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**Michael Browne  
Julian Allen  
Stephen Anderson**

School of Architecture and the Built Environment

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# LOW EMISSION ZONES: THE LIKELY EFFECTS ON THE FREIGHT TRANSPORT SECTOR

*Michael Browne, Julian Allen and Stephen Anderson,  
Transport Studies Group, University of Westminster*

## **Abstract**

London's air quality has improved over recent decades, but is still the worst in the UK. Road transport emissions play an important part in this pollution. A low emission zone (LEZ) would help to accelerate the introduction of cleaner vehicles, and reduce the numbers of older, more polluting vehicles operating in London. The survey work carried out indicates that there is support among goods vehicle operators for an LEZ in London, depending on the precise scheme definition. Operators would generally try to comply with LEZ regulations, with most companies either using technical approaches to ensure that their London vehicle fleet complied with the required emission standard or by redeploying vehicles with the appropriate emission standard from other locations.

**Keywords:** *Freight transport, goods vehicles, emissions, urban, London*

## **Introduction**

The paper is based on work carried out as part of the low emission zone (LEZ) feasibility study for London (Watkiss et al, 2003). The study investigated the feasibility of an LEZ in London. It examined the costs and benefits of the LEZ, what it could achieve and how it could be implemented. Twenty five options for a London LEZ were considered, with different combinations of LEZ area, vehicle types, Euro engine standards, and year of implementation. The analysis assessed each of these 25 options in terms of the emissions and air quality improvements that they would achieve on implementation, and also their potential socio-economic impacts.

The University of Westminster's role in the study was to examine the behavioural adaptation strategies that freight companies might adopt in response to the introduction of such a zone in the London area, as well as the operational and financial impacts of such a scheme. This included investigation of companies' fleet replacement strategies, potential compliance, the likelihood of route diversion, and cost implications of such a scheme for operators. This paper is based on this part of the study.

## **What is a Low Emission zone?**

A 'low emission zone' (LEZ) is a defined area that can only be entered by vehicles meeting certain emissions criteria. An LEZ can lead to major air quality improvements because it capitalises on recent EU legislation for road vehicles, which have set progressively tighter emission limits on new vehicles manufactured over the past decade.

LEZ schemes can take many forms based on the geographical area they cover, the times at which the LEZ is in force, the vehicle emissions standards required for vehicles to enter the zone, the types of vehicles that need to comply with the LEZ, and the implementation and enforcement approaches used (NCSA, 2003). LEZs have already been successfully implemented and run for several years in Scandinavia, and are being widely considered by other UK and European cities. They are seen as one of the main options for helping to improve London's air quality.

The main source of NO<sub>x</sub> and PM<sub>10</sub> emissions in London is road traffic, which is responsible for 58% of total NO<sub>x</sub> and 68% of total PM<sub>10</sub> in Greater London (Watkiss, 2003). An LEZ can be used to ensure cleaner vehicles are being used. Depending on the LEZ scheme implemented, this can include newer conventional vehicles that comply with more stringent emission standards legislation, and also older vehicles that have fitted emission reduction technology or alternatively fuelled vehicles such as those powered by gas or electricity.

Environmental zones (which is another term for low emission zones) have been in place in Sweden since 1996, when they were introduced in the city centres in Stockholm, Gothenburg and Malmo, with the purpose of improving air quality and reducing noise. The environmental zones target all diesel

lorries and buses over 3.5 tonnes. An Environmental Zone was also introduced in Lund in 1999 (Feychting, 2002).

In Stockholm, the environmental zone covers approximately 35km<sup>2</sup> and 30% of the total population of the city (i.e. an area with around 250,000 inhabitants). An assessment of the air quality benefits of the scheme in 2000 (Johansson and Burman, n.d.) found that emissions of NO<sub>x</sub> from heavy vehicles within the zone were reduced by 10% and emissions of particulates by 40%.

### **Studying likely operator behaviour in London**

One of the key issues that needed to be considered for a London LEZ is the likely response by goods vehicle operators. Faced with an LEZ that affects a number of their vehicles, operators have a number of options:

- Fit abatement technology to existing vehicles to comply with the zone;
- Upgrade their vehicles (buy new or used vehicles that comply);
- Divert around the area (for journeys that do not need to start or finish in the zone);
- Risk prosecution and drive non-compliant vehicles into the area;
- Change the vehicles used for specific deliveries, for example switching some London deliveries to smaller vehicles (light goods vehicles) that might not be excluded from the zone, or may not face as stricter emission criteria.

Survey work was carried out to ask goods vehicle operators which of these responses they would adopt. Operators were also questioned about the potential impact of such a scheme on their operating costs and how they would respond to any increased costs. The survey work was carried out through face-to-face and telephone interviews and electronic questionnaires. Fifty-five responses were obtained from companies, of which 35 were interview responses and 20 questionnaire responses.

Respondents were asked questions about the likely effects of an LEZ scheme in the Greater London area that required goods vehicles to meet Euro 2 emissions standards by 2005 and Euro 3 standards by 2010. The survey work was primarily aimed at operators of heavy goods vehicles (i.e. over 3.5 tonnes gross vehicle weight). However, many of these companies also operated fleets of light goods vehicles (i.e. up to 3.5 tonnes gross weight) and, in addition, some large-scale commercial light goods vehicle fleet operators were also included in the survey.

It was recognised that large and small firms might respond differently, and that there might also be differences in the response of public hauliers and own account operators, and companies working in different sectors of the market. The survey work therefore aimed to include as many types of operator as possible within the resources available to gauge the variability in response.

The respondent companies operated a total of approximately 54,000 vehicles, and worked in a wide range of sectors including retailers, manufacturers, construction and waste companies, parcel and letter carriers, third party distribution and logistics firms, and general haulage operators.

### **Survey results**

#### **Operator responses to a London LEZ**

The results indicate that companies would generally try to comply with LEZ regulations if they are introduced. Most companies would either use technical approaches to ensure that their London vehicle fleet complies with the emission standard to be implemented (i.e. by purchasing new vehicles or retrofitting existing ones) or would redeploy vehicles with the appropriate emission standard from other locations. Figure 1 shows respondents' views on their companies' expected behaviour if an LEZ was implemented in London in 2005.

Relatively few respondents expected their company to use other routes outside the LEZ or switch to using vehicles below 3.5 tonnes, even if these were exempt from the LEZ scheme. Also, as may be expected, few respondents indicated that their companies would enter the LEZ with non-compliant vehicles and risk being fined.

When considering how to meet the required standards by using technical approaches (rather than re-routing or vehicle redeployment) few companies felt that they would opt for fitting existing vehicles with Euro 2 standard engines. The re-engining of older vehicles was not considered an economically attractive option. Instead companies would be more likely to choose either modifying existing vehicles with exhaust devices, or buying new Euro 2 vehicles.

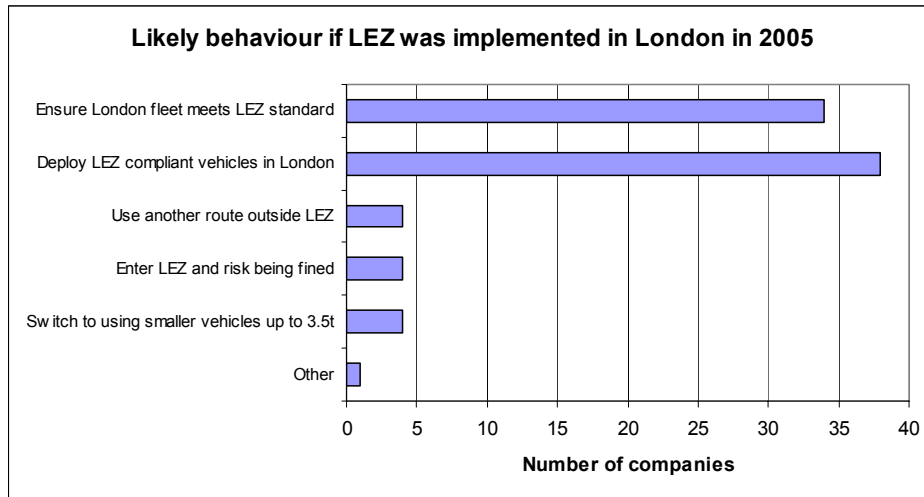


Figure 1 (More than one response allowed per company)

If a London LEZ scheme required Euro 3 emission standard vehicles by 2005, the vast majority of the 47 respondents to this question felt that they would take one of the following three options: modifying existing vehicles (17 respondents), deploying existing vehicles with Euro 3 engines (11 respondents), or buying new vehicles with Euro 3 engines (15 respondents). The other four respondents expected either to relocate or to go out of business as a result of the LEZ policy.

### Redeployment of vehicles

The results presented in the previous section provide a clear indication that older vehicles would be displaced to the companies' operations outside London (i.e. some companies would adopt a non-technical response to the LEZ policy and would operate non-compliant vehicles elsewhere and use compliant vehicles in London). Thirty eight of the 55 companies participating in the survey suggested they would take this action if their vehicles currently used in London were not compliant with an LEZ scheme requiring Euro 2 vehicles by 2005. This could lead to net increases in air pollution from freight transport vehicles elsewhere in the UK as a result of the introduction of a London LEZ.

However, the results indicate that this strategy would only be available to companies operating relatively large commercial vehicles fleets on a national basis. Companies with small fleets (i.e. less than 20 vehicles) would have far less opportunity to redeploy their vehicles in this manner. Also, firms operating their entire fleet in London (which tend to be small companies) would not have the opportunity to redeploy their fleet.

### The costs of an LEZ for companies

The impact of an LEZ policy on operating costs is closely related to the frequency with which companies replace their vehicles, and the stringency of the LEZ policy (i.e. the vehicle engine standard required at a given date). Assuming that the LEZ policy introduced required that an engine standard is met several years after that engine standard first became available, some companies will meet this standard through their existing vehicle replacement strategy. These companies would not therefore incur extra costs as a result of the implementation of an LEZ. However, companies that would not otherwise have upgraded or replaced their vehicle would experience increased costs.

The rate of vehicle replacement varied widely between the companies in the survey. Figures 2 and 3 show the replacement cycles of respondents for vehicles up to and including 3.5 tonnes gross weight, and over 3.5 tonnes gross weight respectively.

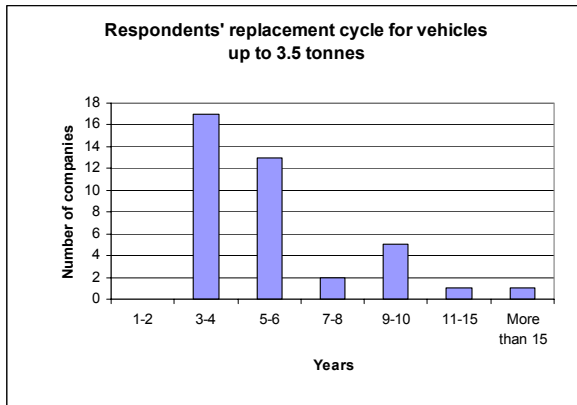


Figure 2 (Answered by 39 respondents)

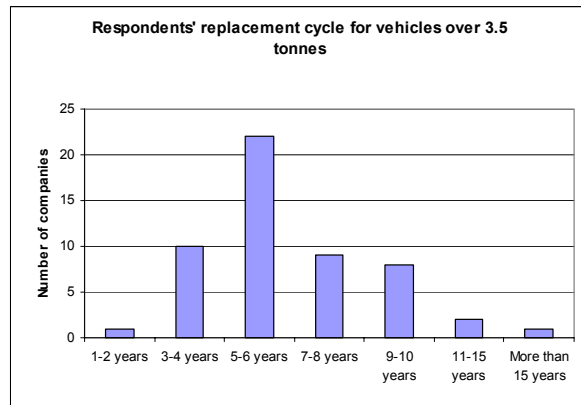


Figure 3 (Answered by 53 respondents)

Companies operating specialist vehicles (such as refuse collection or cement mixer lorries) tend to have longer replacement cycles than companies with non-specialist vehicles. This is related to the higher cost of purchasing specialist vehicles and may also be related to the lower annual mileage that these vehicles tend to perform.

The majority of companies with larger fleets (i.e. more than 20 vehicles) have replacement policies that mean their vehicles are normally renewed at 3-6 year intervals. Some of the smaller companies interviewed also had a 3-6 year replacement cycle, although a higher proportion have longer replacement cycles than companies with larger fleets.

When asked about the likely costs of an LEZ, and the impact on business, a very wide range was reported (between 0.1% and 70% of vehicle operating costs). Smaller companies expressed much concern about the cost implications of the LEZ scheme, especially if it meant that they would have to buy new vehicles.

In general, the larger companies did not consider the cost implications to be such a problem as small companies, as long as there was sufficient time for them to prepare for the introduction of the LEZ. These larger companies were more likely to meet the LEZ requirements through their existing vehicle replacement policy than smaller firms.

In terms of how companies would deal with the cost of complying with the LEZ, 38 respondents said that they would pass cost increases onto customers, while 8 respondents said that they would absorb cost increases. Five smaller companies thought that they might go out of business, as they could not see how they could accommodate what they thought might be substantial extra costs. Respondents raised several other cost issues during the interviews. These included:

- A compulsory LEZ in London is likely to significantly reduce the residual value of commercial vehicles that do not comply with the scheme.
- Many companies opt to have vehicles supplied on a leased basis, which are contracted to operate for a set period. An LEZ could affect the use of these vehicles, and would cause problems in terms of the lease arrangement.
- Some respondents felt that retro-fitting is not a good option for small companies as vehicles have to be off the road while this takes place.
- Many operators foresaw greater problems if LEZs were also introduced in other UK urban areas rather than just in London, as this would reduce the flexibility to move their fleets around and also result in greater cost increases.

### Respondents views on the LEZ concept for London

Respondents were asked for their views on the LEZ concept for London. The results are shown in Figure 4. The vast majority of respondents either "agreed" or "strongly agreed" with the LEZ concept for London and a small minority "disagreed" or "strongly disagreed". It should be noted that

respondents' views are made up of both personal and company views. This is borne out by some respondents who said that from a personal point of view they supported the idea, but from their company perspective it was not necessarily a good thing since it would probably involve additional cost and disruption.

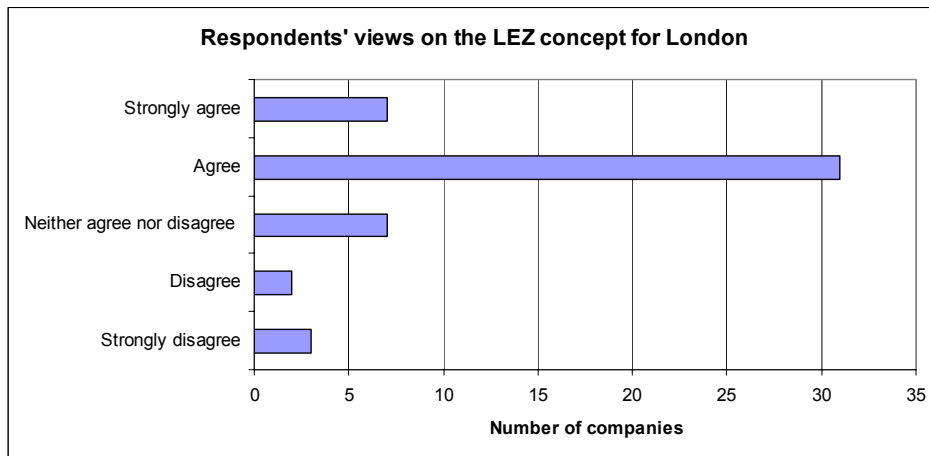


Figure 4 (Answered by 50 respondents)

Respondents were asked which area(s) of London they thought was most suitable for the implementation of the LEZ concept in London. The results are shown in Figure 5 and indicate that central London was by far the most popular location for the LEZ scheme among respondents.

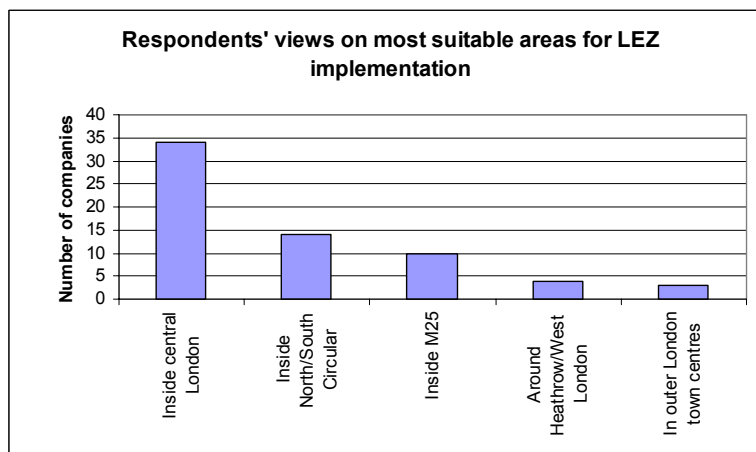


Figure 5 (Answered by 51 respondents)

**Conclusions**

The research indicates that there is widespread general support for an LEZ scheme in London among the operators surveyed. However, that support is dependent on the precise scheme definition. The time lag between new Euro engine standards being introduced at an EU-level and that standard being required by the LEZ scheme will be critical to the level of support for the scheme from operators and its likely cost impact on their operations.

Respondents raised several other important points during interviews about the design, enforcement and administration of an LEZ scheme in London that are worth noting.

Several respondents from firms with large fleets said that it would cause them significant problems if LEZs were also introduced in other UK urban areas that had different compliance arrangements to any London scheme. They were therefore keen to see a common standard for LEZs if such schemes were introduced in several urban areas.

Some respondents expressed a wish that foreign-registered vehicles would be included in any London LEZ scheme, as they felt that these non-UK operators would gain an operating advantage if exempted.

Some large firms with national distribution networks subcontract much of the local delivery work to self-employed owner-drivers. Therefore, although the large firm may be able to meet the LEZ requirements relatively easily given their existing fleet replacement cycle, they may be significantly affected if the sub-contracted owner-drivers they use in London found it difficult to meet the LEZ requirements.

A London LEZ would be likely to improve the health of Londoners by reducing air pollution related impacts, and would also lead to some noise reduction. The economic benefits of these environmental improvements would more than offset any costs of introducing and operating the scheme. However, depending on the stringency of the LEZ standards introduced, the scheme could result in significant cost increases for vehicle operators.

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The full report on the feasibility study (Watkiss et al, 2003) is available at: <http://www.london-lez.org>