

**LED bus lighting**

**March 2011**

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Prepared by FDS International.

# 1. Executive summary

## Abstract

Transport for London (TfL) has begun to phase in LED lighting to the bus fleet. This research was to look at customer views towards LED lighting in buses and on bus blinds and comprised almost 300 interviews with customers. Most customers noticed a difference between LED and Non LED bus blinds. Just over half said the LED lighting was brighter. The majority thought that LED lighting was better than Non LED and that TfL should continue the roll out of LED lighting to more routes.

## Bus interior

Most customers have a positive perception of the quality of lighting inside both LED and non LED lit buses (total excellent/good: LED: 61%, non LED: 75%). Very few said the lighting was poor.

Of those who had experience of traveling on buses with both lighting systems the majority (54%) preferred LED lighting, and just 6% said that non LED lighting was better. The main reason given for preferring LED lighting is that it is brighter, and when asked about a list of nine aspects of the lighting, passengers on LED lit buses were generally more positive than those travelling on non LED lit buses.

When asked directly, more than half (55%) said that TfL should introduce LED lighting on more routes, and only 14% disagreed. The most common reason for supporting a wider role out of LED lighting was the perceived environmental benefit.

Those travelling on LED lit buses were also significantly more likely to say that the lighting on the bus was in no need of improvement: 82% said this compared with 70% on non LED lit buses. The most common suggested improvement to both forms of lighting was that it should be brighter.

Very few customers (just nine on LED lit buses, and two on non LED lit buses) said they had encountered a problem with the lighting – these said that the lighting needed to be brighter.

## Bus blinds

Almost all (91%) customers thought that LED lighting on bus blinds was better than non LED lighting, saying that LED lighting was brighter, clearer and could be read from further away.

70% of those waiting at bus stops serving buses with both LED and non LED lit blinds had noticed a difference spontaneously; half (52%) had noticed that the blinds were brighter, and more than a third (39%) noticed the LED lighting .

## 2. Research details

Since December 2009 Transport for London (TfL) has been testing and phasing in LED lighting systems for some buses. The LED lights are considered to provide purer, whiter light than the fluorescent bulbs used up until now. Additionally, they offer enhanced reliability, cost-effectiveness and environmental benefits.

Research was required to determine whether customers perceive a difference in the lighting inside buses and behind bus blinds.

The findings presented in this report are taken from research conducted in February/March 2011. This comprised of face-to-face interviews:

LED lighting inside buses – 250 customers

LED bus blinds – 44 customers.

### Objectives

The specific objectives fall into two main areas.

- Customers' perceptions of the LED lighting inside buses, in particular:
  - Whether a difference between standard lights is observed by customers
  - Customers' perceptions of the quality of the light
  - Any problems or disbenefits associated with the LED lights
- Customers' perceptions of the LED lighting on bus blinds, in particular:
  - Whether customers notice a difference with the standard bus blinds
  - What difference if any is observed (for example in visibility or clarity of the blinds)

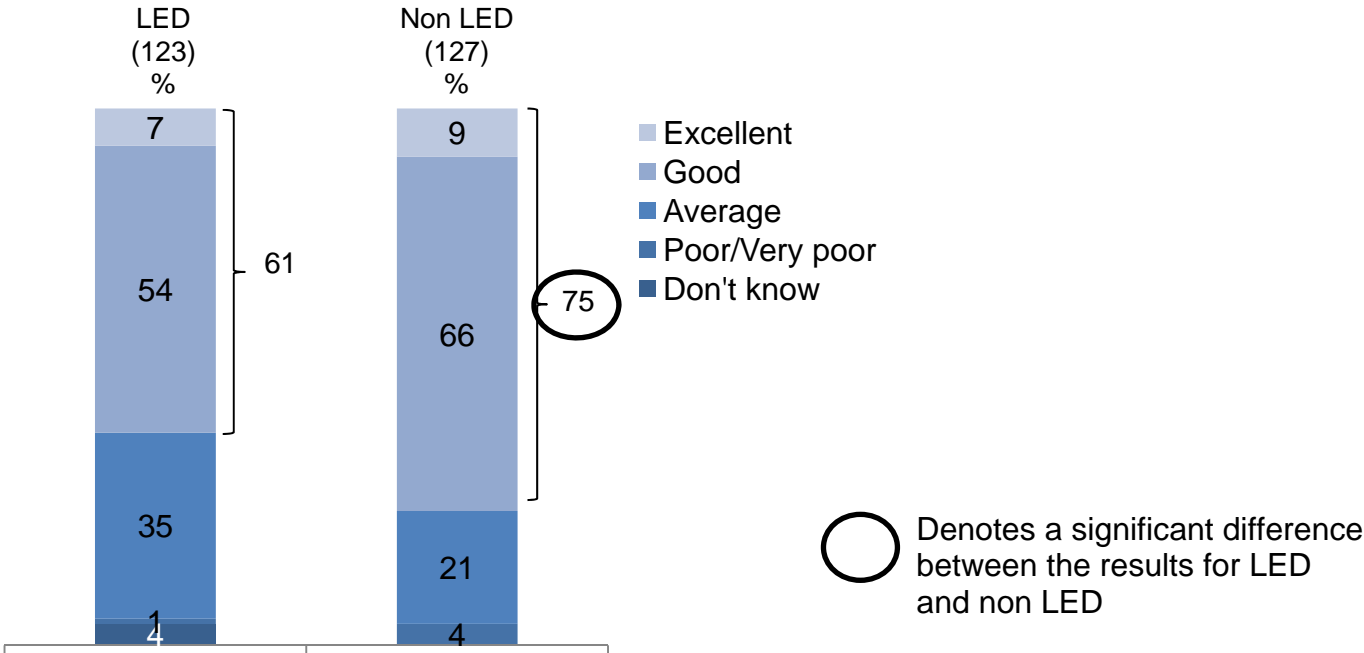
### 3. Main findings – Lighting inside buses

#### Perception of new lighting

The majority of customers said that the lighting in the bus they were travelling in was excellent/good. Those customers travelling in buses with non LED lighting were more likely to say the lighting was excellent/good than those in LED lit buses (non LED: 75%, LED: 61%) – this is a significant difference.

Very few said the lighting was poor.

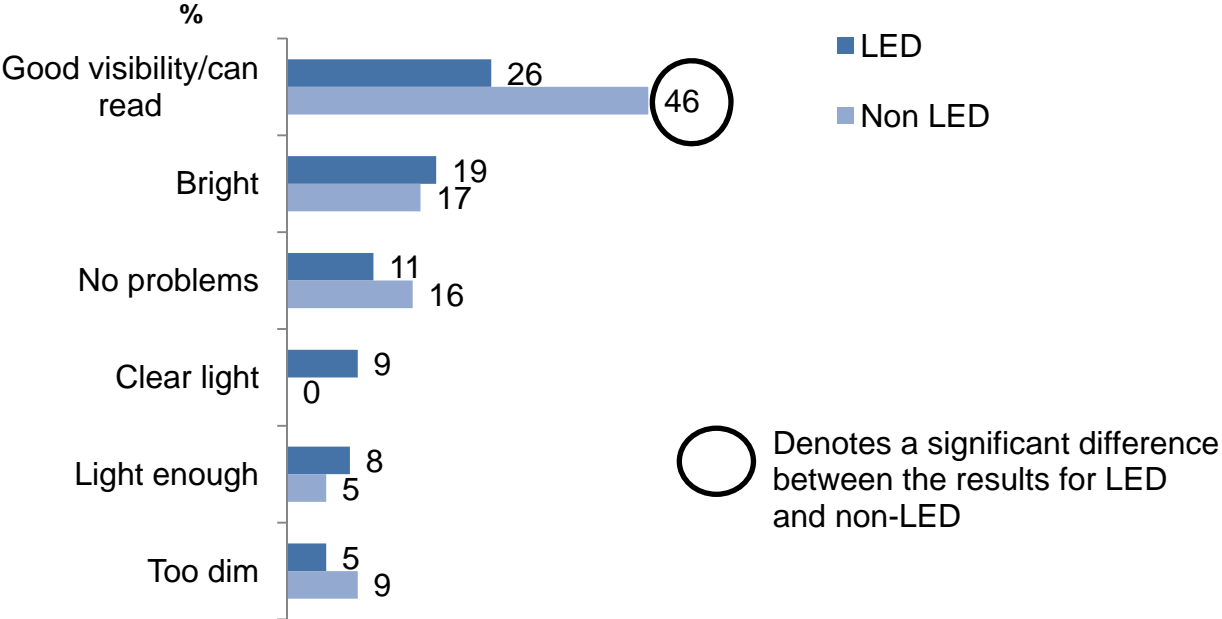
**Chart 3.1 Overall perception of the quality of lighting on the bus**  
Base: all



Asked why they gave a particular rating for the overall perception of the quality of the lighting inside the bus they were travelling in, the largest proportion in both LED and non LED lit buses mentioned 'good visibility/ability to read'.

A larger proportion of those in buses with non LED lighting mentioned 'good visibility/ability to read' than in LED lit buses.

**Chart 3.2 Reasons for rating perception of the quality of the lighting in the bus**  
Base: all LED lit bus: 123, non LED lit bus: 127



### Awareness of changes in bus lighting

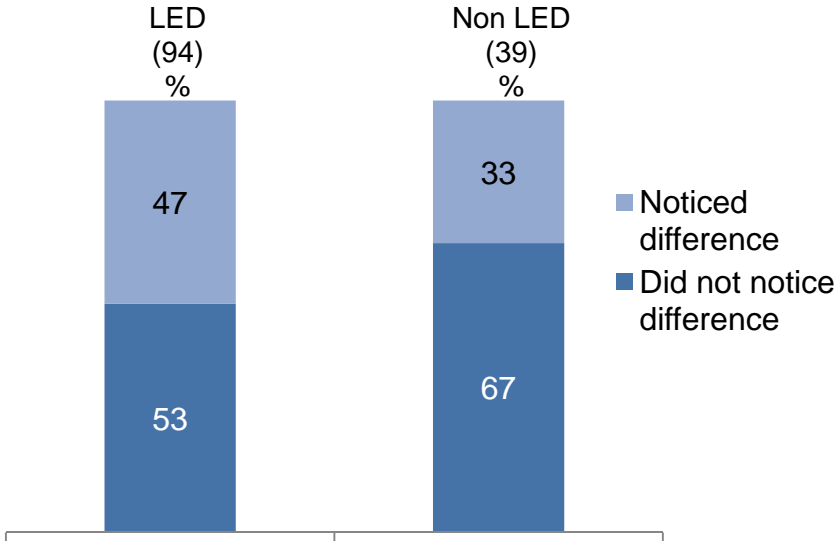
Customers travelling on a route 63 bus (LED lighting) who also travel on buses that do not have LED lighting were asked whether they had noticed that the lighting used in the bus they were travelling in was different to that of the majority of other buses. Those travelling in a route 45 bus (non LED) who also travel in buses with LED lighting were asked whether they had noticed that the lighting used in that bus was different to that in buses on routes with LED lighting.

Just under half (47%) of customers traveling in LED lit buses noticed that the lighting used was different to that on the majority of other buses; 53% were not aware. 33% of customers travelling in Non LED lit buses who had also travelled in an LED bus noticed a difference in the lighting.

Customers in the LED lit buses were more likely to notice that the lighting was different than were customers in the Non LED lit buses – this difference is not statistically significant.

**Chart 3.3 Whether noticed lighting used in bus was different to that on other buses**

Base: all who travel in buses on routes with alternative lighting system



Customers who said they noticed a difference in the lighting systems of the buses they travel in were asked what they had noticed.

**Chart 3.4 Differences in lighting between buses noticed by customers**  
**Base: all who noticed a difference and who also travel in buses on routes with alternative lighting system**

<b>Number of responses</b>	<b>LED (44)</b>	<b>Non LED (13)</b>
<b>Brighter lighting</b>	27	5
<b>Different lighting (unspecified)</b>	8	2
<b>Whiter lighting</b>	2	1
<b>Lighter in this bus is dimmer</b>	2	-
<b>LED lighting</b>	1	4
<b>Improved in last 12 months</b>	1	-
<b>Better quality</b>	1	-
<b>More florescent</b>	-	1



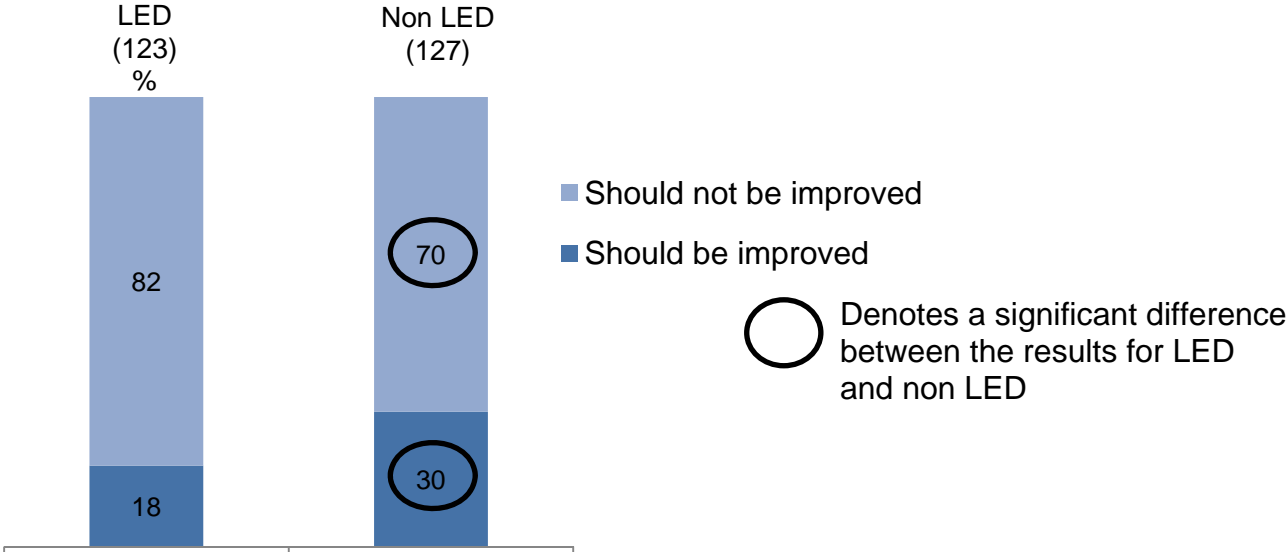
### Quality of bus lighting

Customers were asked whether the quality of the lighting in the bus they were in should be improved.

The majority of both those in LED lit buses and in Non LED lit buses said they did NOT think that the quality of the lighting needed to be improved (LED: 82%, Non LED: 70%).

**Chart 3.5 Whether customers think the quality of the lighting used in the bus should be improved**

Base: all



The customers who thought the quality of lighting in the bus should be improved were asked how they thought this should happen. The highest number of mentions on both buses lit with LED and those with Non LED lighting was for 'brighter lighting'. However, a greater proportion mentioned 'brighter lighting' in respect of Non LED lit buses than in respect of LED lit buses (LED: 8, 36% Non LED: 27, 71%). Caution needs to be taken in respect of these results as the base size is small.

**Chart 3.6 How the quality of lighting in the bus should be improved**

Base: all who thought the quality of the lighting should be improved

Number of responses	LED (22)	Non LED (38)
<b>Brighter lighting</b>	8	27
<b>Have LED lighting</b>	-	4
<b>Less white</b>	1	1
<b>Less intense</b>	-	1
<b>Other</b>	8	2
<b>Don't know</b>	4	1

## Comparing LED and Non LED lighting

The customers who had experience of travelling on both buses with and without LED lighting were asked to compare the types of lighting on nine factors.

On eight of the nine factors, a higher proportion of those travelling in buses with LED lighting were more likely than those travelling in buses with Non LED lighting to agree that the LED lighting was better.

### Chart 3.7 Extent agree/disagree when comparing LED/non LED lighting on various factors

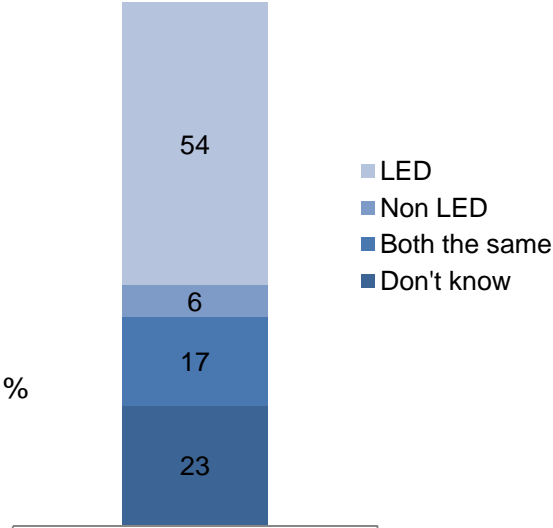
Base: all who travel on buses with different lighting systems (LED: 94, non LED 39)

	Agree that with LED lighting ...	Agree that with non LED lighting ...	Neither agree nor disagree that with LED lighting ...	Neither agree nor disagree that with non LED lighting ...	Disagree that with LED lighting ...	Disagree that with non LED lighting ...
<b>you can see more clearly</b>	65%	36%	19%	33%	12%	26%
<b>you feel safer</b>	43%	21%	46%	54%	9%	21%
<b>it is brighter</b>	66%	26%	19%	36%	14%	26%
<b>it is easier to read</b>	56%	31%	29%	41%	8%	24%
<b>you can navigate yourself around bus more easily</b>	40%	28%	53%	49%	5%	16%
<b>you can see the bus stopping sign more clearly</b>	36%	36%	50%	44%	8%	13%
<b>you can see on board passenger notices more clearly</b>	36%	26%	50%	51%	11%	13%
<b>you can see more easily when you walk down the stairs</b>	43%	33%	27%	44%	-	13%
<b>you can see clearly when looking outside the bus</b>	43%	26%	43%	38%	5%	18%

Comparing LED bus lighting with non LED bus lighting, amongst the 133 customers with experience of both lighting systems just over half (54%) said that LED lighting is better. Just 6% said non LED lighting is better.

**Chart 3.8 Type of lighting considered better**

Base: all who travel on buses with different lighting systems (133)



Just 8 customers preferred non LED lighting. This equates to 6% of those who had experienced both lighting systems.

Among the 72 customers who said that they preferred the LED lighting, the reason receiving the highest number of mentions was that LED lighting is 'brighter.' This was mentioned by 17 customers.

**Chart 3.9 Reasons for preferring LED lighting in buses**

Base: all who travel in buses on routes with alternative lighting system

Number of responses	Prefer LED (72)
<b>Brighter lighting</b>	17
<b>Softer light/better for eyes</b>	15
<b>Environmentally friendly</b>	11
<b>Clearer lighting</b>	7
<b>Easier to read/navigate</b>	6
<b>More economical</b>	3
<b>Better quality</b>	1

### Problems encountered with the quality of lighting

Nine customers (7%) travelling in buses lit with LED lighting and three (2%) in buses with non LED lighting said they had encountered a problem with the quality of the lighting.

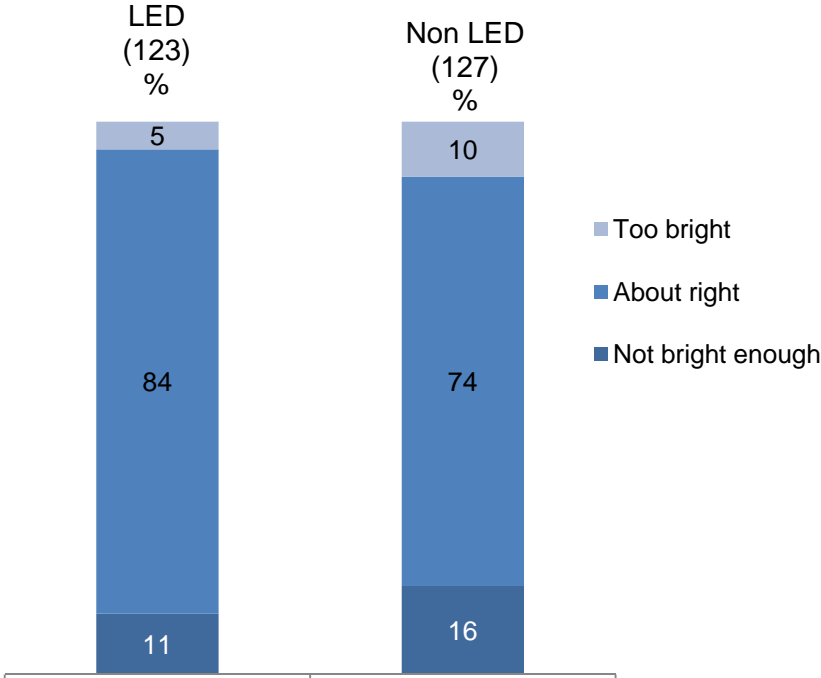
The nine LED customers and three non LED customers who encountered a problem all said that the lighting in the bus needed to be brighter.

### Luminescence of the bus lighting

Most customers said that the level of lighting in the bus in which they were travelling was 'about right'. A larger proportion of customers in LED lit buses said the lighting level was 'about right' than in non LED lit buses (LED: 84%, non LED: 74%).

**Chart 3.10 Opinion of the level of lighting in the bus**

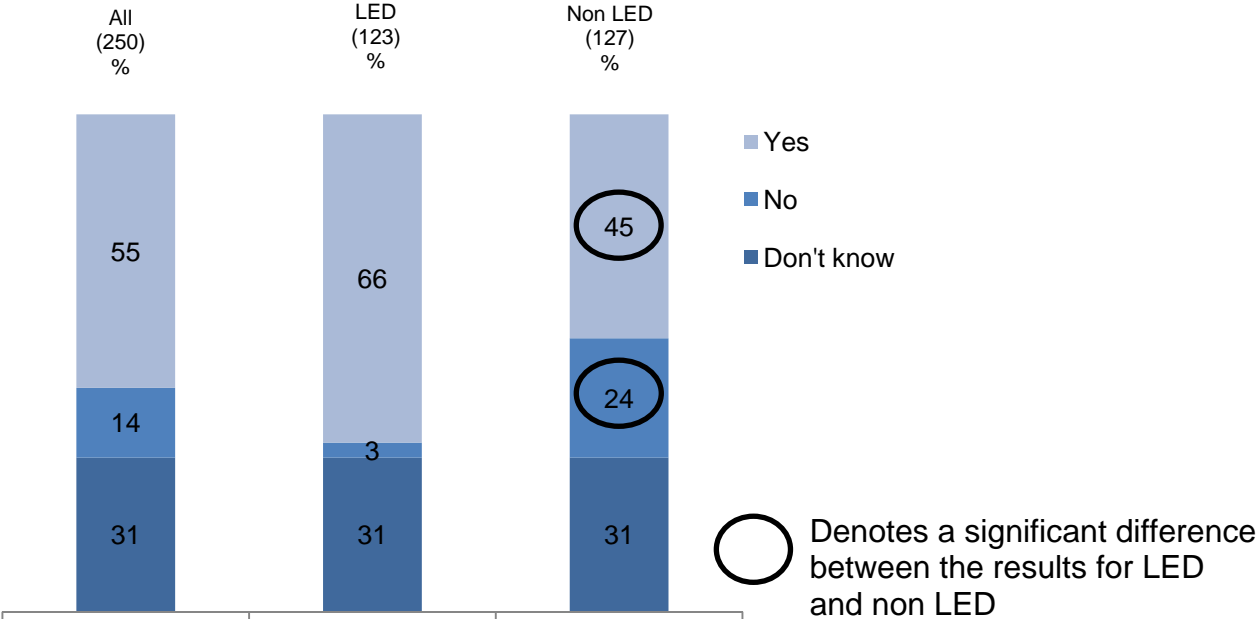
Base: all



### Introducing LED lights to more London bus routes

Over half of all customers (55%) think TfL should introduce LED lighting to more London bus routes. Just over one in ten (14%) do not think the LED lights should be introduced and just under a third (31%) ‘don’t know’.

**Chart 3.11 Whether TfL should introduce LED lighting to more bus routes**  
Base: all

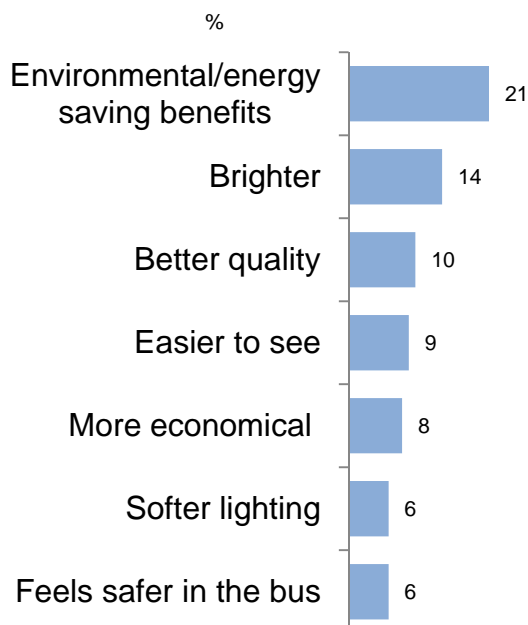


A larger proportion of customers travelling in LED lit buses than in non LED lit buses said that TfL should introduce LED lighting to more bus routes (LED: 66%, non LED: 45%).

Amongst customers who said TfL should introduce LED lighting to more bus routes the key reason mentioned was ‘environmental/energy saving’ (21%).

**Chart 3.12 Reasons why TfL should introduce LED lighting to more London bus routes**

Base: all those who think LED lighting ought to be introduced (173) – multICODES allowed, spontaneous responses



Amongst the 35 respondents who do not think the LED lights should be rolled out onto more London bus routes, the highest number of mentions relates to the lighting on buses currently being 'fine/no need to change'. This was mentioned by 16 people which equates to 6% of the total sample.

**Chart 3.13 Reasons why TfL should not introduce LED lighting on more bus routes**

Base: all (35) – multiple response question

	Number of responses
<b>Fine as it is/no need to change</b>	16
<b>Waste of money</b>	5
<b>Not like LED</b>	3
<b>Not bright enough</b>	1

## 4. Main findings – Bus blinds

### Awareness of changes in bus lighting

Of the 44 people interviewed, 31 (70%) said they had noticed differences between the destination blind of the bus lit with LED compared to that lit with non LED lighting.

When asked what changes they had noticed, 12 of the 31 respondents who noticed a difference between the bus blinds of the two buses said 'LED lighting'. Over half (16) said 'brighter lighting'.

**Table 4.1 Differences noticed between LED and non LED bus blinds**

Base: all who noticed a difference (31) – multiple response question

	Number of responses
<b>Brighter lights</b>	16
<b>LED lighting</b>	12
<b>Whiter lighting</b>	1
<b>New bus</b>	1
<b>Don't know/not stated</b>	1

The 32 respondents who did not mention LED lighting were told that a different type of lighting is being used for the bus blinds serving route 63 and asked whether they considered it to be an improvement to the lighting of bus blinds on other buses.

Most (28) thought the LED lighting on the destination blind was an improvement on the non LED lighting.



## Perception of new lighting

All respondents were asked to compare the non LED lighting of the bus blinds with the LED back lit lighting used on route 63.

The majority (40 out of 44) said LED was better.

**Table 4.2 Comparing non LED with LED lighting of bus blinds – which is better**

Base: all (44)

	Number of responses
<b>LED lighting</b>	40
<b>Non LED lighting</b>	0
<b>Both the same</b>	3
<b>Don't know</b>	1

Respondents were asked to what extent they agreed or disagreed when comparing various aspects of the LED lighting of the destination blinds with that on the other buses that use non LED lighting.

On all aspects, most respondents agreed that LED destination blinds compared favourably against those with non LED lighting.

**Table 4.3 Comparing LED lighting on route 63 destination blinds with those of other buses**

Base: all (44)

Number of responses	Agree strongly	Agree slightly	Neither/nor	Disagree slightly/strongly
<b>Can see the route number/destination more clearly</b>	32	7	4	1
<b>Bus blind is brighter</b>	34	5	5	-
<b>Bus blind is easier to read</b>	33	7	4	-
<b>It is easier to know where the bus is going</b>	31	9	4	-

## Appendix A – research methodology

### Bus lighting

The research was undertaken on two bus routes that carry different lighting:

- Route 63 – LED
- Route 45 – standard

Interviews were carried out face-to-face with passengers. The interviewer moved around the bus to ensure that they captured the views of customers seated/standing in all areas.

Bus customers were interviewed on the bus as they travel during the hours of dusk and night time so they could provide feedback on the lighting as they experienced it.

### Bus blinds

Research focused on the two routes identified above (63 and 45). Interviews were carried out face-to-face with customers waiting at bus stops which serve the two bus routes with both LED blinds and standard blinds so that customers could compare the quality and visibility of each fitting.

The bus stops selected for the study were:

- Fleet Street/City Thameslink (A201)
- Blackfriars/Farringdon Street (A201)

Interviewing took place between 4.30 and 9pm when it was sufficiently dark for lighting to be in use.

No specific quotas were set.

## Appendix B – respondent profiles

**Table 1: Respondent profiles**

	Total LED/non LED (250)	LED (123)	non LED (127)	Bus blinds (44)
<b>Gender</b>				
<b>Male</b>	117 (47%)	64 (52%)	53 (42%)	23
<b>Female</b>	133 (53%)	59 (48%)	74 (58%)	21
<b>Age</b>				
<b>16-24</b>	41 (16%)	9 (7%)	32 (25%)	3
<b>25-34</b>	72 (29%)	34 (28%)	38 (30%)	17
<b>35-44</b>	61 (24%)	36 (29%)	25 (20%)	10
<b>45-54</b>	37 (15%)	20 (16%)	17 (13%)	10
<b>55-64</b>	27 (11%)	17(14%)	10 (8%)	3
<b>65+</b>	11 (4%)	6 (5%)	5 (4%)	1
<b>Ethnicity</b>				
<b>White</b>	135 (54%)	62 (50%)	73 (58%)	27
<b>BAME</b>	115 (46%)	61 (50%)	54 (42%)	17

4% of those interviewed on the bus blinds survey had a long-term physical or mental impairment which limits their daily activities or the work they can do.

10% of those taking part in the LED in bus lighting study had a long-term physical or mental impairment which limits their daily activities or the work they can do.

**Table 2: Whether wear contact lenses/glasses**

	<b>LED (123)</b>	<b>Non LED (127)</b>	<b>Bus blinds (44)</b>
<b>Yes – contact lenses</b>	6 (5%)	9 (7%)	3
<b>Yes – glasses</b>	45 (37%)	42 (33%)	22
<b>No</b>	72 (59%)	76 (60%)	19