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Chapter 14

The London experience

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Abstract: This chapter discusses the London Congestion Charging Scheme. It provides a thorough and critical discussion of the background, design, effects, and costs and benefits of the scheme, and it indicates its "winners and losers". Furthermore the chapter elaborates on the possible effects of extending the scheme.

14.1 Background to the London Congestion Charging Scheme

On 17 February 2003 the London Congestion Charging Scheme (LCCS) was implemented, after a number of public consultation exercises and with a fair amount of background research supporting its design. The legislation needed had been in place since 1999.

The Greater London Authority Act 1999 (Acts of Parliament 1999) had created an authority for Greater London, which consisted of the Mayor of London and the London Assembly; and had, at the same time, given the Mayor powers to implement road user charging and/or workplace parking levies.

Two major research studies on congestion charging in London had also been carried out. In July 1995, the Government Office for London published the results of The London Congestion Charging Research Programme (The MVA Consultancy 1995), which examined a range of technical options. The Review of Charging Options for London (ROCOL) Working Group had been set in August 1998 with the aim of providing an assessment of options for congestion charging in London. They also produced a report, overseen by the Government Office for London, and published in March 2000 (ROCOL 2000), which reviewed the available options for charging, conducted and discussed public attitude surveys, and assessed the impact of illustrative charging schemes.

The introduction of congestion charging was a central part of Mayor Ken Livingstone's manifesto for election in May 2000. After being elected, Ken Livingstone decided to take forward the ROCOL proposals for a London Congestion Charging Scheme in Central London. A number of documents and public consultations followed his decision.

The first such document was *Hearing London's Views*, which was published in July 2000, and sent to local councils, businesses and road user representatives in order to get feedback on the initial ideas for a charging scheme.[1] After these comments, the Mayor's draft Transport Strategy, which included proposals for a central London congestion charging scheme, was published on 11 January 2001 and sent to public consultation until 30 March 2001. This in turn was followed by his final Transport Strategy, published on 10 July 2001.

The proposed congestion charging scheme was then sent out for public consultation in its own right from 23 July to 28 September 2001. The results of this public consultation, especially in the area of exemptions and discounts, translated into modifications to the proposed scheme. Following the publication of the proposed modifications to the Scheme in November 2001, there was a further consultation period until 18 January 2002.

On 26 February 2002 the Mayor finally confirmed the Scheme Order. This Order was subsequently modified several times until 14 February 2003. Even after the Scheme was implemented there were a number of Variation Orders that were confirmed and incorporated into the Greater London (Central Zone) Congestion Charging Order, the most significant one being the extension of the charging zone to include Kensington and Chelsea. More variations may be introduced in the future.

[1] Despite several phone and e-mail attempts over three months, TfL were unable to provide the author with information on the proportion of people who replied to *Hearing London's Views* in favour of the scheme before it was implemented. As of February 2007 no information on the matter is available on the Transport for London website.

14.2 The London Congestion Charging Scheme

The LCCS, designed and managed by Transport for London (TfL), is an area licensing one. All vehicles entering, leaving, driving or parking on a public road inside the zone between 7:00am and 6:00pm Monday to Friday, excluding public holidays must pay a congestion charge. This was initially £5, but on 4 July 2005 it was increased to £8. Similarly, the original hours of charging extended until 6:30pm, but they were shortened by 30 minutes on 19 February 2007, when the charging zone was extended westwards.

Figure 14.1 shows the limit of the area. The north limit follows the Grand Union Canal and Harrow Road in part, Westway A40, Eastbourne Terrace, Praed Street, Sussex Gardens, Old Marylebone Road, Marylebone Road, Park Crescent, Euston Road, Pentonville Road, and City Road. The east limit follows Old Street, Commercial Street, Tower Bridge Road. The south limit is determined by New Kent Road, Kennington Lane, Vauxhall Bridge Road, Grosvenor Road, Chelsea Embankment and Cheyne Walk. The west limit follows Edith Grove, Redcliffe Gardens, the southbound route of the Earl's Court One-Way System, Pembroke Road, Warwick Gardens, Addison Road, Holland Road, the West Cross Route, the Great Western Railway Line and Scrubs Lane.

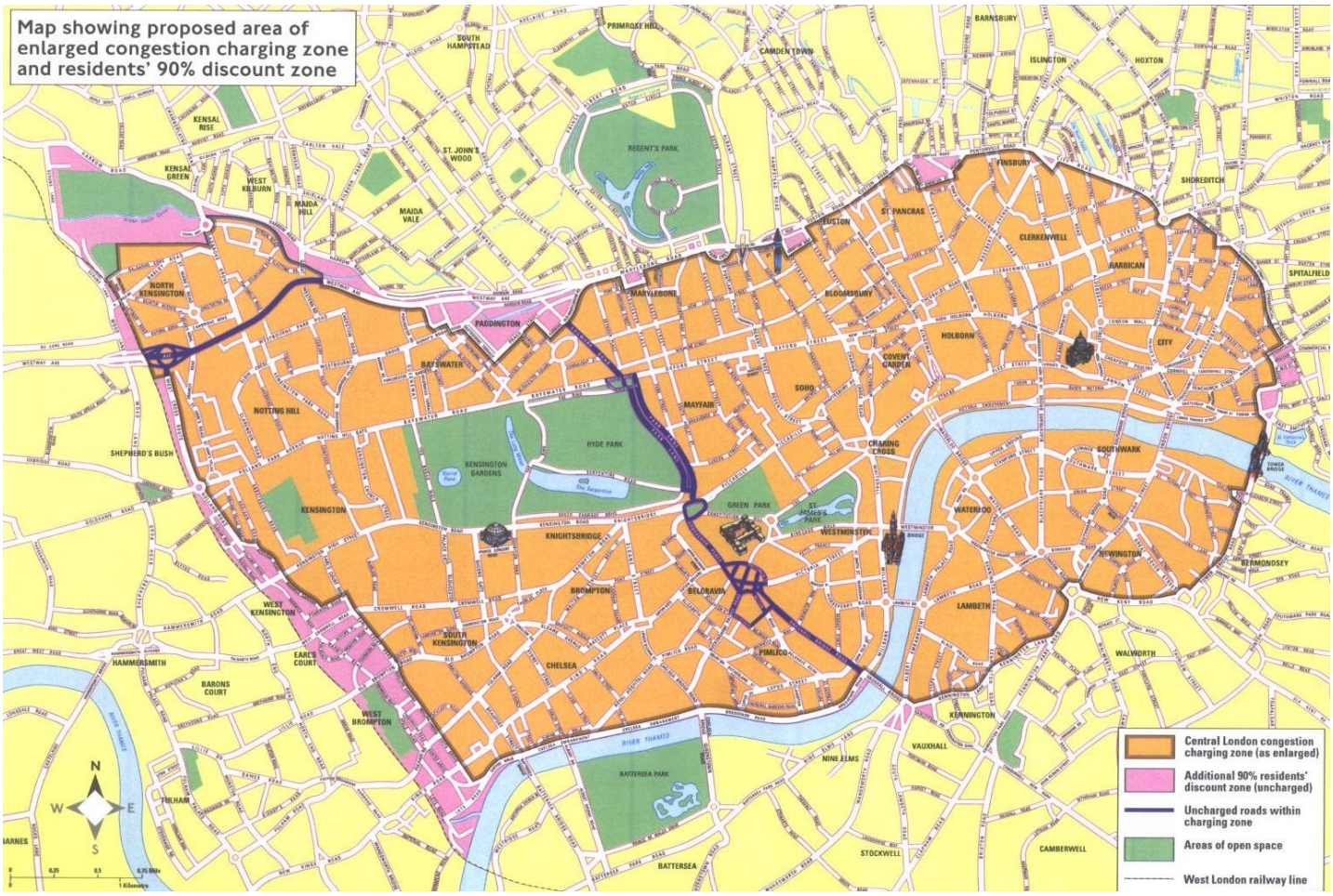

Figure 14.1 Map of the London congestion charging zone

Source: www.cclondon.com/download/DetailMapECCZ.pdf

No charge is made for driving on the roads that mark the limit of the charging zone, and there are two free corridors: one north to south along Edgware Road, Park Lane, Grosvenor Place, Bressenden Place and Vauxhall Bridge Road; and another one north-west of the zone, east to west, as the diversion route would have been too long for drivers just wanting to cross that segment of Westway A40. The dark-coloured roads on Figure 14.1 are all free of charge.

The charging zone is relatively small. It roughly covers 39 km^2 (15 mi^2), representing 2.4 per cent of the total 1,579 km^2 (617 mi^2) of Greater London.

Payment can be made for a day, a week, a month and a year, up to 90 days in advance. The

charge can also be paid on the day or on the day after. However, if the charge is paid on the day after, it increases to £10.

The methods of payment are online, in person at selected shops, petrol stations and car parks, by post, by telephone, by SMS from the payer's mobile phone, and at BT Internet kiosks. Paying for the previous charging day, however, can only be made via the call centre or via the TfL's website.

Businesses and other organizations operating more than ten vehicles can use the Fleet Automated Scheme. After registering the ten or more vehicles and paying an annual administration charge of £10 for each vehicle, the number plates of the registered Fleet vehicles are photographed by the cameras and the corresponding charges, calculated automatically. A pre-payment for the forthcoming month is drawn by direct debit from the Fleet account. The daily charge for the registered Fleet vehicles is £7, rather than £8.

There are a number of exemptions and discounts in place, which, as of February 2007, can be summarized as shown in Table 14.1.

Table 14.1 Exemptions and discounts

Discount/status	Category
Fully exempt	Motorcycles, mopeds and bicycles Emergency vehicles Public transport vehicles with 9 or more seats Vehicles used by disabled persons who are exempt from road tax Licensed London taxis and mini-cabs National Health Service vehicles that are exempt from road tax
100% discount with free registration	Certain military vehicles Vehicles with 9 or more seats not licensed as buses (e.g. work buses, community service buses, private hire minibuses)
100% discount with a one-off £10 registration	Vehicles driven for or by individuals or institutions that are Blue Badge holders[a] Motortricycles (1 metre or less in width and 2 metres or less in length)
100% discount with £10 registration per per year	Alternative fuel vehicles (requires certain emission savings for each vehicle type, as described on the TfL website) and electrically propelled vehicles Roadside assistance and recovery vehicles (e.g. motoring organizations such as the Automobile Association)
90% discount with £10 registration per year	Vehicles registered to residents of the central zone

Notes:

[a] Blue Badges, which existed before the scheme was implemented, are special parking permits issued to disabled people to allow them to park near shops, stations, and other facilities. The badge belongs to the disabled person who qualifies for it (who may or may not be a car driver) and can be used in any vehicle they are travelling in. The discount applies to individual Blue Badge holders anywhere in the EU.

Source: www.cclondon.com/exemptions.shtml

The 90 per cent discount to residents, which originally only applied to residents living inside the charging zone, has been extended beyond the charging zone boundary. The decision was made on the basis of the results of the 2004 public consultation on the Transport Strategy Revision.

The reasons for extended residents' discount zones are linked to parking and severance issues (TfL 2005b, p.10). For example, in some cases, the designated residents' parking is inside the extension and there are no alternative parking arrangements for these residents outside the zone. In other cases, the nearest, most accessible local services and amenities (such as hospitals, libraries, and leisure centres) are inside the extension (TfL 2005b, p.11). The areas where the extended residents' discount applies are the shaded areas just outside the bold line that shows the limits of the charging zone on the map in Figure 14.1.

Enforcement is undertaken with Automatic Number Plate Recognition (ANPR). There are camera sites located at every entry and exit to the congestion charging zone and also inside the zone. These cameras read and record the number plates of virtually all the vehicles making use of the zone, to subsequently send them to a processing centre with ANPR software. These number plates are then matched against the number plates that have paid, are exempt, entitled to a 100 per cent discount, or registered with the Fleet Scheme. The pictures of the matched number plates are then deleted. After a manual check, violators are tracked through the Driver and Vehicle Licensing Agency and issued with a Penalty Charge Notice (PCN) of £100. As of February 2007 the PCN of £100 is reduced to £50 if paid within 14 days, and increased to £150 if not paid within 28 days.

Once a penalty has increased to £150, a charge certificate is sent to the registered keeper or hirer of the vehicle. Failure to pay the outstanding charge can lead to the registration of the debt with the County Court and the eventual appointment of bailiffs to recover the debt.

Vehicles with three or more outstanding congestion PCNs may be clamped or removed, anywhere in Greater London. As of February 2007 the clamp fee is £65 and the removal fee is £150. Storage of the vehicle costs £25 a day. If a vehicle is clamped or removed, then all the outstanding charges must be paid before it is released. If the release fee is not paid, then the vehicle may be disposed at auction or by scrapping. In this case, the registered keeper remains liable for all outstanding charges, including an £80.25 disposal fee.

14.3 Impacts of the LCCS

At the time of this chapter going to print, the Western extension was still very recent and there were no actual data on the impacts, only forecasts. For this reason, the impacts are reported separately for the original zone, which is the area to the east of what is now the north to south free route, highlighted with a bold line cutting across the whole charging zone on Figure 14.1, and the extension, which is the area to the west of that route.

14. 3.1 Original zone

14. 3.1.1 Impacts on traffic

Congestion

The aim of the LCCS was to reduce traffic congestion in and around the charging zone, and it succeeded in so doing in the first two years. Even in the third year congestion was lower than that observed before the Scheme was introduced, although the difference was not as big.

During 2003 and 2004 there were average reductions in congestion within the charging zone of 30 per cent when compared with pre-charging levels (TfL 2005a, p.14). Congestion is defined by TfL as 'the difference between the average network travel rate and the uncongested (free-flow) network travel rate in minutes per vehicle-kilometre' (TfL 2003a, Table 3.1, p.46). Using the uncongested network travel rate of 1.9 min per km (approximately 32 km per hour) from TfL (TfL 2003a, p.52), and 2002 and 2003/04 average travel rates of 4.2 and 3.5 min per km, respectively, it can be seen that congestion decreased from 2.3 to 1.6 min per km (TfL 2005a, p.15). Most of this reduction in travel times was the result of reduced queuing 'time at junctions, rather than increases in driving speeds' (TfL 2005a, p.13).

In 2005, however, TfL (2006, p.4) reported that average delay values were 1.8 min per km, rather than 1.6 min per km as in the previous two years. This would imply a reduction in congestion of just under 22 per cent, in contrast with the 30 per cent reported for 2003 and 2004.

Since vehicles travelling on the Inner Ring Road (which marked the limit of the original charging zone) do not pay the congestion charge, TfL expected that through traffic, with origin and destination outside the charging zone, would divert and use the Inner Ring Road

instead. However, improved traffic management arrangements were put into place on the Inner Ring Road before the Scheme started, and this prevented an increase in congestion. For example, between one and two seconds were taken off green light time on radial roads, which were anticipated would have less traffic, and added on to green light time on the Inner Ring Road. That made a sufficient difference to keep the Ring Road operating satisfactorily with marginally lower levels of congestion in 2003, when compared with pre-charging conditions in 2002 (TfL 2004a, p.14). However, a further two surveys were undertaken in 2004 and, although the first of these surveys still indicates a reduction in congestion, comparable to that found in 2003, the second survey, conducted in Autumn 2004, indicates similar levels of congestion to those that prevailed in 2002, before the LCCS was implemented.

Congestion on main radial routes approaching or leaving the charging zone decreased in 2003 and increased in 2004, with TfL (2005a, p. 18) concluding that the level of congestion in that year was only marginally lower than in 2002, before charging. In 2005 conditions on the main radial routes were similar to those observed in 2004 (TfL 2006, p.4). Main roads in inner London also had higher levels of congestion in 2005 than in 2002, before the Scheme was implemented (TfL 2006, p.4).

Vehicle counts

The total volume of traffic entering the charging zone during charging hours in 2003 and 2004 was 18 per cent lower than in 2002. Table 14.2 gives the percentage changes in numbers of different vehicle types entering and leaving the charging zone in 2003 and 2004. As expected, there was a reduction of potentially chargeable vehicles and an increase in exempt vehicles.

Table 14.2 Percentage change in number of vehicles entering and leaving the charging zone in 2003 and 2004

	Change inbound 2003 vs 2002	Change outbound 2003 vs 2002	Change inbound 2004 vs 2003	Change outbound 2004 vs 2003
Cars	-33%	-35%	-1%	-2%
Taxis	+17%	+8%	-1%	0%
Buses and coaches	+23%	+21%	+8%	+4%
Vans	-11%	-15%	-1%	-1%
Lorries and other	-11%	-12%	-5%	-5%
Pedal cycles	+19%	+6%	+8%	+8%
Powered two-wheelers	+12%	+5%	-3%	-4%

Source: TfL (2005, Fig.11, p.25).

Whilst the number of certain vehicle-types will decrease, the kilometres they are driven may increase. Depending on the relative magnitude of these changes, the total vehicle-kilometres driven may increase or decrease. Chargeable vehicles in London have, however, all decreased their vehicle-kilometres, which indicates that the reduction in their number was not compensated by the potentially longer distances driven.

TfL reports a decrease of 15 per cent in vehicle-kilometres driven by vehicles with four or more wheels inside the charging zone during charging times in the first year of the LCCS and a further 6 per cent reduction in the second year (TfL, 2005a, p.28). Table 14.3 gives the changes in vehicle-kilometres by vehicle type.

Table 14.3 Vehicle-kilometres (vkm) driven within the charging zone during charging hours, including percentage share of traffic

Vehicle type	2002 vkm (millions)		2003 vkm (millions)		2004 vkm (millions)		% change 02 to 03	% change 03 to 04
All vehicles	1.64	100%	1.45	100%	1.38	100%	-12%	-5%
Four or more wheels	1.44	88%	1.23	84%	1.16	84%	-15%	-6%
Potentially chargeable	1.13	69%	0.85	58%	0.80	58%	-25%	-6%
Cars	0.77	47%	0.51	35%	0.47	34%	-34%	-7%
Vans	0.29	18%	0.27	19%	0.26	19%	-5%	-4%
Lorries and other	0.07	4%	0.07	5%	0.06	5%	-7%	-8%
Licensed taxis	0.26	16%	0.31	21%	0.29	21%	+22%	-7%
Buses and coaches	0.05	3%	0.07	5%	0.07	5%	+21%	+5%
Powered two-wheelers	0.13	8%	0.14	9%	0.13	10%	+6%	-2%
Pedal cycles	0.07	4%	0.09	6%	0.09	7%	+28%	+4%

Source: TfL (2005, Fig.15, p.29).

Note: Annualized weekday for 2002, 2003 and 2004.

Public transport

Table 4 summarizes the number of buses and bus passengers crossing the charging zone in 2002 and 2003. Up to half of the increase in bus passengers was provisionally assessed as being primarily due to the LCCS, with the remainder probably reflecting the long-term background growth in bus patronage, as a result of service improvements (TfL 2005a, p.44).

Table 14.4 Bus passengers and buses crossing the charging zone boundary

	AM peak (7:00-10:00am)			**Charging hours (7:00am - 6:30pm)**					
	Inbound			**Inbound**			**Outbound**		
	Passengers	Buses	Passengers per bus	Passengers	Buses	Passengers per bus	Passengers	Buses	Passengers per bus
Autumn 2002	77 000	2 400	32	193 000	8 280	23	163 000	7 800	21
Autumn 2003	106 000	2 950	36	264 000	10 500	25	211 000	9 900	21
Percentage difference	+38%	+23%	+12%	+37%	+27%	+8%	+29%	+26%	+2%

Source: TfL (2005, Fig. 27, p.45).

In 2004 the number of passengers crossing the charging zone by bus inbound between 7:00am and 10:00am increased by a further 12 per cent compared with 2003 (TfL 2005a, p.45)

In the first full year after the introduction of the LCCS there were substantial reductions in excess waiting time, the additional waiting time at bus stops caused by service irregularity or missing buses. This reduction was 24 per cent overall across Greater London and over 30 per cent in and around the charging zone (TfL 2005a, p.50). In the period March to December 2004, there was a further reduction in excess waiting time of 18 per cent in and around the charging zone (TfL 2005a, p.50).

In the first year of the LCCS there was a decrease in patronage of the London Underground. This was mainly due to the slowdown of the economy, the decrease in tourism in London, which in turn might have been linked to the war in Iraq, and the temporary closure of the Central Line for almost three months, following a derailment at Chancery Lane station (TfL 2003b, points 2.2 and 5.4). In the second year of the LCCS this trend was reversed. Although inside the charging zone, patronage of the Underground during 2004 was still lower than in 2002, across the whole Underground network, patronage was roughly similar to that of 2002, before the introduction of charging (TfL 2005a, p.52).

No change was registered in the use of national rail following the implementation of the LCCS (Tf, 2004a, p.39; TfL 2005a, p.53).

14.3.1.2 Economic impacts

The impacts of the LCCS on the economy in central London have been neutral (TfL 2005a, p.68). The scheme started in February 2003, when the economy was slowing down, after four quarters of negative growth (TfL 2005a, p.71). The economy picked up however, at the end of 2003 and during 2004.

A number of studies and data bases were used to compare business performance in terms of variables such as number of businesses or sites, numbers of employees, sales and profits, inside and outside the congestion charging zone and before and after the introduction of the LCCS. The conclusion of these comparisons is that, overall, businesses have not been significantly affected by the congestion charge (TfL 2005a, p.73). Commercial and residential property markets do not show any impacts from the congestion charge either (TfL 2005a, p.68).

Ernst and Young conducted an independent review, which concluded that the £5 charge had had a neutral impact on the central London economy (TfL 2006, p.68).

14.3.1.3 Impacts on accidents and the environment

TfL (2005a, p.5; 2006, p.6) claims that the LCCS is responsible for between 40 and 70 fewer accidents per year within the charging zone and on the Inner Ring Road in comparison with the background trend. They estimate the monetary costs of accident savings at £15 million per year. Assuming there have indeed been between 40 and 70 accidents saved per year,[2] the monetized value of 15 million seems to be too high.

[2] TfL (2006, pp.112-114) summarizes the results obtained by an independent statistical study, which confirms that congestion charging has led to these additional net reductions.

From all traffic accidents in London involving personal injury, around 87 per cent are slight, 13 per cent are serious, and just under 1 per cent are fatal (TfL 2005a, Figure 78, p.106; TfL 2001, Table 16, p.28; TfL 2004b, Table 6.1.1, p.50).[3] Applying these shares to the upper bound of 70 accidents saved, as reported by TfL (2005b; 2006), together with the total cost per accident by severity as calculated in the Highways Economics Note 1 (DfT 2007, Table 3, p.11), yields an estimate of just over £4 million at 2005 prices.[4] This is much lower than the £15 million reported by TfL.

Despite the increase in the use of bicycles and motorcycles, accidents involving them have decreased, in line with the long-term background trend (TfL 2005a, p.5). Higher average speeds have not resulted in more accidents because most of the time savings are experienced at junctions, where there is less queuing (TfL 2005a, p.5). Driving speeds themselves have not increased.

Emissions of nitrogen oxides and particulate matter within the charging zone have been reduced by 18 and 22 per cent, respectively, due to the effect of both charging and vehicle technology (TfL 2006, p.118). On the Inner Ring Road, the reductions were approximately 12 per cent for nitrogen oxides and 13 per cent for particulate matter (TfL 2006, p.118).

[3] Figure 78 (TfL 2004b) corresponds to traffic accidents on the Inner Ring Road and within the charging zone only, but the shares are the same as those derived from Table 16 in TfL (2001) and Table 6.1.1 in TfL (2004b), which cover the whole of Greater London.

[4] The average values per accident, by severity of accident, are £1,644,790 for fatal accidents, £188,920 for serious accidents, and £19,250 for slight accidents (DfT 2007, Table 3, p.11). These estimates include lost output, medical and ambulance costs, human costs to reflect the pain, grief and suffering, police costs, insurance and administration costs, and damage to property. These estimates correspond to average accidents. For example in 2005, a fatal accident on average involved 1.10 fatalities, 0.36 serious casualties and 0.54 slight casualties (DfT 2007, paragraph 6, p.4).

The reduction in emissions of carbon dioxide inside the zone in the first year of operation is estimated at 15.7 per cent inside the charging zone and 8.5 per cent on the Inner Ring Road (TfL 2006, Table 6.3, p.117). No estimates are available for later years.

14.3.2 Western extension

The Western extension is different form the original charging zone. The impacts from congestion charging are therefore expected to be different. Table 14.5 presents the numbers of employees, business units and residents in the two zones, showing how these differ.

Table 14.5 Employees, business units and residents in the original charging zone and in the Western extension

	Original zone	**Western extension**
Employees[(a)]	1,235,257	218.477
Business units [(a)]	81,667	21,692
Residents[(b)]	148,000	230,000

Sources: (a) TfL (2006, Table 11.2, p.206); (b) TfL (2005b, Table 7.1, p.95) and TfL (2004b, p.3).

The benefits in general will be lower because the expected reductions in traffic are smaller than those experienced with the original scheme. The reasons for this are as follows:

1. Drivers in the extension who already pay the charge because they use the original charging zone, will continue to travel regardless of charging inside the extension or not (TfL 2005b, p.66, point 6.1.7).

2. Residents within the extension are entitled to a 90 per cent discount and will probably be attracted onto the roads. By paying the discounted charge they are able to drive not only in

the extension but also in the original charging zone. Some residents who did not drive may start driving, including those who initially made alternative arrangements after the LCCS was first introduced (TfL 2005b, points 6.4.11 and 6.4.12, p.72).

3. There is a greater proportion of car travel by residents in the extension than there is in the original zone, and therefore a higher proportion of households are able to take advantage of a residents' discount. The number of cars registered for a resident discount may thus increase by more than 150 per cent (TfL 2004c, p.3).

A reduction in vehicle-kilometres of between 10 and 14 per cent within the extension is expected. Average speeds are also projected to increase by between 10 and 14 per cent (TfL 2005b, point 6.4.10, p.72).

Traffic on the free corridor north to south (the west limit of the original charging zone) is expected to increase by between 1 and 2 per cent, and traffic on the other limits of the original zone is expected to decrease by between 1 and 2 per cent (TfL 2005b, point 6.4.14, p. 73). Traffic on the boundary of the Western extension (other than the free corridor north to south) is projected to increase by between 3 and 5 per cent (TfL 2005b, point 6.4.16, p.73).

The extension will also cause an increase in vehicle-kilometres in the original charging zone of roughly 2 per cent, mainly because, as explained in point (2) above, residents will be priced onto the roads. As a result of this, average speeds in the original charging zone are expected to decrease by 2 per cent (TfL 2005b, points 6.4.17 and 6.4.19, p.74).

With the end time brought forward to 6:00pm, inbound traffic to the enlarged zone between 6.00pm and 6.30pm is expected to increase to pre-charging levels. The increase could be even higher if drivers who used to enter the original charging zone earlier in the day change their travel time to enter it after 6:00pm and those who used to arrive after 6:30 change their travel time to arrive earlier but after 6:00pm, when charging now finishes (TfL, 2005b, point 6.4.21, p.74).

An increase of between 2 and 3 per cent in public transport passengers is expected, 75 per cent of which will affect buses (TfL 2005b, point 6.4.47, p.84).

As shown in Table 14.7 in the section that follows, TfL believes that as a result of the extension there will be fewer accidents, which they value at £5 to £10 million per year. However, Santos and Fraser (2006, pp.287-288) are suspicious of those estimates, which either attribute too many accidents prevented to the extension or assume an excessive proportion of severe injuries and fatalities prevented, or both.

14.4 Costs, benefits and revenues

14.4.1 Original LCCS

The capital costs of the LCCS were approximately £200 million at 2002 prices, most of which were provided by the central government.[5]

The annual costs and benefits of the LCCS are presented in Table 14.6. The figures are in 2005 values and prices.

[5] Information provided by TfL on request.

Table 14.6 Annual operating costs and benefits of the London scheme (£ million at 2005 prices and values, charge at £5)

Costs	
TfL administration	5
TfL contractors	85
Additional bus costs	20
Total	**110**
Benefits	
Time savings and reliability benefits to car occupants, business trips	65
Time savings and reliability benefits to car occupants, journey to work and other trips	45
Time savings and reliability benefits to taxi occupants, business trips	30
Time savings and reliability benefits to taxi occupants, journey to work and other trips	10
Time savings and reliability benefits to commercial vehicle occupants	35
Time savings and reliability benefits to bus passengers, business trips	2
Time savings and reliability benefits to bus passengers, journey to work and other trips	40
Charge-payer compliance costs to car occupants, business trips	-10
Charge-payer compliance costs to car occupants, journey to work and other trips	-10
Charge-payer compliance costs to commercial vehicle occupants	-10
Vehicle fuel and operating savings	10
Accident savings	15
Disbenefit to deterred trip makers, business trips	-5
Disbenefit to deterred trip makers, journey to work and other trips	-20
Reduced CO_2 emissions	3
Total	**200**

Source: TfL (2006, Table 9.1, p.172).

'Charge-payer compliance costs', listed as disbenefits, are resources consumed by charge-payers (not the Scheme operators) to comply with the Scheme. These estimates include, for example, the time consumed in actually paying charges, such as in making the telephone call,

walking to the retail outlet, or logging on to the Internet. They do not include the financial transaction as this is deemed to be a transfer payment.

The scheme generated net revenues of roughly £122 million in 2005/06, including the increase experienced after the change from £5 to £8. From these revenues, £100 million have been spent on improving bus services (TfL 2006, p.174).

14.4.2 Western extension

The capital costs of the extension are projected to be between £113 and £118 million at 2005 values and prices (TfL 2005b, Table 7.8, p.108).

Table 14.7 gives costs and benefits of the extension for the first year of operation. The values are in 2005 values and prices.

Table 14.7 Costs and benefits of the Western extension for the first year of operation

(£ million at 2005 values and prices)

Costs	High sensitivity	Low sensitivity
Service provider costs (operating)	9.9	11.8
Enforcement infrastructure costs (operating)	6.1	6.1
Contracted enforcement costs (operating)	4.6	4.6
Business operations costs (operating)	3.0	3.6
Additional bus costs	15.0	11.0
6.00pm finish: reduced operating costs to existing scheme	-1.0	-1.0
Total	**37.6**	**36.1**

Benefits	High sensitivity	Low sensitivity
Time savings to vehicle occupants	63	44
Increased journey time reliability to vehicle occupants	6	4
Time savings and increased reliability for bus users	21	15
Reduced fuel consumption	2	2
Reduced number of accidents	10	5
Disbenefits to deterred car occupants	-16	-12
Charge-payer compliance costs	-6	-7
6.00pm finish: loss of benefits to existing scheme	-12	-7
Total	**68**	**44**

Source: TfL (2005b, Tables 7.4, 7.6 and 7.7, pages 100, 104 and 105, respectively).

The lower sensitivity values reflect a ‘relatively inelastic response to the introduction of charging’, and the higher sensitivity values reflect a more elastic response (TfL 2005b, p.71). The corresponding reductions in vehicles with four or more wheels entering the extension are projected to be 13 per cent under the low sensitivity assumption and 17 per cent under the high sensitivity assumption.

The net revenues from the extension, after including operating costs but not implementation costs or additional bus costs in the calculations, are projected to be between £25 and £40 million per year (TfL 2005b, Point 7.5.26, p.102).

It is interesting to note the very high annual costs of the extension, which result in relatively small benefits – between £7.9 and £30.4 million per year. Santos and Fraser (2006) model the extension using a spreadsheet traffic model and find similar results to TfL's, and a benefit cost ratio of around 1. This cost-benefit analysis includes capital and operating costs and benefits, discounted over a ten-year period.

Unfortunately Tables 14.6 and 14.7, which are virtually reproduced from TfL's reports, contain information that cannot be checked. The author would have preferred to check the reliability and validity of the data, methods and assumptions in more detail. However, TfL were unable to answer any of her questions or provide any data within a reasonable time span.

14.5 Winners and losers

In the case of London, the original charging zone has clearly yielded social gains by reducing levels of traffic and travel times. With heterogeneous travellers, who have different values of time, use different modes of transport, and have different journey purposes, the distributional impacts are, however, necessarily complicated to assess.

Using vehicle counts pre- and post-charging and their occupancy rates, Santos (2004, p.273) estimates that 52 per cent of all people travelling to or from the charging zone used buses

before the LCCS was introduced. If taxi and pedal and motorcycle users are added as well, the total share of people who did not use a chargeable mode of transport before the LCCS rises to 63.9 per cent. These are winners, in the sense that they are enjoying the benefits from the scheme (higher speeds and lower travel times) without paying anything and without undergoing the disutility of making alternative travel arrangements.

From a very conservative point of view, the remaining 36.1 per cent would be car users, who are probably losers. These car users are mostly worse off either because they have had to switch mode or change time or suppress their trip, or because the benefits they get from lower travel times are lower than the cost of the charge. The exceptions are commuters with a very high value of time and car users that travel during working hours, or are either exempt or entitled to a discount.

Santos and Bhakar (2006, p.29) estimate that the minimum income for a car commuter to benefit from a £5 charge is £1,400 per week. They do this exercise assuming that the value of time is lower in uncongested conditions in comparison with congested conditions.[6]

This weekly salary of £1,400 is roughly equivalent to an annual salary of just under £75,000. Given that on average, the richest 10 per cent of full-time workers in London earn over £65,450 per year (Office for National Statistics 2004a, Table 7.7a), it is not unreasonable to think that quite a number of car commuters would have benefited from the £5 congestion charge.

[6] MVA et al (1987, p.176) estimate that the value of time in congested conditions can be up to 40 per cent higher; Wardman (2001, p.125) concludes that it can be 50 per cent higher; and Steer Davies Gleave (2004, p.19) concludes that it can be almost 100 per cent higher. TfL (2005b, point 7.5.4, p.99), however, assumes a uniform value of time, regardless of the prevailing traffic conditions.

Using the same methodology reported in Santos and Bhakar (2006), if an £8 charge is assumed instead of a £5 charge, the minimum weekly salary for a car commuter to benefit from the scheme increases to £2,348, roughly equivalent to an annual salary of £122,000. This casts doubt on what proportion of car commuters would actually benefit. Although it can be ascertained that it will be less than 10 per cent, the smallest quantiles reported by the Office for National Statistics (2004a, Table 7.7a) are deciles, and so it is impossible to pinpoint the exact percentage of Londoners with an annual salary higher than £122,000. In any case, it would be difficult to determine what proportion of those high earners use the charging zone on a daily basis. It should be borne in mind, however, that these estimates refer to commuting values of time, and not to working values of time. There is no doubt that business trips by car benefit from the charge, even if the same values of time are assumed during congested and free-flow conditions.

14.6 Conclusions

The London Congestion Charge is not a first-best (Pigouvian) charge and it is not a second-best charge either. It is rather a practical, unsophisticated charge, equal for all vehicle types, despite their different congestive effects. It does not vary in time or location, except for the fact that it applies in a specific area between 7:00am and 6:00pm.

Even though the costs of running the scheme are very high, the economic benefits are positive. In general, it is seen as a success story. The only aim of the LCCS was 'to reduce traffic congestion in and around the charging zone' (TfL 2004a, p.7). It has, no doubt, succeeded in so doing, and as expected, is contributing to four of the Mayor's ten priorities for transport as set out in his Transport Strategy (Greater London Authority, 2001): 'to reduce congestion, to make radical improvements in bus services, to improve journey time reliability

for car users, and to make the distribution of goods and services more reliable, sustainable and efficient' (TfL 2004a, p.7).

Santos and Fraser (2006, p.296) note that important decisions regarding the scheme design such as: (a) the level of the charge, and whether it was going to differ by vehicle type or time of the day; (b) the times when the Scheme was going to operate; and (c) the exact limits of the charging zone, were not based on economic principles. Instead, they were based on political considerations, and the results of an extensive consultation process in which TfL engaged before the Mayor confirmed the final Scheme Order. Interestingly, this did not prevent the LCCS from achieving the objective of reducing congestion.

The Western extension, on the other hand, may yield negative economic benefits. The benefit-cost ratio that TfL (2005b, p.108) calculates is only positive under an optimistic set of assumptions. Given the limited scope for decreases in congestion in the extension (due to the very different composition of traffic and the attractiveness the extension will present to residents who might be priced onto the roads) and the very high implementation and operation costs, the prospects are not promising.

When the LCCS was implemented in 2003, the Mayor managed to surpass the most important obstacle, which was public and political acceptability. Proof of that is that, if no one had paid the charge, the Scheme would simply not have worked. The enforcement system, not designed to deal with no one paying the charge, would have collapsed.

Banking on that success, the Mayor extended the charging zone westwards, despite the low benefit-cost ratios forecast by TfL. This decision was really a political one, not an economic one, as the net social gains will be negligible, if not negative. Environmentalists, supporters of sustainable transport and users of non-chargeable modes of transport are probably on his side. A situation like this can only happen in London, where car dependency is the lowest in the UK. Data averaged over the years 2003 and 2004 (Office for National Statistics 2006, Table 10.05) show the miles travelled by car per person per year is 63 per cent in London,[7] in contrast with an average of 84 per cent for the UK as a whole. No other region in England is below 80 per cent. Scotland and Wales are also above 79 per cent.

The London experience is therefore not easily transferable to other towns and cities in the UK, and care should be taken when trying to apply a similar policy in other places around the world, especially those with poor public transport and/or high car dependency.

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[7] This was 67 per cent in the period 1999-2001 (Office for National Statistics, 2004b, Table 10.6). The reduction is probably caused by both the LCCS and the improvements in bus services.

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