Congestion Charging in London
Past, present and future
March 2007
Presentations in US
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Transport for London
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Central London’s traffic problem in 2000

• Greater London: largest urban area in Europe, population over 7m with 40% of England’s congestion in London

• Central London:
  – 1m workers, heart of UK business, government, media, heritage
  – 90+% of personal travel to central London by public transport, predominantly rail

• Central London suffered worst traffic congestion
  – all day problem
  – average traffic speeds 15 km/hr with vehicles typically spending half their time in queues
  – All of the central area was subject to high priced on-street and public off street car parking
  – Despite significant number of bus priority measures bus services were slow and unreliable and bus and tube infrastructure was suffering from substantial under investment
  – Consensus that building new road capacity would not address the problem

• General acceptance by the public and business community that – ‘something more must be done’.

• New legislation passed by Blair Government to create a Mayor for London with London wide Transport powers and ability to introduce road pricing or workplace parking

• An independent Government funded study into problems/solutions had been carried out

• All of the Mayoral candidates made reference to road pricing in their manifestoes
Congestion Charging Schemes: some preliminary questions

- **What are the policy objectives?**
  - reducing congestion? raising revenue? environment?

- **Congestion: what are the causes?**
  - parked vehicles? network management? traffic levels?

- **What other policy initiatives have or could be tried?**
  - parking controls, UTC, bus priority, corridor management, cycle and pedestrian priority, new PT capacity, travel plans, fares/ticketing etc

- **Congestion: how bad is it?**
  - relationship between network speed/congestion and traffic levels
  - will charging make a significant difference?
  - where is the congestion; when; which vehicles

- **Driver behaviour in response to charges**
  - different types of trip, different trip purposes, different types of vehicle
  - different responses
  - issues of exemptions and discounts

- **How good is existing public transport and how can it be improved?**

- **What are the views of the public and wide variety of stakeholders?**

- **What research has been carried out?**
The Original Scheme introduced in February 2003
Where is the Congestion Charging zone?

Central London only
Choice of Scheme

• Ken Livingstone elected Mayor in spring 2000 having included central London Congestion charging scheme in his manifesto as part of a package of policies

• Key elements were:
  – Area charging scheme
  – 7am – 6.30pm working week
  – Flat charges with 90% discount for residents with limited range of users/vehicles eligible for exemption
  – Complementary Bus improvements
  – no charge boundary route
  – use of reliable/proven detection technology
  – Easy to use with full choice of payment channels available
  – Robust camera-based enforcement with high fines for non payment (£100- $194)
## Implementation programme

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Charge Payment

- Daily, weekly, monthly or annual payment, for individual vehicle registration number

  T 123 ABC

- Flat charge of £8 ($15) per day (was £5 ($10) up to 4 July 2005)
- Monday - Friday 7am - 6.00pm (*changed 19 Feb 2007*)
- Can pay next day at a rate of £10 ($20) (from June 2006)
- Range of exemptions and discounts including 90% discounts for in zone residents
Camera Enforcement

Monochrome Image from ANPR camera

Number Plate image from ANPR camera, Lane 1

ANPR 1 - K924 BEC

ANPR system output

Colour Contextual Image

Evidential Record Summary

Site: 195 - Finchley Road - northbound
Lane: ANPR 1
Date: 01 March 2001
Time: 14.15.56
Frame: 000258176
Encryption: JD516383
Impacts of the 2003 central London scheme
Impacts

• Traffic entering charging zone reduced by 21% (4+ wheels): with chargeable vehicles down 31%

• Bus patronage up, reliability and journey time improved

• Little or no change in number of trips to central area: 50 – 60% moved to public transport
Traffic entering charging zone by time of day

- **2002 average**
- **2003 average**
- **2004 average**
- **2005 average**

**Charging hours**
Traffic entering the charging zone during charging hours

- Cars and minicabs
- Vans
- Lorries and others
- Taxis
- Buses and coaches
- Powered two-wheelers
- Pedal cycles

- Feb/Mar 2002
- Spring 2002
- Autumn 2002
- January 2003
- February/March 2003
- Spring 2003
- Autumn 2003
- January 2004
- February/March 2004
- Spring 2004
- Autumn 2004
- March 2005
- Spring 2005
- Autumn 2005
- November 2005
Congestion

• Initial impact on congestion high: 30% decline in first year and then averaging at 26% in 2005
• More recently, congestion has risen in the central zone but remains below levels before the scheme was initiated
• A key cause of the increase can be attributed to more road and utility works which are lasting longer

• A backdrop of decreasing traffic speeds nationally – without congestion charging in place central London would have been in gridlock?
Environmental Impacts

Reduced emissions in the zone:

- Nitrogen oxides (NOx) down 13%. 8% due to Congestion Charging.
- Particulate matter (PM10) down 15%. 7% due to Congestion Charging.
- Carbon Dioxide (CO₂) down 15%.

Road traffic accidents down 40 – 70 / year
Business Impacts

- Broadly neutral impact on overall business performance in the charging zone – no overall impact on employment, number of businesses, turnover, commercial rents or profitability.
- Professional services benefiting from improved mobility
- Although year-on-year retail sales in central London saw a sharp decline throughout the July to September 2005 period, by early 2006 this trend was reversed resulting in full recovery with annual growth rates above those being seen in the rest of the UK.
- Within the charging zone, the retail sector has increased its share of enterprises and employment since 2003.
Influences on Business Performance 2005

- Internal Factors: 21%
- Terrorism Factors: 19%
- Economic Factors: 16%
- Congestion Charging: 16%
- Drop in Consumer Spending: 10%
- Tourism Factors: 3%
- Other: 15%
Net revenues spent on Transport in London

Net revenues: £122 ($236) million/year in 2005/6

Set up costs - £190m ($367m) (inclusive of £100m ($195m) complementary traffic management costs)

Operating costs: £90m ($175m) p.a., income £202m ($392m) (05/06)
350 more buses to catch

The Charge is helping it happen
Less road traffic emissions

The Charge is helping it happen

MAYOR OF LONDON

Transport for London
72km of new cycle routes
The Charge is helping it happen
Support for the scheme

- Public opinion was equivocal prior to the introduction of the Central London scheme.
- After its introduction, public opinion shifted decisively in favour of the scheme, with opposition levels falling.
- Talk of extensions produced a drop in support.
- After waning support, support picked up following benefits campaign and then reduced over concerns over the WEZ.
The Western Extension introduced in February 2007
Reason for extension

• The Mayor wanted to extend benefits to a wider area
• 40% of England’s congestion in London
• Western extension area experiences high levels of traffic congestion through the working day
• Second most congested area of London after the central zone
• Important business and tourist sites in the area which would benefit from congestion relief
Suitability of westward extension

- Easily identifiable diversion routes around the boundary for traffic to avoid the zone
- Area well served by public transport
- Could operate scheme using same technology and systems
- Possible to develop “free” routes to cross north-south and east-west, preventing a major diversionary effect
- Initial feasibility studies summer 2003, decision to proceed following consultation Sept 2005, implement Feb 2007
Customer improvements programme

• payment channels
• Automated fleet accounts,
• Improved discount registration
• Big investment in explaining the charge and making it as easy as possible to pay
• Pay next day
• Investment in further improvements to buses with 25% increase in peak period capacity
Projected impacts

- 10 to 14% reduction in traffic volumes within extension
- 15 to 20% reduction in congestion in western zone
- Knock on benefits to bus journey times and reliability
- Traffic on boundary routes will be largely unchanged
- Increase in public transport passengers
- £30–50m ($58-$97m) net revenue
- Reduced accidents and emissions
WEZ impacts – early indications

• Weeks 1 - 3 impacts in accord with TfL expectations
• No indications of traffic or other problems
• Traffic entering WEZ down approx 13% (charging hours)
• Traffic on boundary route broadly unchanged
• Traffic in central zone broadly unchanged
• Clear evidence of increases in average speeds/ reduced congestion

But full understanding will take several months - Initial summary (after 3 months of operation) to be published in TfL’s 5th Annual Monitoring Report – due end June 2007
Media reporting of go live of Western Extension – Feb 19 2007
Congestion Charging: what have we learnt (1)

- Political leadership and support plus clear governance are essential
- Other key elements of a successful scheme are:
  - Thorough research, monitoring,
  - Extensive consultation and public information;
  - Improvements to buses;
  - Strong project management;
  - Effective traffic management and provision of some complementary traffic schemes and
  - Providing a good service to customers
- Effective
  - Charging reduces traffic and congestion
  - More congestion than we imagined is being caused by reduced effective traffic capacity from measures to favour pedestrians, buses, public spaces and from intense programmes of utilities activity
  - Seen by majority as effective but still contentious and newsworthy with concerns over wider application and wish for more flexible charging
Congestion Charging : what have we learnt (2)

• **Winners / losers**
  - main winners are those that experience reduced congestion, but do not pay the charge - bus passengers; taxi occupants; residents (pay only 10%); drivers outside the zone
  - overall impact of charging on business appears to be broadly neutral but some losers
  - accident and environmental gains

• **Bus improvements**
  - *additional bus services*, relatively straightforward given institutional arrangements in London
  - bus passenger levels already increasing in response to fares and other initiatives
  - roughly 30% increase in buses to central London, of which half in response to charging
  - additional bus and underground fares broadly cover the cost of additional buses

• **Value for money?**
  - main scheme has benefit cost ratio or around 1.5
  - western extension has benefit cost ratio of around 1.0
Congestion Charging: what have we learnt (3)

• Integration with other policy goals
  - principally with the objective to radically improve bus services. Charging recognised as the single most effective bus priority measure
  - roughly a quarter of all London’s bus services pass through or adjacent to the original zone
  – Reduces emissions and can be used to encourage take up of less polluting cars
  – Facilitates increased walking, cycling and urban realm projects

• London-wide impacts
  - original charging scheme affected up to 15% of London households
  - but much car travel to central London was relatively infrequent, once a month or less
  - overall impact, even with western extension, is concentrated on central London given its business, financial, government and entertainment focus
  - net revenues from charging are important additional revenue but relatively small part of overall TfL finances
Next steps

1. Emissions based charging in central London
2. London wide Low Emission zone
3. Relet of existing contracts
4. New technology
1. Emissions (CO2) influenced charging

November 2006 Mayoral announcement:

• aim to take forward a policy of reducing London’s CO₂ emissions by introducing emissions influenced charging within extended Congestion Charging scheme
• complements the existing scheme

Proposed that:

• cars with lowest emissions (up to 120g/km) obtain 100% discount.

• cars with highest emissions (over 225g/km) would pay £25. (Some v18% of existing CC users fall into third category compared to 4% for all Londoners)

• 90% residents’ discount withdrawn for VED band G equivalent cars

TfL currently developing proposals and undertaking analysis work. Proposals will be subject to public consultation with proposed implementation in 2008
2. London wide Low Emission Zone

Air Quality in London

• Air pollution is a serious problem in London
  - 1,000 premature deaths per year
  - 1,000 hospital admissions per year
• Affects most vulnerable parts of society
• Majority of Londoners concerned about poor air quality and want to see it improved
• Particular problems with emissions of particulate matter (PM$_{10}$) and nitrogen oxides (NO$_x$)
• Worse in central London, main roads, Heathrow
• Road traffic major source of emissions
Contribution of Road Transport to Air Pollution in London

Sources of Emissions of NOX in London (%)
- Road Transport: 58%
- Domestic: 13%
- Industry: 9%
- Other transport: 12%
- Commercial: 7%
- Other: 1%

Sources of Emissions of PM10 in London (%)
- Road Transport: 68%
- Industry: 22%
- Other transport: 8%
- Other: 2%
Emissions from different vehicles at average London speeds

Grammes of NOX emitted per km driven

Grammes of PM10 emitted per km driven
What is the London Low Emission Zone?

- Covers the whole of Greater London in order to maximise benefits
- Discourages the most individually polluting vehicles from being driven in London
- Requires heaviest diesel-engine vehicles to meet strict emissions standards to drive within London
- Operates 24 hours a day, 365 days per year
- The LEZ does not ban vehicles from London, non-compliant vehicles can pay a charge
- Complements other Mayoral initiatives to improve air quality
Proposed LEZ Boundary
Proposed definitions and standards

<table>
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<tr>
<th>Vehicle type and definitions</th>
<th>Date of LEZ scheme implementation</th>
<th>Vehicle ‘Euro’[1] emission standard (for PM) required to drive in the LEZ at no charge</th>
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<td><strong>Heavier lorries.</strong> Goods vehicles exceeding 12 tonnes</td>
<td>February 2008</td>
<td>Euro III</td>
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<tr>
<td></td>
<td>January 2012</td>
<td>Euro IV</td>
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<tr>
<td><strong>Lighter lorries.</strong> Goods vehicles between 3.5 and 12 tonnes</td>
<td>July 2008</td>
<td>Euro III or Euro 3</td>
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<td></td>
<td>January 2012</td>
<td>Euro IV or Euro 4</td>
</tr>
<tr>
<td><strong>Buses and coaches.</strong> Passenger vehicles with more than eight seats plus the driver’s seat exceeding 5 tonnes</td>
<td>July 2008</td>
<td>Euro III</td>
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<tr>
<td></td>
<td>January 2012</td>
<td>Euro IV</td>
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<tr>
<td><strong>Heavier vans.</strong> Goods vehicles between 1.205 tonnes (unladen) and 3.5 tonnes</td>
<td>October 2010</td>
<td>Euro 3</td>
</tr>
<tr>
<td><strong>Minibuses.</strong> Passenger vehicles with more than eight seats plus the driver’s seat below 5 tonnes</td>
<td>October 2010</td>
<td>Euro 3 or Euro III</td>
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\[1\] Vehicle ‘Euro’ refers to the European Union’s vehicle emission standards.
High levels of charge and penalty charge to encourage all but most infrequent visitor to London to clean up their fleets

- **Daily charge**
  - £200 ($390) for non-compliant HGVs, buses & coaches
  - £100 ($195) for non-compliant heavier LGVs & minibuses

- **Penalty charge**
  - £1000 ($1943) (£500 ($970) if paid within 14 days) for HGVs, buses & coaches
  - £500 ($971) (£250 ($485) if paid within 14 days) for heavier LGVs & minibuses

- The level of charge was determined by taking account of the cost to operators of fitting pollution abatement equipment to vehicles (£3,000 - £5,000 ($6,000 - $10,000) average), combined with the probability of being captured in the zone and having to pay a penalty if caught.
Economics of the London LEZ

• The LEZ is not proposed to be revenue raising for TfL
• Capital costs of setting up LEZ £60m - £70m ($120 - $135m) (NPV).
• Costs of running LEZ(2008 to 2015) £60m - £70m ($120 - $135m) (NPV).
• Overall, from 2008 to 2015, monetised health benefits estimated at between £160m ($310m) and £640m ($1243m).
• LEZ will result in reductions in tonnage emitted of PM and other harmful pollutants.
• Compliance costs for operators are estimated at between £200m ($390) and £490m ($950m) over lifetime of scheme. Sectors that would be most affected could be small construction businesses, tourist coach operators and small businesses operating heavier LGVs.
3. Detection and Enforcement Technology

Improved cameras plus ANPR - effective solution available for simple charging schemes:

• Number plate readers at roadside, not data centre
• Enables use of cheaper broadband communications
• Less public nuisance in laying new fibre optic cable
• Greater resilience to comms failure
• Greater flexibility of location of data centres
• Easy future integration with Tag and Beacon
• Needed as an enforcement technology for non-registered / tagged vehicles

ANPR Solution now operating in London western extension
Tag and beacon technology is already providing high capture rates for schemes where charges vary across the day, for example cordon charging varying by time of day.

Stockholm 2006
Urban Tag & Beacon detection technology

A solution suitable for sensitive urban areas allowing for more flexible charging could be developed in the short term. For example, charging varying by time of day and vehicle type.

Testing site Borough High St
Satellite/mobile positioning systems

Satellite and mobile phone location systems for distance-based charging need further development for affordable, accurate use in urban areas.

Example position reports from multiple different GPS and GSM mobile devices.
4. Re-let of Service Provider Contracts

• Contract with existing providers for business and core support services ends in Nov 2009
• Currently in an ongoing procurement process with a number of bidders for a range of services
• Re-let provides an excellent opportunity to:
  – make use of proven new technology to deliver the scheme
  – enable more flexibility
  – Introduce further customer improvements
• Exploring various options and best practice from across the world
• Further technology trials underway in London
A possible pathway for new technology?

• STEP 1 - simple area charge using ANPR technology
  – no OBUs required
  – allows for visitors
  – and anonymity
  – area charges could cover congested centres or routes

• STEP 2 – provide ‘variable time of day charging’ with ‘tag and beacon’ as an ‘additional method of payment’
  – not compulsory – can still pay area charge anonymously
  – Incentivise tag take up by offering more flexible charging
  – more convenient for users and provide for interoperability
• **STEP 3** – provide ‘distance based charging’ with satellite tracking units again as ‘another method of payment’
  – Users may have OBUs already with which distance based charges could be determined
  – Again take up would be incentivised by even more flexible charges more closely related to use

• **STEP 4** – with voluntary take up of distance based charging in time may be able to move to wholesale use across the country
The future?
Existing traffic congestion

40% of all congestion in England is found in Greater London
Job and population growth will be in different locations

Projected Employment Growth 2001 - 2025

Projected Population Growth 2001 - 2025

Concentrated job growth in a central east-west corridor – leads to large radial flows

Population growth across London – leads to dispersed travel
Future transport trends

1993-2025 Future Transport Trends

Main Mode Trips Per Day - Millions

10.8m

7.6m

Projected increase in car trips

Projected increase in public transport trips

Possible Impact of policies to limit car trips
Travel growth requires modal transfer

2005

Car 11m
Walk&Cycle
PT 27.2m
16.2m

2025

Car 10m
Walk&Cycle
PT 31.2m
21.2m

+5m trips by PT & W&C
Transport Strategy for 2025

T2025 objectives:

Supporting economic development

*By improving public transport*
  - Getting people to work in central London
  - Supporting outer London growth and travel demands

*And managing the road network effectively to reduce congestion*

Tackling climate change and enhancing the environment

*By reducing carbon dioxide (CO2) emissions, improving air quality, reducing noise, and improving the urban environment*

Improving social inclusion

*By making transport more accessible and safe for users*

Growth

London population set to grow by 500,000 people (to 8.3m) and by 900,000 jobs (to 5.5m). Despite investment in public transport, set to get more congestion.
T2025 strategies

- Renewing the existing system
- Ensuring the existing system is efficient & safe
- Reducing the need to travel
- Influencing travel behaviour
- Reducing congestion & emissions
- Providing new pt capacity
Strategy 6: Providing new capacity

Bus

- The bus system will play a key role in supporting economic growth, tackling climate change and improving social inclusion
- The multi-purpose nature of bus is the only mode that can serve such diverse needs
- Prior to the delivery of new rail schemes, bus is the only feasible way to support London’s growth
- And additional bus capacity will be critical as part of the complementary measures for RUC in the congestion and emissions reduction plan
- An additional 40% extra bus capacity will be needed by 2025
- Effective end-end bus priority measures will be a critical success factor
Walking and cycling

• The T2025 target is to increase cycling’s mode share to 5% and walking’s to 22% - each mode will have an increase of 1m trips/day by 2025

• A combination of local small-scale initiatives, e.g. signage, lighting, better signals, and larger projects, e.g. Mayor’s 100 public spaces programme

• Urban realm initiatives will provide high quality public spaces and create better conditions for pedestrians

• Wider policies will have a big impact on people’s propensity to walk and cycle, e.g. the congestion and emissions reduction plan will improve traffic conditions
Objective 2 – Tackling climate change

Climate change challenges

- London’s climate is changing – **causing major economic, environmental and social impacts**
- Stern Report “**climate change presents very serious global risks, and demands an urgent global response**”
- Transport CO₂ emissions set to grow
- **Mayor’s target: 60% cut in CO₂ emissions from 1990 levels by 2050, 30% cut by 2025.**
- A range of actions needed:
  - Travel behaviour change/mode shift
  - Technical change for fuel efficiency
  - Fuel /power type
The role for road user charging

- RUC must be an element of the policy mix because the objectives and targets for London cannot be met without it
- The Mayor has indicated that he is keen to implement RUC in London within the context of a national scheme in the next decade
- RUC can reduce congestion by:
  - encouraging a shift to other modes as well as less congested times of the day
- RUC can reduce emissions by:
  - reducing traffic volumes
  - improving traffic flow
  - encouraging the take up of less polluting vehicles
  - providing for carbon offset arrangements
The evolution of a national scheme for the UK?

The precise form of a so-called ‘national’ road user charging scheme has yet to be confirmed but there are a number of ways in which it might be conceived for example:

- A series of local schemes covering the most congested areas, joined by a common back office;

- A network wide scheme – based on distance-based charging;

- A combination of the above; with local charging schemes superimposed onto a national distance-based scheme.
a national scheme for the UK?

- What will it look like?
- What technologies will be needed?
- What provision will be made for visitors?
- Will it be mandated?
- What about privacy?
- How can it be rolled out?
- What do the public think?
Links to Useful Congestion Charging Information

- Information about how the scheme works, plus lots of publicity material, FAQs etc. is available on www.cclondon.com

- The background to the implementation of the scheme, along with the results of the comprehensive monitoring programme are available at: www.tfl.gov.uk/congestioncharging

- Congestion Charging’s recently published 4th Annual Report including an overview can be found at: http://www.tfl.gov.uk/tfl/cclondon/cc_publications-library.shtml#reports

- The Congestion Charging Scheme Stage 1 Trials Report can be found at http://www.tfl.gov.uk/tfl/downloads/pdf/congestion-charging/technology-trials.pdf

- For information on how the development and implementation of congestion charging was managed from the political point of view, see http://www.london.gov.uk/mayor/congest/index.jsp

- Details of the background study, Road Charging Options for London, are available at: http://www.gos.gov.uk/gol/transport/161558/228862/228869