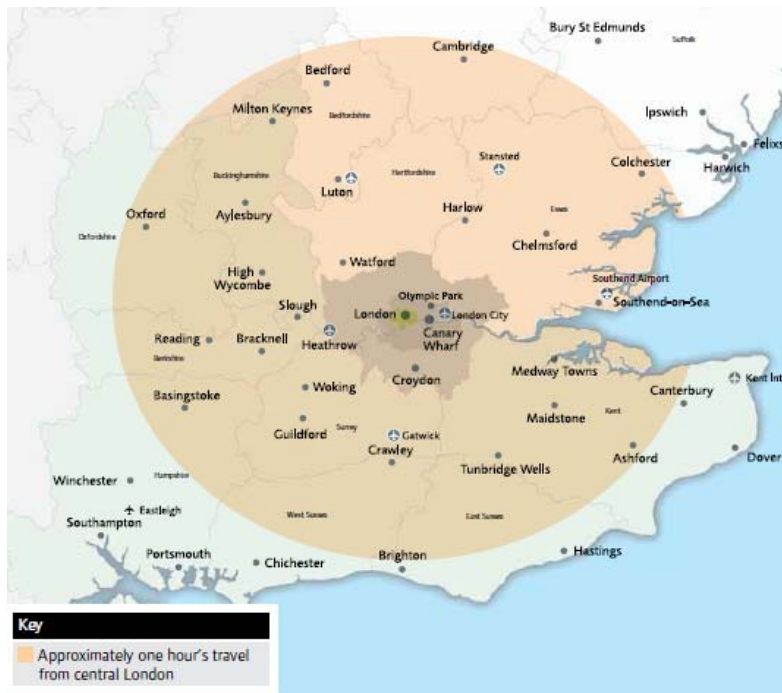
Introduction

London is a centre of global financial activity. It considers itself an exemplar in moving towards a low carbon economy with a set of challenging carbon reduction targets, and in its desire to maintain and enhance its multi cultural and environmental credentials. Its priorities are consistent with most of the major cities in developed countries, where sustainability is viewed primarily as environmental quality with reductions in CO₂ and local pollutants being the major objectives. Transport has proved a difficult challenge as it is totally dependent on oil, and less energy is currently used in London than in other cities of comparable income and size. This is due to its high levels of public transport use and its demand management strategies, such as congestion charging. It has also taken a lead role through investment in higher density developments and the use of transport development areas at key interchanges that are public transport accessible. It is now considering alternative fuels and has taken the lead in investing in an electric vehicle infrastructure, in cycle hire schemes and in cycle highways.

Background

London has a population of 7.7 million (2009), with an average density of 4800 persons per km².¹ With 15 per cent of the UK workforce (4.7 million), London contributes 20 per cent of the UK's GDP and accounts for about 37 per cent of inward investment (Figure 1). The wider London region that includes those commuting into London accounts for 40 per cent of the UK's GDP. By 2031, the population of London will increase to 8.8 million.

Figure 1. London in the context of South East England



Source: GLA, 2010, Figure 6.

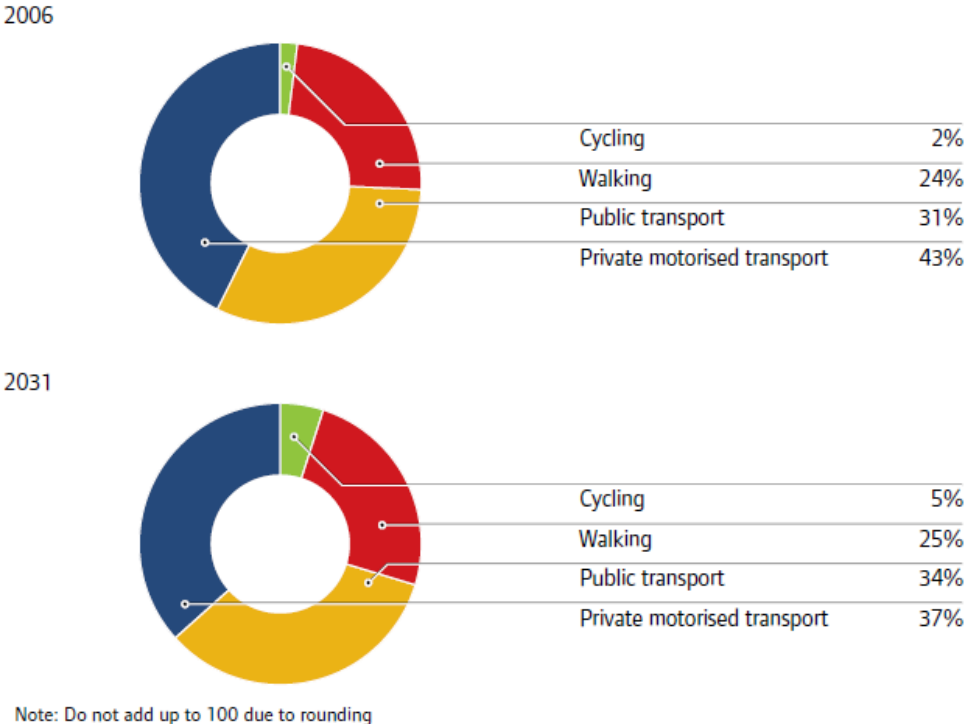
1. All the data used in this case study comes from GLA (2010) unless otherwise stated.

London’s transport vision is to create a world class transport system that delivers a safe, reliable and efficient movement of people and goods that enhances London’s economy, environment and social inclusion. The Mayor’s Transport Strategy (GLA, 2010, p6) states that ‘*London’s transport system should excel among those of world cities, providing access to opportunities for all its people and enterprises, achieving the highest environmental standards and leading the world in its approach to tackling urban transport challenges of the 21st century.*’ The target within the Transport Strategy is to reduce London’s CO₂ emissions by 60 per cent in 2025 (on 1990 levels).

The basic aim of the strategy is to increase the connectivity and capacity of the public transport system, and at the same time improve efficiency and integration so that maximum use is made of walk, cycle and public transport. Such a system is the most accessible and fairest for all users, and it offers value for money, but at the same time improves the quality of life and the environment, and it improves opportunities for all Londoners (Figure 2).

The overall number of trips² in London is forecast to increase from the current level of 24

Figure 2. Modal split in London – Trips

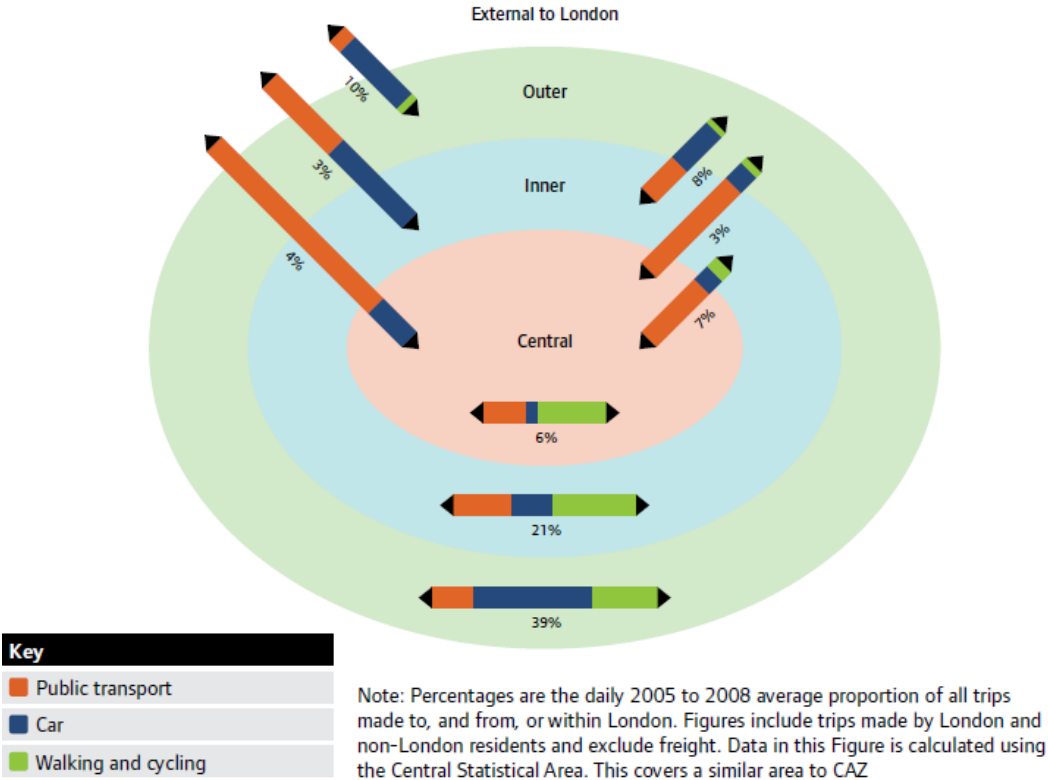


Source: GLA, 2010, Figure 2.

million per day (2006) to more than 27 million by 2031. International, national and inter-regional trips to and from London account for 17 per cent of the total (4 million), and these longer distance movements are distributed between private (65 per cent) and public transport (35 per cent). London itself is divided into three types of area, the central area zone (CAZ), the Inner and the Outer area (Figure 3). The CAZ covers the City of London and the majority of the City of Westminster and parts of the Boroughs of Camden, Hackney, Islington,

2. A trip is a complete door-to-door movement, such as from home to the office, and can include several stages within it, such as a walk from home to the station, the journey on a train and then a further walk from the end station to the office.

Figure 3. Spatial patterns of travel across London, with mode shares



Source: GLA, 2010, Figure 11.

Lambeth, Southwark, Tower Hamlets, Wandsworth, and Kensington and Chelsea, with 4 per cent of population and over 25 per cent of jobs. Inner London contains about 36 per cent of London’s population, including areas of deprivation and regeneration, and about a third of all jobs. It has a higher density than Outer London, which is mainly sub-urban with about 60 per cent of the population and 42 per cent of jobs. There are 12 metropolitan town centres in the suburbs where most of the jobs and facilities are located (Table 1).

Within the CAZ, most trips are by foot (up to 75 per cent in some areas of those trips wholly made within the area), and by public transport (over 80 per cent of those made to and from the area). About 21 per cent of all trips are made within Inner London, with walking accounting

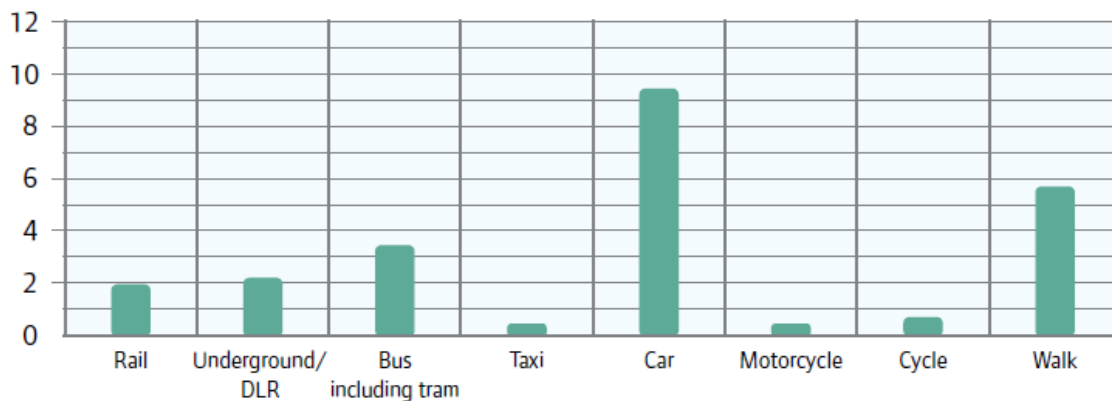
Table 1. Population and employment distribution and growth

	Population				Employment			
	2007(m)	2031(m)	2007(%)	2031(%)	2007(m)	2031(m)	2007(%)	2031(%)
CAZ	0.3	0.3	4	4	1.2	1.4	26	25
Inner (excl CAZ)	2.7	3.4	36	38	1.5	1.9	32	35
Outer	4.6	5.1	60	58	2.0	2.2	42	40
Total	7.6	8.8	100	100	4.7	5.5	100	100

Note: These projections have been supplied by the GLA. They are consistent with the projections underpinning the draft London Plan and Economic Development Strategy. The GLA update population and employment projections for London usually on an annual basis. Significant changes would influence the forecast levels and patterns of travel demand.

Source: GLA, 2010, Figure 13.

Figure 4. Daily average number of trips across London (millions, 2007)



Note: Estimates of the daily average number of trips in London (including trips to, or from, London).
Source: GLA, 2010, Figure 12.

for 46 per cent, car 26 per cent, bus 18 per cent, and rail 7 per cent of these internal trips. It is only in Outer London that the car is dominant (52 per cent of trips), with walk and cycle making up a further 35 per cent and public transport 14 per cent (Figure 4).

Six key indicators of environmental quality have been chosen to illustrate different environmental issues as they relate to London:

1. Population density ranges from 10,000 to 1,500 people per km² and averages about 4,800 persons per km², but these levels are much lower than those in other Global Cities, such as Tokyo and New York. They also decrease more rapidly over about 10km from the centre, unlike Tokyo where high densities persist for 20–30km. The empirical evidence from the UK National Travel Survey suggests that people living in higher density locations travel less far, as trip lengths are shorter, and they are likely to make more use of public transport (Banister, 2011) – this has positive environmental benefits.
2. The mode of transport is defined in terms of the average use over a year of the car, public transport, and walk and cycle. This indicator differs across London, as shown in the commentary above. In the Central and Inner areas, about 80 per cent of trips are made by public transport and walk or cycle, but in the Outer suburban areas about 50 per cent of trips are by car and a further 35 per cent by walk and cycle (Figure 3). Higher levels of car use are associated with higher levels of resource consumption and higher levels of emissions (Banister, 2005).
3. Although roads are ubiquitous, there is considerable variation in the quality of public transport provided in different parts of London (e.g. ease of access, frequency and travel times). The picture is complex, with locations near the centre having higher levels of public transport accessibility, reflecting the radial transport system in London, but there are several locations elsewhere with high levels of accessibility. The average Londoner spends about 74 minutes a day travelling (TfL, 2009, p. 150), but this conceals considerable variation, as on any given weekday 13 per cent do not travel at all and about 20 per cent of Londoners are travelling over 120 minutes – high levels of public transport accessibility reduce environmental costs.
4. The level of air pollution relates to the impact of transport on people's health and sense of well-being. The National Air quality Strategy requires a maximum annual mean NO₂

level of $40\mu\text{g}/\text{m}^3$, but the levels in London are much higher in many areas. This affects much of the CAZ, as well as the area around Heathrow airport to the west. It also sharply identifies the road network, where much of the NO_2 is emitted from the use of diesel engines. It was expected that these levels should have fallen with cleaner car and truck engines, but the levels have remained constant, even though there have been substantial reductions in nitrogen oxide (NO_x) emissions over the last ten years. Emissions of NO_2 also comes from the chemical conversion of NO_x , and this pollutant together with particulate matter provide two of the most important sources of local air pollution, and transport contributes significantly to this problem³ – people’s health is adversely affected by high levels of pollution, particularly if they live near to the sources of pollution (i.e. close to roads).

5. CO_2 emissions are the global indicator used for the measurement of transport’s contribution to climate change, and this has proved very difficult to reduce. London has lower levels of CO_2 emissions in transport than other cities in developed countries due to its relatively high density, strong regulations and low levels of car use. Within London, the transport sector accounts for about 24 per cent of ground based CO_2 emissions (10.8 million tonnes of CO_2 , including ground based aviation, or about 1.51 tonnes of CO_2 per person in 2006), with car accounting for about 49 per cent and road freight another 23 per cent (Banister and Hickman, 2009). As this is a global pollutant, the levels do not vary across London, but it relates to the distribution of population and their travel patterns.
6. The most important social indicator of the environmental impact of transport is the average number of pedestrian accidents over a year in a given location. London has a rate of 14 pedestrians killed or seriously injured per 100,000 (2009), a reduction of 50 per cent on the corresponding levels in 1999. The highest levels are found in the centre, as this is where the density of pedestrian activity is much greater than elsewhere in London. The accident rates in the eight central London Boroughs are 43 per cent higher than those found elsewhere in London (2009). Many of these pedestrian accidents are caused by out of town drivers, as there are low levels of car ownership and car use in Central London, with only around 20 per cent of the local population travelling by car.

London is a city that prides itself as a role model for sustainability, even when it comes to transport. Levels of car ownership are much lower than one would expect given its income levels (43 per cent of households in London have no car – the overall figure for Great Britain is 25 per cent, DfT, 2009a), and London has a high quality public transport network. It has even succeeded in reversing the growth in car use, as public transport has increased its modal share of trips by 4 per cent since 2000. The car and public transport account for 43 per cent and 31 per cent of trips respectively, with walk and cycle making up the remaining 26 per cent (Figure 2). In Table 2, the six key indicators demonstrate the different challenges for sustainable transport in the three types of areas – Central London, Inner and Outer London, and international travel.

3. For example, nearly 70 per cent of fine particulates (PM_{10} - those with a diameter of less than 10 microns) result directly from road transport, mainly from diesel engines.

Table 2. Six key indicators by type of area in London

Indicator	Central London	Inner and Outer London	International travel
Population density	High: >10,000 km ²	Medium: >3,500 km ²	Low: <3,000 km ²
Mode of transport	High levels of walk, cycle and public transport use	High levels of car use – lower levels of other modes	High levels of car use – low levels of other modes
Accessibility	High and major destination for trips	Low to medium	Very high – for national and international travel
Air pollution	High levels of NO ₂ and particulate matter	Medium levels of particulate matter	High levels of particulate matter and nitrogen oxides
CO ₂ emissions	High levels as more people live here	Medium to high levels to reflect population density	Low levels as fewer people, but more from freight
Pedestrian accidents	Highest levels in London	Low levels of pedestrian accidents	Low levels

Central London

Within Central London (20 per cent of the total area) considerable progress has been made to enhance sustainable transport, and six initiatives will be highlighted here. First, there has been a reconsideration of the *priority for the use of the street space*. The majority of people (around 80 per cent) are travelling by foot, cycle or public transport, and this means there is an opportunity to provide a greater proportion of the available space to these modes. Streets are primarily for people, with the vehicular movement of people and goods also being fitted in. This dual objective can be achieved through the flexible use of shared spaces, where different uses can complement each other by the allocation of space for particular periods of the day or different days of the week. This allows street markets, parties and other activities to coexist with the same space being used for deliveries and through traffic at other times. The purpose is to encourage local street life in residential and other areas, and this in turn may lead to car free zones.

Activities are accessible and there is high quality public transport available, so it is no longer necessary to own a car in the city centre. There may be a case for renting a small ‘clean’ vehicle for particular occasions or for being part of a car sharing scheme, but the high quality cycle and pedestrian network combined with public transport and taxi, make car ownership unnecessary. This in turn reduces the need for street parking space and releases more space for walking and cycling – a virtuous circle. Air quality, noise and other pollution would be replaced by peace and quiet, and more green spaces in cities (Gehl, 2004). Such a change has already taken place in London and other European cities (e.g. Freiburg and Copenhagen).

Secondly, the creation of quality *spaces for people* is one initiative that London has taken a lead in promoting the World Squares movement with the closure of the most scenic part of Trafalgar Square to traffic (Figure 6). As with the streets for people, the intention is to create a larger number of quality spaces for people to walk, relax and talk, as these are all essential ingredients of the sustainable city. The third measure is *supporting pedestrian access* through giving people greater priority in locations where traffic is still necessary and high flows prevent easy crossing of streets. The needs of pedestrians have become an integral part of new schemes, where they have equal rights as other road users (Figure 5).

Figure 6. World squares: Making Trafalgar Square a place for people



Trafalgar Square in the centre of London had a high density of mixed traffic and high levels of pedestrian accidents until 2003 – now it is a space for people.

Source: Google Images.

Although London has a higher use of bicycles than other major cities in the UK, this level is still much lower when compared with many other European cities, where cycling is seen as a healthy and efficient form of transport. A *London cycle network*, which has been talked about for nearly twenty years, has now become a reality, through the introduction of cycle highways across London. Two have been introduced, and a further ten will be operational by 2015. These new routes have been supplemented by the introduction of 6000 hire bikes in Central London (54 km²) with electronic locks and over 400 docking stations where they can be picked up or left (Figure 7). In the first six months more than 2.1 million trips have been made (July 2010 to January 2011).

The continued enhancement of the *public transport network* is taking place, with the upgrading of the underground rail system to give a capacity increase of 28 per cent and substantial investment in new buses, including the bendibus, the new routemaster, and hybrid buses (these use 30 per cent less fuel than conventional diesel buses). The bus system is seen as being the most flexible and high capacity system that is best able to accommodate the

Figure 5. Priority to Pedestrians: Oxford Circus



This area had high levels of pedestrian congestion before it was redesigned in 2009 as diagonal crossing, with more space for people and journey times for buses and other vehicles being maintained.

Source: GLA, 2010, p7.

Figure 7. World squares: Making Trafalgar Square a place for people



The Cycle Hire scheme has recorded its two millionth journey, in 5 months after it was introduced (July 2010). There are 6000 bikes and 400 docking stations across Central London, and 110,000 registered users. Eventually, there will be 8,000 bikes and 14,400 docking points throughout London.

Source: Google Images.

increasing levels of demand. This means that priority is given to public transport through dedicated routes and preference at signalled controlled junctions. The increased speeds and reliability are both enhanced by the smart ticketing (the Oyster Card) that is available across all London and the wider region, making travel by public transport more attractive. Part of the arguments for the introduction of the *congestion charging scheme* in Central London (February 2003) was to promote other forms of transport, whilst making the costs of bringing a car into central London more expensive (Figure 8). This measure reduced traffic (by 20 per cent), increased use of public transport and cycle (by 20 per cent) and improved air quality, at least initially, but its effectiveness has reduced over time, even though the charge has been increased substantially (Banister, 2005).

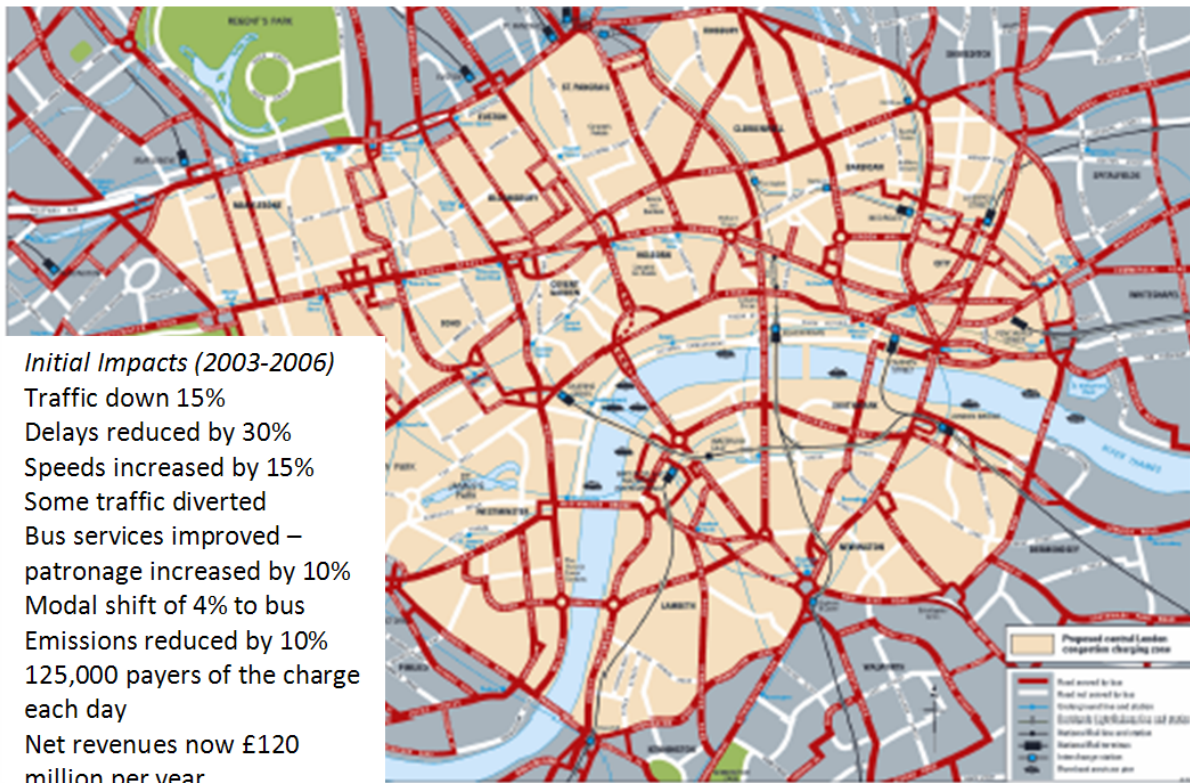
Inner and Outer London

Outside Central London, there are many smaller local high density population and more intensive transport centres, with strong commercial, administrative and cultural activities. Each of them has local and regional functions that complement the capital functions of Central London – London is a City of ‘Villages’. These smaller centres need their own particular public transport systems, without which they too will experience the disadvantageous environmental and economic effects of traffic congestion. Four main themes are highlighted here that contrast with the actions taken in the Centre. This is because the streets are relatively wide in comparison with those in Central London, and it is possible to introduce *trams* running alongside other street traffic. The Croydon Tramlink opened in March 2000 and has carried over 16 million passengers a year. This is part of an orbital system that links in with the London Overground network to join up many of these smaller centres, so that travel can take place directly between them without having to pass through central London. It is estimated that these new and upgraded routes will add 10–15 per cent to the capacity of the public transport system in London (TfL, 2009).

A second set of actions attempts to get all major employers engaged in tackling their own contribution to the quality of transport in London. Many of the major producers of traffic (such as businesses, schools, hospitals, government offices and universities) now draw up

Figure 8. Demand management: Congestion charging in Central London covering an area of 25km²

£8 daily charge (€10): £80 penalty for non compliance (€100): Requires registration of all vehicles
About 50% vehicles have discounts or exemptions



Source: TfL, 2009.

travel plans to suggest the best means by which the amount of car based travel can be reduced, by the use of measures that encourage car sharing, more use of public transport and the bicycle, and the possibility of home working. This is a process of discussion and involvement, trying to explore the means by which car use in cities can be reduced, and it is seen as a useful means to raise awareness of environmental issues as they relate to transport. Local communities themselves are now thinking about travel plans to reduce traffic and pollution in their areas. As these plans develop, they can be linked to those for improving air quality being produced by the London Boroughs who are tackling particular pollution 'hotspots' where air quality is bad. In other residential and shopping areas, local low emissions zones (LEZ) to discourage through traffic.

The latest thinking is to look at the potential for *electric vehicles* in London, and this provides another example of the cooperation between the public and private sectors (Mayor of London, 2009). The intention is to set up a network of 25,000 charging points across London, with 2,500 of these in public car parks and on the street, and the remaining 22,500 will be provided by employers at the workplace. The plan is to have 100,000 electric vehicles operating in London by 2020, and the lower density suburbs are seen as an ideal test bed for the technology (Figure 9). Although electricity production will still involve carbon, there will be a net reduction of 80,000 tCO₂ annually, and there will be zero emissions of local pollutants (NO_x and PM₁₀).

Figure 9. Alternative transport fuels: Electric vehicles in London



Source: Google Images.

Technology can both increase the efficient use of vehicles and improve vehicle performance. Goods vehicles make up less than 10 per cent of traffic, but they contribute 30 per cent of nitrogen oxide and 63 per cent of particulate emissions in London (GLA, 2009 and 2010), and so the potential for decarbonising and cleaning up the freight sector is also central to the overall picture. The introduction of the London wide low emissions zone (LEZ) has helped give industry a clear message, but much more is needed so that London can meet its obligations on air quality. The role of electric vehicles in freight distribution in London has been adopted by some organizations, often in the public sector for local distribution – these include universities, hospitals and public authorities.

Finally, *densities and mixed use development* are central in ensuring a clear link between land use and more sustainable transport policies, by encouraging people to live (and work) in higher density locations. This means that car dependence can be reduced provided that public transport is available, and as people live closer to their work place then journey lengths are also reduced – another virtuous circle. These residential densities would be similar to those found in the smaller centres in London such as that at Greenwich Millennium Village where

Figure 10. High density residential development: Greenwich Millennium Village



Source: Google Images.

an architecturally innovative housing development has been constructed on a 32 acre site with accommodation for 1400 flats (Figure 10). This is a density of about 100 units per hectare, some four times the average for new development in England, but quite comparable with those in Barcelona. Higher densities around accessible rail stations (Croydon and Wembley) can also provide mixed use developments for offices, shops and flats, so that most activities can be undertaken locally, and access is provided by rail. Stations again become the main transport hubs where people want to meet, eat, socialise and spend money – these are the new centres of urban activity.

International Travel

The main environmental challenges relate to air travel, high speed rail and the CrossRail project. All five international airports in London (Heathrow, Gatwick, Stansted, Luton and City) are the World Gateways, and they handle nearly 130 million passengers each year (2009) and an increasing volume of air freight (1.7 million tonnes) (Figure 11). About 11 per cent of London's transport CO₂ emissions are attributed to access to and from the airports (TfL, 2009, p103). Over 80,000 people are directly employed in the airports with many other jobs linked to the airport-related activities (Banister and Berechman, 2000). In addition, there are some 16.3 million passengers using Eurostar and Le Shuttle services through the Channel Tunnel (DfT, 2009b, Table 6.8). International travel is expected to double over the next twenty years (DfT, 2002), with potentially damaging consequences for the environment.

The rate of increase does just apply to the aircraft movements, but the means of transport used to access the airport, whether it is by road or by rail. A major goal for mitigating the effects on the environment is to increase the use of public transport, especially by train, which is most effective for reducing greenhouse gas emissions and air pollution. In 2001, about 35 per cent of air passengers and 23 per cent of employees arrived at Heathrow by public transport (2001) and the target was to increase this level to 40 per cent by 2007 – this level has now been achieved (BAA, 2008). But apart from the airport activities, there are many other demands on land close to airports as these locations are seen to be desirable by several high tech and other international businesses. Heathrow is the prime example of this, as it forms a second major retail and commercial centre outside of Central London.

All forms of pollution in the Heathrow area are high, with nitrogen dioxide being particularly bad around the airport and the M4 and M25 corridors. This pollutant increases people's susceptibility to lung infections and it has possible links with cancer. One of the main factors in the debate over a 3rd runway at London Heathrow (and a 2nd runway at Stansted) was the impact of additional flights on emissions around airports. If a 3rd runway is built here, some 35,000 residents would be affected by nitrogen dioxide levels in excess of the EU limits. Even

Figure 11. International travel: Heathrow Airport and high speed rail



Source: Google Images.

with the introduction of the best available technology, the affected number will still be 5,000 residents – this proposal has now been abandoned (2010).

Noise impacts have been reduced by quieter engines and steeper approach and take-off routes, but aircraft noise still causes enormous disruption for those living and working under the flight paths. But with the continued increase in the demand for international travel for both business (stable) and leisure (growing) activities, pressure for more capacity at London's airports will continue. The associated growth in CO₂ emissions is substantial and can overwhelm the reductions achieved by other reduction strategies.

A simulation study of CO₂ emissions associated with international aviation makes the achievement of reduction targets almost impossible. A CO₂ reduction of 25 per cent in London in the transport sector is possible (1990–2025 – note that this is considerably less than the 60 per cent target set by TfL, 2009, p101), through the introduction of a comprehensive range of policy packages such as those discussed here, but when international aviation⁴ is included, that 25 per cent reduction reduces to 6 per cent with an increase in runway capacity and 9 per cent with no increase in runway capacity (Banister and Hickman, 2011).

The damaging effects on global warming and air pollution caused by air travel could be reduced by substantially raising the prices charged for travelling to internalize those externalities. This would result in a substantial increase in airfares as a carbon tax would be charged on kerosene. Airports could set an example for travel plans, ensuring that at least 50 per cent of all vehicle movements to and from airports are made by public transport, increasing to 70 per cent over time. Consideration should also be given to closing the tunnel at London Heathrow so that only non-polluting forms of public transport have access to the central airport site. It would not be difficult to run a fast and frequent tram link through the tunnel or a fuel cell bus fleet on exclusive rights of way.

Recent discussion has also focused on whether high speed rail could replace air on some national and international trips. The completion of the high speed rail link from the Channel Tunnel to St Pancras has substantially increased the capacity on the routes to Paris and Brussels, but there has been only a limited reduction in flights between London and these cities. With the extension of the European high speed rail network to Amsterdam and Cologne, rail is becoming more competitive with air, at least on time. The proposed construction of a second high speed rail line in the UK from London to the north (possibly via Heathrow airport) would ensure that the UK was part of the EU wide network, but this investment is unlikely to take place for at least 10 years given the difficulties in obtaining funding and the public concerns over any new rail construction. The construction of CrossRail as a major new East-West link across London (mainly underground), together with the upgrading of the Underground network and the new Thameslink investment will increase London's rail capacity by 30 per cent (2006–2031).

In summary, the growth in air travel and the importance of airports to the economy of London means that difficult decisions will have to be made over whether future growth is sustainable or desirable. If the high growth expectations are fulfilled and the economic growth case takes precedence over the environmental issues, then Heathrow (and the other London airports) may pose the largest single threat to London's environment, and investment in new rail will not redress that situation.

4. Note that the method for allocation of CO₂ comes from the Climate Change Action Plan (GLA, 2007) where half of the carbon emissions from any flight landing at Heathrow and London City airports have been allocated to the London emissions total.

Conclusions

Transport in London cannot yet be called sustainable, but there are many positive signs. Much can be achieved in improving both the quality and the environmental profile of transport in London, and this has been achieved through the range of cost effective measures outlined here. As can be seen from the examples given, there are very different approaches being used in different parts of London, and these reflect the different levels of the indicators selected to reflect environmental quality for transport (Table 2).

The Mayor's transport strategy (GLA, 2010) has a clear vision of the role that transport should play in the sustainable city, and this has been agreed upon by national, industry and community leaders. There seems to be a willingness to reallocate priority for space in our streets from vehicles to people and from cars to public transport. As the introduction of congestion charging in Central London has shown, radical policy changes are possible to introduce. There seems to be no reason why this process cannot be accelerated. Major investment is also needed in the transport infrastructure, and much of the Mayor's Transport Strategy is devoted to these high cost improvements in the underground and cross London rail links, as well as new radial bus routes and complementary tram schemes and substantial investment in East London (GLA, 2010). Both the capacity and the connectivity of the public transport system are being considerably enhanced.

Environmental priorities are now considered as being of equal importance as the economic and social objectives. But environmental policies, if they are to be successful require careful implementation, based on good science and good design, which must match the high standards expected of improvements in environmental quality. There is a need to create places within which people want to live and work, and to make them affordable. In the longer term, successful implementation and bold decisions will encourage more people to move back into London, and this in turn will create the possibility for shorter journey lengths and further increases in the use of public transport, walk and cycle. The potential for a sustainable transport system in London grows as the need to travel is reduced.

Transport has in the past been seen in a very technocratic way, and as such has been left to the expert to make decisions about what should be done. This has now changed and it is important to win the support of the people (community and other stakeholders) through their active involvement. Such an approach leads to empowerment and a commitment to change. This support is crucially important when radical alternatives are being considered. The challenge of a sustainable transport system for London is a considerable one, but the ingredients are available for its successful implementation if the momentum that is now building up for radical change continues to grow over the next few years.

References

- Banister, D. and J. Berechman (2000) *Transport Investment and Economic Development*, University College London Press, London
- Banister, D. (2005) *Unsustainable Transport: City Transport in the New Century*, Routledge, London
- Banister, D. (2011) 'The trilogy of distance, speed and time', *Journal of Transport Geography*, forthcoming
- Banister, D. and R. Hickman (2009) 'Techno-optimism: progress towards CO₂ reduction targets in transport – A UK and London perspective', *International Journal for Sustainable Development* **12**(1): 24–47
- Banister, D. and R. Hickman (2011) 'Visioning and backcasting on transport and the environment: The case of London', in W. Rothengatter, Y. Hayashi and W. Schade (eds) *Transport Moving to Climate Intelligence: New Chances for Controlling Climate Impacts of Transport after the Economic Crisis*, Springer Science, Berlin
- British Airports Authority (BAA) (2008) 'A surface access strategy for Heathrow: Sustaining the transport vision, 2008-2012', BAA Heathrow, http://www.baa.com/assets/B2CPortal/Static%20Files/LHR_SAS.pdf, last accessed 6 June 2011
- DfT (Department for Transport) (2002) 'The future development of air transport in the United Kingdom: South East', A National Consultation, Department for Transport, July
- DfT (2009a) 'National travel survey 2008', Transport Statistics Bulletin SB (09)20, DfT, London
- DfT (2009b) 'Transport statistics Great Britain 2009', November, The Stationery Office, London;
- Gehl, J (2004) *Towards a Fine City for People- Public Spaces – Public Life – London 2004*, London: Transport for London and the Central London Partnership
- GLA (Greater London Authority) (2007) *Action Today to Protect Tomorrow: The Mayor's Climate Change Action Plan*, GLA, London
- GLA (2009) *The London Plan*, Updated Version, GLA, London, October, <http://www.london.gov.uk/thelondonplan/thelondonplan.jsp>, last accessed 30 May 2011
- Greater London Authority (GLA) (2010) *The Mayor's Transport Strategy*, GLA, London, August
- Mayor of London (2009) *Turning London Electric: London's Electric Vehicle Infrastructure Strategy*, Greater London Authority, London, December
- TfL (Transport for London) (2009) *Travel in London: Key trends and developments*, TfL, London