Visioning and Backcasting for Transport in London (VibatLondon)

Halcrow Group Ltd
in association with
Oxford University, Transport Studies Unit (Professor David Banister)
Space Syntax and ZupaStudio
Greater London Authority
Transport for London

Stage 2 Report:
Images of the Future

UrbanBuzz Building Sustainable Communities
http://www.vibat.org
http://www.urbanbuzz.org
August 2009

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1 Introduction

1.1 Towards Likely Images of the Future

The VIBAT London study (Visioning and Backcasting for Transport in London[1]) aims to assess the potential contribution of the transport sector in reducing carbon dioxide (CO_2) emissions in London.

Halcrow lead on the study, in association with Oxford University Transport Studies Unit, Space Syntax, the Greater London Authority and Transport for London, The work is funded by the UrbanBuzz programme[2].

This stage 2 report focuses on the development of alternative images of the future for London, an important part of visioning scenarios to represent a more sustainable transport future (see study method in Figure 1). The scenarios are used to illustrate what a sustainable transport system might look like under different sets of external and strategic constraints, for instance in which technological and behavioural options are implemented at different levels of application. These scenarios build on and inform the policy approach as set out in Transport 2025 (TfL, 2006a), the Mayor's Transport Strategy (TfL, 2006b), the London Plan (GLA, 2004) and Climate Change Action Plan (CCAP) (GLA, 2007).

The targets adopted within the baseline work are a 60% reduction in transport CO_2 emissions by 2025, and an 80% reduction by 2050. These are derived from CCAP, and use a business as usual (BAU) projection for 2025 as the baseline against which to measure target reduction.

1.2 The Study Team

The VIBAT London core study team is as outlined below:

- Dr Robin Hickman (Halcrow Group) - Project Coordinator and UrbanBuzz Research Fellow
- Professor David Banister (Transport Studies Unit, Oxford University Centre for the Environment) - Project Director and Urban Buzz Innovation Fellow
- Olu Ashiru (Takedo International and Halcrow Group)
- Sharad Saxena (Transport Studies Unit, Oxford University and intern at Halcrow Group)
- Dr Annabel Bradbury (Halcrow Group)
- Alain Chiaradia (Space Syntax)
- Chris Stutz (Space Syntax)
- Jorge Gil (Space Syntax)
- Jasia Ward (ZupaStudio/Space Syntax)
- Gavin Baily (ZupaStudio/Space Syntax)

Richard McGreevy (GLA Transport Team) and Catherine Jones (TfL) act as steering group members from the London authorities. Richard McGreevy is an UrbanBuzz Research Fellow.

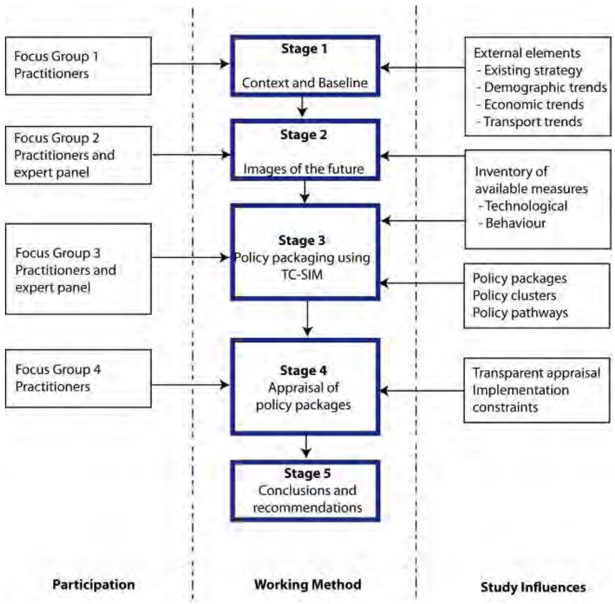
The lead authors of this stage 2 report were Sharad Saxena, Robin Hickman and David Banister.

[1] Study reports are hosted on the VIBAT website: www.vibat.org

[2] UrbanBuzz: Building Sustainable Communities is a 2-year programme (running from 2007-08) that aims to develop new ways of delivering sustainable forms of development and community in London and the wider South East region. University College London (UCL) and University of East London (UEL) are the co-originators and facilitators of UrbanBuzz. For more details see: www.urbanbuzz.org

An academic expert panel plus formal peer review has been used to comment on study outputs throughout the VIBAT London study.

Figure 1: The VIBAT London Study Method



1.3 Structure of the Report

The remainder of this stage 2 study report is as follows:

- Section 2: Developing Images of the Future
- Section 3: Conclusions and Next Steps

2 Developing Images of the Future

2.1 Introduction

A wide range of previous work has been carried out in developing future year scenarios; the stage 1 baseline report details some of the early work in this field. Highlights include the early development of scenarios in the US (Kahn and Wiener, 1967), the Swedish debate (Johansson et al., 1983) and pan-European sustainable transport studies (EST, OECD, 2000; EU-POSSUM, Banister et al., 2000).

There is also a developing literature in the transport futures field in the UK. This includes the original VIBAT UK study (Hickman and Banister, 2006), which developed a technological and behavioural focus for two different futures. The DTI Foresight Intelligent Infrastructure Futures study (DTI Foresight, 2006) has also become well known and used. Below the DTI Foresight scenarios are explored and related to the London context.

2.2 DTI Foresight Scenarios

The DTI Foresight Intelligent Infrastructure Futures study set out to explore how science and technology could, over the next 50 years, bring ‘intelligence’ into infrastructure development to meet key policy objectives. The study sought to:

- Meet a growing demand for transport;
- Support economic growth;
- Be environmentally sustainable;
- Meet the wider needs of all elements of society;
- Accommodate future uncertainties;
- Be safe and resistant to shocks.

A number of drivers of change were seen as important to future trends, see Table 1. Many of these are relevant to the London context for transport planning. Recent economic uncertainty should be added to the list of issues to consider.

Table 1: Foresight Drivers of Change

Relevance to Transport in London

** Strong

* Some

Growing demand for mobility – passengers and goods **	Growing crisis in higher education puts the science base under threat	'Digital natives' – the new generation growing up accustomed to technology **
Growing skills shortage as infrastructure acquires the skills	Decline in power of national governments *	Reducing cost of ICT and enhanced data processing *
Increasing migration (and emigration) *	Increasing world trade *	High –speed rail travel *
Growing awareness of the importance of 'employee liveability' *	Emergence of networked organisations, clusters and supply chains *	Growing gap between rich and poor *
Increasing importance of the knowledge economy *	The rise of pan-regional hubs	Continued capital under-investment *
Ageing, yet more active, population *	The end of affluence	Growing impact of climate change **
People face increasing time intensity *	Increasing emphasis on sustainable design **	Increasingly localised/decentralised energy production *
Growth in 'cyber fraud'	Rise of 'zero waste' movement *	Relatively low spend on energy research and development **
Emergence of better physical and virtual management systems	E-commerce continues to grow **	Increasing consumer desire for social and environmental responsibility and transparency **
Satellite location devices, smart antennas	Increasing focus on tourism and its contribution to climate change *	Growth of the surveillance society
Increasing use of 'telepresence' technology *	Decoupling of tourism and transport **	Complex just-in-time models are vulnerable to external shock
Converging revolutions in biotech, nanotech, Infotech and cognitive science	Rising tension between freedom of information and privacy	Travel demand management **
Culture of control	Emergence of megacities *	Changing data storage: from desktop to network
'Real time' everywhere *	The rise of 'slow' *	Movement away from office-based working *
Changing family and household structures *	Growing utilisation of 'embedded' technology	Emerging debate around provision of 'citizen's income'
Growth of Asian economies	Continued growth of an 'always on' culture *	Rising importance of local provision *
Growing global energy deficit - increased demand and consumption **	Semi-autonomous/ autonomous vehicles becoming safer and more efficient *	Taxation increasingly based on resource consumption rather than income **

Emergence of radical solutions to climate change *	Grids and networks create shared capacity *	Move towards full-cost accounting
Declining trust in institutions		Emerging infrastructure, emerging cultural forms

The Foresight study (DTI, 2006) created four main scenarios to illustrate potential futures for the UK. The study used 'axes of uncertainty' for the scenarios exercise to establish: a) whether people will develop low-environmental impact transport systems; and b) whether people will accept intelligent infrastructure. The four scenarios are:

1. Perpetual motion
2. Urban colonies
3. Tribal trading
4. Good intentions

Table 2 summarises these four scenarios.

Figure 2: Foresight Scenarios

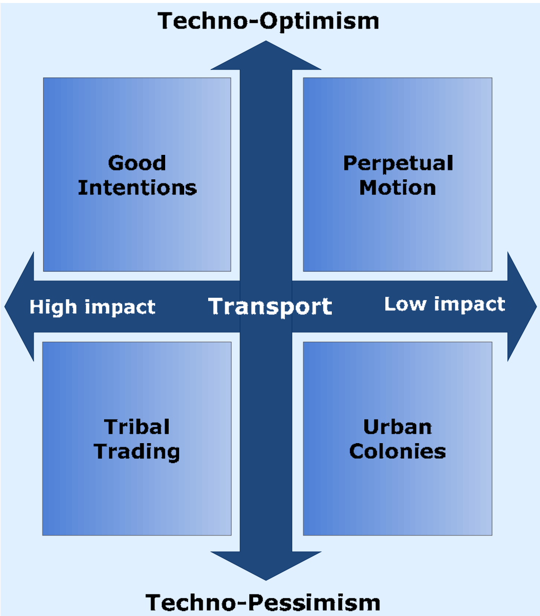


Table 2: Foresight Scenario Characteristics

Good Intentions	Perpetual Motion
The need to reduce carbon emissions constrains personal mobility. Traffic volumes have fallen and mass transportation is used more widely. Businesses have adopted energy-efficient practices: they use wireless identification and tracking systems to optimise logistics and distribution. Some rural areas pool community carbon credits for local transport provision, but many are struggling. Airlines continue to exploit loopholes in the carbon enforcement framework.	Society is driven by constant information, consumption and competition. Instant communication and continuing globalisation has fuelled growth: demand for travel remains strong. New, cleaner, fuel technologies are increasingly popular. Road use is causing less environmental damage, although the volume and speed of traffic remains high. Aviation still relies on carbon fuels – it remains expensive and is increasingly replaced by 'telepresencing' for business, and rapid trains for travel.
Tribal Trading	**Urban Colonies**
The world has been through a sharp and savage energy shock. The global economic system is severely damaged and infrastructure is falling into disrepair. Long distance travel is a luxury that few can afford and for most people, the world has shrunk to their own community. Cities have declined and local food production and services have increased. There are still some cars, but local transport is typically by bike and by horse. There are local conflicts over resources: lawlessness and mistrust are high.	Investment in technology primarily focuses on minimising environmental impact. Good environmental practice is at the heart of the UK's economic and social policies: sustainable buildings, distributed power generation and new urban planning policies have created compact, dense cities. Transport is permitted only if green and clean – car use is energy-expensive and restricted Public transport – electric and low energy – is efficient and widely used.

2.3 Projections for London

The developmental path London has chosen is one of high population and economic growth, combined with aspirations for a fair society, and, at the same time, carbon efficiency (involving deep reduction targets).

Achieving large reductions in carbon emissions whilst retaining economic and quality of life goals, is likely to be difficult with a static population and employment base. Add in large population and economic growth and the task to reduce aggregate emissions becomes considerable.

A considerable amount of strategic forward planning and analysis has already been carried out by the public agencies in London. Transport for London has produced Transport 2025 (T2025) (TfL, 2006a). The Greater London Authority has produced the London Plan (GLA, 2004) and Climate Change Action Plan (CCAP) (GLA, 2007).

2.4 Application to London

The VIBAT London study considers two potential futures, based on modified versions of the DTI Foresight work:

1. Image 1: Perpetual motion

2. Image 2: Good intentions/urban colonies (a combination of the DTI Foresight scenarios 2 and 4).

Image 1: Perpetual Motion

Under scenario 1 (Figure 3), London is developed with a strong emphasis on technological change. The demand for transport remains strong and mobility, including air travel, continues to grow. There is a ready acceptance of new technology, both in the home and the workplace, but particularly in transport with a keen desire to overcome the consequences of CO_2 emission increases through clean technology. However, this concern is not backed up by major lifestyle changes; only marginal changes using ICT to reduce the need to travel for certain activities (e.g. some use of teleconferencing and home shopping). Mobility levels remain unaffected; particularly travel by private car in the suburbs.

The main aim of transport policy is to achieve the required CO_2 emissions target with a minimum of change in terms of behaviour. Car traffic still dominates in terms of modal share, and occupancy levels remain about the same as in 2000. The main changes are in pushing hard on hybrid technologies and alternative fuels so that the overall average emissions profile of the total car stock reduces to below 100 gCO_2/km in 2030. This is achieved through the phasing in of electric-hybrid technology over the next 25 years so that by 2030 virtually all new vehicles are hybrid.

There is also considerable investment in alternative fuels to reduce the carbon content of existing internal combustion engines (ICEs) and the non-electric parts of hybrids. Electric vehicles also have a role for low speed vehicles in central London, provided that their source of energy is renewable. The cost of fuels rises overall, but this increase falls increasingly on those car users that continue to consume fossil fuels. New materials are used to make vehicles lighter.

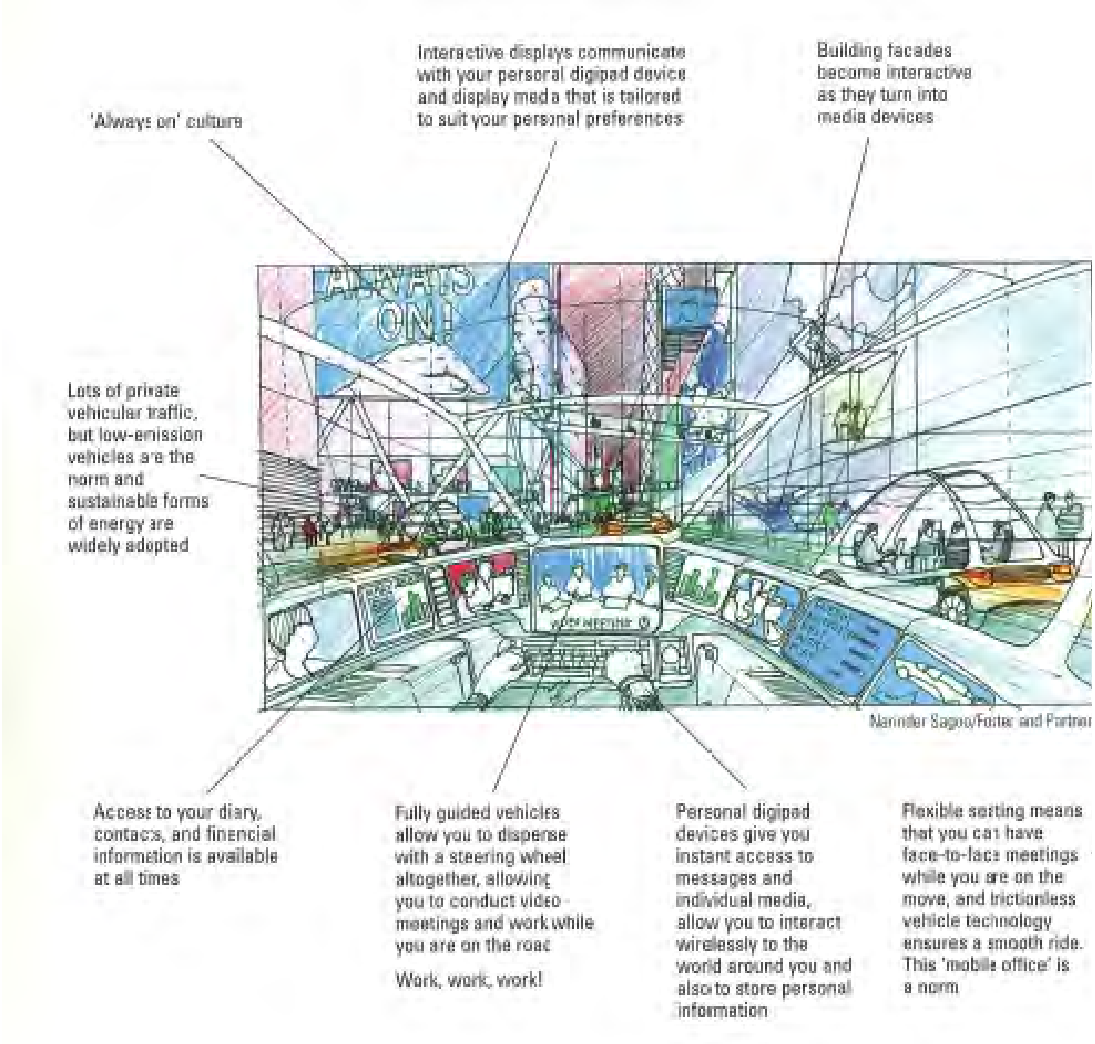
To complement these measures, technology is used to ensure maximum efficiency in engine monitoring systems, in route and parking guidance, and in ensuring that vehicles are used efficiently, through measures such as car sharing and demand responsive public transport and taxi services. Freight distance remains constant, but contributions to the CO_2 reduction target are met through logistics planning, load consolidation and the use of smart freight matching services to reduce empty running. Hybrid technology is used for distribution vehicles so that their emissions are reduced.

The technological measures therefore concentrate on a very heavy promotion of technological alternatives through a restructuring of the car fleet, through the use of new renewable fuels, and the encouragement of more efficient engine technologies, coupled with an extensive use of technology in transport to ensure that the system is working at its maximum efficiency.

Although behavioural change is also acknowledged as being important, the general view is that little lifestyle change is required, apart from clear pricing signals to encourage less fuel consumption and a switch to cleaner technologies. Public transport use increases, but mostly for long distance travel (by High Speed Train) and short haul air, as leisure-based lifestyles increase and as global networks expand. Urban planning is not used to any great degree to reduce travel; there is only a minimal effort to develop higher densities around the public transport system. There is only a token use of soft measures to raise awareness and involve individuals and firms in travel plans. The main changes here again relate to the use of technology to allow greater flexibility in the use of time and location for work, shopping and other activities.

Figure 3 and Table 3 summarise the changes envisaged under the Perpetual Motion scenario.

Figure 3: Perpetual Motion (Image 1)



(From DTI Foresight, 2006)

Table 3: Perpetual Motion (Image 1)

Indicator or Measure	Characteristics of The Transport Sector
Headline indicators	
Transport CO_2 emissions aspiration	▪ 4.7 $MtCO_2$ for ground transport in London by 2025 (60% reduction against a BAU projection – transport sector share of CCAP target) ▪ 2.3 $MtCO_2$ for ground transport in London by 2050 (80% reduction against a BAU projection – transport sector share and moving beyond the CCAP target)
Personal travel	Total mobility is higher than in 2000, certainly higher than in image 2 for 2025. People are not willing to dramatically change their travel behaviour, hence trip volumes increase (commuting, shopping and leisure travel) Working hours become more flexible
Car Ownership	Car ownership increases from 2000 levels, car-based lifestyles, saturation of ownership Car stock increases Car occupancy levels similar to 2000 levels Lock in to car dependency New patterns of car ownership
Freight travel	Centralised production, long supply chains High volumes of goods are transported over long distances, freight centres for inter-modal distribution at periphery of cities Freight travel remains road dominated, but with focus on new vehicle technologies and higher load factors Use of IT, logistics planning and new management strategies
Incomes and GDP	Higher incomes = 110% Similar increase in GDP (+2.0% p.a.) Volatile economic conditions year on year; but growth in the long term
Technological change	
Vehicle technology	Hybrids market uptake for all new vehicles = 2010 (10%), 2020 (50%), 2025 (100%) Cars are 25% lighter than at present Niche marketing of cars, global production Battery cars become niche market vehicles Strong shift to hybrids reduces emissions impact of increase in travel Average vehicle fleet CO_2 emissions $<$ 100 gCO_2/km by 2025
Vehicle fuels	Efficiency gains in vehicles mean that fuel consumption reduces Fuel prices increase (in real terms)
Use of new technology	Car sharing and mobile technologies are prevalent Matching for work and social activities Public transport and taxi becomes demand responsive White vans and distribution of goods use tracking and tracing systems
Behavioural change	
Personal travel behaviour	Limited mode shift to public transport, cycling and walking, increased car dependent lifestyles Domestic air travel grows in line with global economy, but with larger more fuel efficient planes and higher load factors Business travel by air and high speed train (HST) is popular, leisure travel by air and car grows rapidly
Urban planning	Little further strategic thought behind integration of land use planning and transport, continued urban sprawl Minimal increase of densities around public transport nodes; urban design and transport planning remain un-coordinated Some roadspace reallocation, priority to public transport, pedestrianisation, parking supply issues not well resolved
Soft measures/smarter choices	Limited use of travel plans and safe routes to school; low take up of car clubs and car sharing Telecottaging, telecentres, flexible working and teleshopping remain fringe activities

Wider traffic demand management measures	Congestion charging schemes remains as existing Parking controls and market pricing for all uses related to commercial and residential activities
Traffic management	Higher speed limits introduced, but with variable speed technology Few area-wide traffic calming schemes introduced across London
Grand total for Image 1	Aspiration that 60% emissions reduction target is achieved by 2025 and 80% emissions reduction target achieved by 2050. Target achievement is dependent on intensity of application of policy packages. (Stage 3 report explores policy packaging within images and target achievement more fully)

NB. % changes refer to end date-2025 unless stated.

Image 2: Good Intentions/Urban Colonies

Under scenario 2 (Figure 4), London develops with a strong emphasis on environmental and wider sustainability objectives. Economic and social considerations are still important, however are not pursued at the cost of environmental goals.

Slowly, the importance of designing the urban environment for less travel and efficient use of resources achieves great importance. Over time, technology systems become essential to deliver carbon efficiency.

Within London, the central activity zone is an important centre for growth, but growth is also concentrated in the suburbs, with local, polycentric growth. Societal benefits accrue from a society integrated more at the local level. People in this scenario are environmentally aware and more careful in their use of resources.

This image is also market driven, but has a much stronger social and environmental emphasis, and is focused on improving quality of life. The transition to the technological society is moderated by greater social intervention. The economy is a knowledge-based economy, producing specialist products for hi-tech businesses. It is accepted that behavioural change is critical to address the required CO_2 emissions targets, however technology is also important – there is realism though in terms of expected application.

London takes the lead in moving towards less CO_2-intensive lifestyles, through a combination of strategies including a strong contribution from the transport sector. This includes changes to individual travel patterns and the transport element in the goods and services consumed. Supply chain lengths are, for example, targeted for reduction. Excellence in the social, environmental and quality of life spheres leads to economic competitive advantage in the UK.

Global businesses adapt to the changing environment with more local production. The priorities are still in efficient production, but not necessarily in the lowest cost locations, as consumers are prepared to pay slightly more for goods that are produced locally and have a lower transport cost associated with them. Carbon labelling hence becomes very important.

Intervention by government is at a high level as social welfare objectives are perceived as important, as are the means to ensure that all members of society are included within the future society. High oil prices are seen as a benefit and one incentive by which the transport sector can switch from high carbon dependency to a lower carbon dependency.

With regard to transport policy, the expectation in this image is that there will be a slight reduction in the total amount of travel distance by each person in 2025 and again to 2050, but the effect of this will be offset as population will have increased in London. The main reduction has not taken place in the number of trips made, but in the length of trips. The distribution has changed, with some growth in long distance trips, but these are more than compensated for by the increase in shorter more local trips. The desire for less travel (and distance for freight distribution) links in with the greater social awareness and conscience of the population, and the importance of community and welfare objectives. The lock-in to car dependency (as found under the technological change scenario) is broken with social priorities pushing for greater use of public transport and other clean modes of transport.

There is less dependence on technological solutions, but cars become cleaner over the period (at most 120 gCO_2/km for new cars by 2025) through new taxation and pricing incentives to use more efficient and cleaner technologies, with national tax reductions for not owning a car or for participating in car sharing schemes. Real fuel prices increase over the period.

Most of the technological innovation is focused on low emissions and the monitoring of vehicles according to their emissions profiles. A national system of road pricing is implemented based primarily on environmental charging. The costs of motoring relates to the type of vehicle, emissions and distance travelled, with reductions for more people (or goods) carried. Technologies are employed to keep track of the CO_2 and local pollutant emissions from vehicles. In one such technology, the system, in the form of a small 'black box', is directly connected to the diagnostic port of the vehicle's engine management system, and gathers engine data that is used to calculate the pollutants/fuel used. The data output can be read as instantaneous values or as values accumulated over a predetermined interval, such as distance, time period, trip or vehicle lifetime. Automated control on vehicles is also utilised.

The desire for fast travel is moderated through extensive variable speed limits, so that travel is carried out in an optimal way environmentally – this means that maximum speeds on urban roads are limited to around 80 km/hr or where the engine is working in the most efficient manner.

Smart technology is used in all forms of public transport to provide full information and interactive services for seamless travel between places using a variety of interconnected transport services. Many forms of public transport are demand responsive with the facility to share trips and routes. This results in a further renaissance for all forms of public transport, as their characteristics become more comparable to those of the car. In many cases it is only possible to gain access to the city and town centres and other facilities by public transport, as car parking is severely limited, and priority is given to public transport. All centres have extensive areas set aside for pedestrians, with comprehensive cycle networks (and appropriate safe storage facilities) to encourage the substantial growth in clean travel. Suburban areas are served by clean taxi services, utilising smart loading technology, and offering ride shares and high occupancy levels – a new form of public transport.

Complementary action in urban planning and development permits higher densities, mixed uses and local facilities, with further encouragement of higher density residential (>40 dph and upwards) and office developments around accessible public transport nodes. There is a real focus on developing activity centres around public transport nodes and in developing new interchanges and connectivity between lines. Social and leisure activities are also concentrated at these accessible interchanges, which in turn develop as shopping, leisure and social meeting places. Their functional use is complemented by high quality design and local environmental standards, as they become new city landmarks. Similar design quality issues are important in residential neighbourhoods and elsewhere. The quality of the public realm is improved dramatically - the city becomes the 'living room'.

Complementary policies also involve all stakeholders in the debate over priorities, as it is important that people and firms 'buy into' the need to reduce CO_2 emissions. Environmental and economic objectives are not perceived as opposed; the green economy is critical to competitive advantage.

Travel plans and car clubs are all part of the process of change, as people move away from the concept of private ownership towards one that involves shared ownership. It is here that technology is used to help create a better quality transport system for all users. Hence ICT is used to reduce the need to travel through working, shopping and networking from home, but not in the sense of facilitating additional compensatory travel. Smarter choices move beyond niche activities to the mass market.

Beyond 2025 issues relating to personal tradable emissions are discussed - with a view to moving towards a more stringent contraction and convergence global environmental future. Difficulties relating to the costs and administration and likely equity impacts of such a carbon trading scheme, and whether individuals require (or are entitled to) the same number of credits all need to be resolved in the early years to 2015. It is possible that rationing schemes prove unworkable at the individual level and are easier to apply at the industrial level (via the fuel supplier or motor manufacturing company). The latter involves less actors; though a wide public debate and understanding is still required.

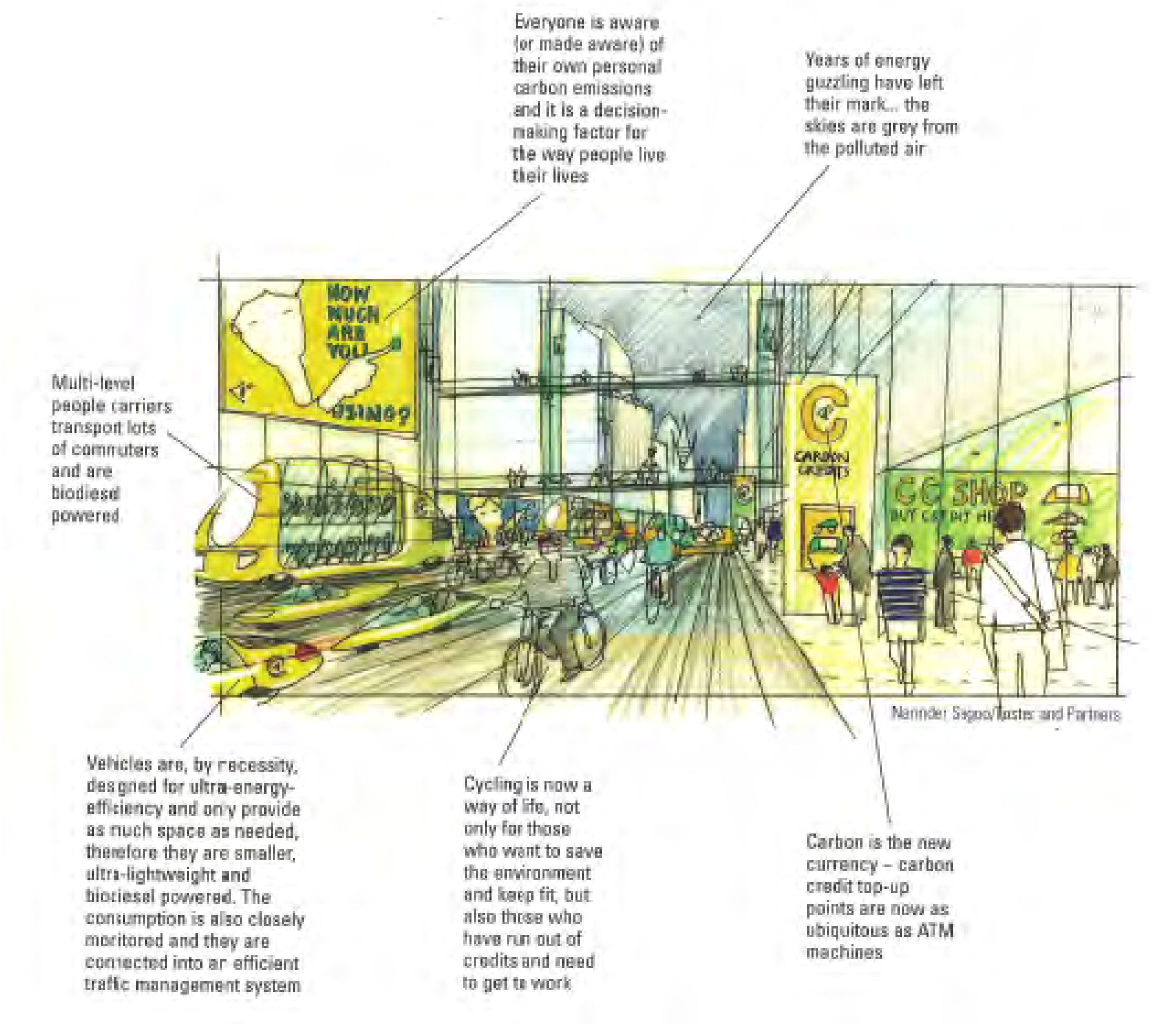
There is also potential for less freight traffic through more local sourcing of production, and through companies and individuals purchasing more locally produced goods. Again, greater use is to be made of the rail system to transport freight with intermodality actually reducing the total CO_2 profile of journeys. There is extensive use of load matching through internet based freight exchanges.

Prices for all forms of transport reflect their full environmental costs, including air travel, and there are limited subsidies available for social reasons. The basic premise is that users of all forms of transport should pay their full environmental costs of travel - the polluter pays.

Overall in the scenario 2 image, there is less travel and journey lengths are shorter. Travel time reduction is of less importance, as lower speeds are related to using less energy. This proves a fundamental change to the practice of transport planning. Sustainability objectives drive investment. There is a strong shift to public transport, walking and cycling and to the greater use of local facilities. Traffic demand management is accepted by the public as being necessary to achieve environmental objectives, and is perceived as helping to reduce the impact of the car and improve the quality of life in cities. Available road space is allocated to priority users by time of day and urban and transport planning is fully participatory.

Figure 4 and Table 4 summarise the changes envisaged under the Good Intentions/Urban Colonies scenario.

Figure 4: Good Intentions/Urban Colonies (Image 2)



(From DTI Foresight, 2006)

Table 4: Good Intentions/Urban Colonies (Image 2)

Indicator or Measure	Characteristics of Transport Sector
Headline indicators	
Transport CO_2 emissions aspiration	▪ 4.7 $MtCO_2$ for ground transport in London by 2025 (60% reduction against a BAU projection – transport sector share of CCAP target) ▪ 2.3 $MtCO_2$ for ground transport in London by 2050 (80% reduction against a BAU projection – transport sector share and moving beyond the CCAP target)
Personal travel	Total mobility is the less than in 1990. People recognise environmental concerns and change their travel behaviour Average distance per person p.a. = small reduction, but offset by population growth Long distance internal travel mainly by High Speed Train (HST) Individuals move away from single mobility to multi-mobility use (from one mode to many modes). Working hours become more flexible
Car Ownership	Car ownership remains stable Occupancy levels in all forms of transport increases New forms of ownership - rental and shared ownership End of lock in to car dependency
Freight travel	Regionalised production, shorter supply chains, glocalisation with regional and local production of goods Distribution networks more regional and local, public transport bias Extensive use of IT, logistics planning and new management strategies, load matching and intermodality Internet-based freight exchanges, spot markets for load matching, load factors increase
Incomes and GDP	Incomes increase = 105% Some increase in GDP (1.5% p.a.), but increased focus on improving quality of life Volatile economic conditions year on year; but growth in the long term
Technological change	
Vehicle technology	Niche marketing of cars Use of light materials in cars Low speed city vehicles and use of renewable energy
Vehicle fuels	Efficiency gains in vehicles mean that fuel consumption improves Fuel prices increase Average new fleet CO_2 emissions $<$ 120 g/km
Use of new technology	Car sharing and mobile technologies Matching for work and social activities Public transport and taxi are demand responsive and technologically advanced Smart public transport – rail, bus, and clean taxis with seamless, smart payment and information systems
Behavioural change	
Personal travel behaviour	Mode shift to public transport, cycling and walking Increased investment in public transport, e.g. new LRT schemes Public transport is competitive in price Higher vehicle occupancies Internal air travel growth is slower Personal tradable emissions quotas

Urban planning	Public transport orientated development, polycentric nodal development Increased densities and activity nodes around public transport nodes, mixed uses. Urban mobility centres (highly accessible meeting places at interchanges) Development and transport generation profiles matched with accessibility profiles High quality in urban and public realm design ensuring improved quality of life in cities, for all age groups Less space for cars in cities: roadspace reallocation, limited car parking provision
Soft measures/smarter choices	Social acceptance of traffic demand management approaches Participatory approaches, information, debate and labelling Travel plans and safe routes to school widely used (mass market) Niche vehicle usage, car clubs and car sharing Use of telecottaging, telecentres, flexible working and teleshopping, telephone and video conferencing widespread
Wider traffic demand management measures	National system of road pricing, strong public and political support Bus priority on main roads and motorways
Traffic management	Lower speed limits Area-wide traffic calming Eco-driving widespread
Grand total for Image 2	Aspiration that 60% emissions reduction target is achieved by 2025 and 80% emissions reduction target achieved by 2050. Target achievement is dependent on intensity of application of policy packages. (Stage 3 report explores policy packaging within images and target achievement more fully)

NB. % changes refer to end date 2025 unless stated.

3 Conclusions and Next Steps

3.1 Achieving the Images: Integrated Policy Packaging

The two potential images of the future outlined in this stage 2 report are developed to explore different policy options for London. There are a wide variety of future policy trajectories for the city. Those discussed in this study are, of course, stereotypes, and future policy implementation will be a hybrid of these futures.

The next steps for the VIBAT London study are to develop clusters of policy packages that can represent pathways towards these generic images of the future. This stage of the work will utilise the transport and carbon simulation model (TC-SIM) that has been developed as part of the project. The work will also develop and test an appraisal framework to allow an assessment of the potential achievements of different policy approaches.

Figure 5: Future Policy Trajectories

Scenarios	
BAU	Business as usual - Extrapolating existing trends
S1	Travel +++ Technological changes +++ Behavioural changes +
S2	Travel + Technological changes ++ Behavioural changes +++

This background paper has been produced by the study authors as part of the VIBAT-London study under a contract with UrbanBuzz. Any views expressed are not necessarily those of UrbanBuzz or, indeed, wider study contributors such as the GLA or TfL.

Annexes

Annex 1: Selected References

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Annex 2: Academic/ Expert Panel

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- Dr Jillian Anable (Research Fellow, Centre for Transport Policy, Aberdeen Business School)
- Professor Abigail Bristow (Professor of Transport Studies, Civil and Building Engineering Department, Loughborough University)
- Dr Miles Tight (Senior Lecturer at the Institute of Transport Studies, Leeds)
- Tim Pharoah (Independent Transport Planning Consultant)