



The road to reducing commercial vehicle emissions

Exploring the technical barriers to uptake of
alternatively fuelled commercial vehicles

A study commissioned by Transport for London

Executive Summary

Background and objectives

Transport for London has ambitious targets to meet over the next 10-15 years, both in terms of air quality improvement, and in terms of decarbonisation of transport. Commercial vehicles, including light goods vehicles (LGVs) and heavy goods vehicles (HGVs) account for 16% of transport CO₂ emissions and 17% of transport-related nitrogen oxides in London¹, and TfL is taking specific measures to reduce emissions from this sector.

The introduction of the Ultra Low Emission Zone in 2020 will require all HGVs and diesel LGVs to meet Euro VI / 6 standards (or pay a daily charge) to operate in this zone. This is expected to considerably reduce the NO_x and particulate matter (PM) contributions from commercial vehicles, but further measures will be needed to reduce air pollution to safe levels that achieve compliance with national air quality objectives. LoCITY was launched in 2016 with the objective of further reducing emissions from commercial vehicles, by helping fleets to go beyond the ULEZ requirements. LoCITY will make it easier for operators to invest in low emission commercial vehicles by working to improving the supply of vehicles and infrastructure, identifying locations for refuelling and recharging infrastructure, and developing new procurement standards that will stimulate accelerated uptake of alternatively fuelled vehicles².

Transport for London has commissioned Element Energy to provide a detailed account of the technical (i.e. non-cost related) barriers to wider adoption of alternatively fuelled commercial vehicles, and to identify opportunities for a range of measures that could be introduced to incentivise their increased uptake. The results of this study will inform LoCITY and enable it to develop specific outputs that will stimulate uptake of alternatively fuelled vehicles (AFVs). The recommendations will support LoCITY in taking forward and prioritising measures to address the barriers to uptake of AFVs, and help fleets, manufacturers, and infrastructure providers maximise opportunities to adopt these technologies.

Scope and approach

The alternative energy vectors that have been considered are (bio)methane (including CNG and LNG), electricity, hydrogen and liquefied petroleum gas (LPG). This study has explored the technical barriers to AFV uptake in London, and the opportunities to address these barriers, through:

- An extensive review of previous research;

¹ TfL, *Transport Emissions Roadmap, Cleaner transport for a cleaner London*, September 2014

² i.e. vehicles using fuels other than petrol or diesel, and which provide reduced emissions levels.

- Interviews with 15 fleet operators with vehicles operating in and around London (including HGV and LGV fleets); 6 infrastructure providers (hydrogen, rapid charging points, natural gas, LPG); 7 vehicle manufacturers (covering all the alternative powertrain technologies in scope);
- A workshop with policymakers to test feasibility of suggested actions

Barriers to uptake of alternatively fuelled vehicles in London

The key barriers identified in this study (beyond vehicle cost premiums) are summarised in Figure 1. The arrows show how the barriers for each stakeholder contribute to barriers for the other stakeholders.

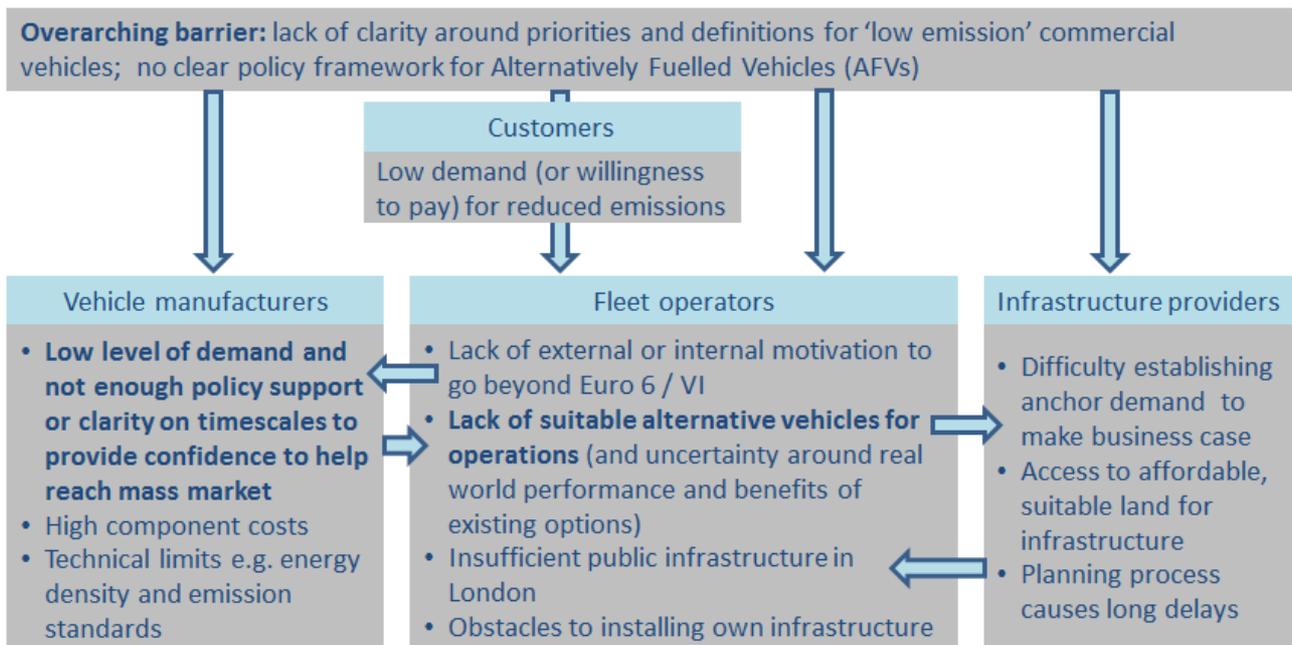


Figure 1 Barriers to uptake of AFVs in London

Major barriers affecting all stakeholders

1. *Lack of clarity around priorities and definitions for “low emission” commercial vehicles*
2. *No clear, long term policy framework for alternatively fuelled commercial vehicles*

These factors impact all stakeholders in the commercial vehicle sector to some extent. Although there have been various funding schemes available to support fleets in adopting AFVs in recent years, there is no clear policy framework for alternatively fuelled commercial vehicles. This reflects the fact that, beyond Euro 6 / VI standards, there is no definition of what constitutes “low-emission” or “ultra-low emission” for commercial vehicles that is consistent at local and national level. There is also no clear national

picture of the priorities and expected timescales for reduction of air quality related pollutants (i.e. NO_x and PM) beyond Euro 6 / VI, or for reduction of carbon emissions from commercial vehicles. To date, uncertainty around the benefits of HGV technologies such as gas have delayed policy commitments of this nature. Evidence emerging from ongoing work supported by DfT and LoCITY (e.g. the DfT-LowCVP HGV Methane Strategy, the LowCVP HGV Accreditation Scheme and the DfT-LowCVP Gas Truck Trials, including the LoCITY van extension) will support policy development and inform possible local measures.

The key barriers for different stakeholder groups are summarised below.

Barriers for fleet operators

1. *Lack of suitable alternatively fuelled vehicles*

This was the most frequently identified barrier by the fleets interviewed in this study. It manifests in three ways:

- No alternative fuel options in some vehicle classes (e.g. refuse collection vehicles above 26t)
- No alternative fuel / low emission options with sufficient range, payload or power capabilities (e.g. van fleets requiring ranges and/or payloads beyond that provided by current electric van offerings; haulage companies requiring higher horse power than that provided for the available gas trucks)
- Limited volumes or long lead times on some options, such as converted or bespoke vehicles and the newest gas or electric truck models.

2. *Insufficient public infrastructure in London*

- An insufficient network of CNG, LNG and hydrogen refuelling stations, and of rapid charging points, was reported to be a significant barrier to the adoption of the corresponding vehicle technologies. Similarly, there is limited information on the locations of LPG stations that can be used by HGVs (i.e. without a low canopy).
- Based on the interviews, fleets already operating CNG or LNG HGVs in the UK are more likely to operate these vehicles outside London, rather than in and around the city. This was partly due to the limited gas infrastructure in and around London, and partly due to the third identified barrier (see below).

3. *Uncertainty around vehicle performance and whole life costs for London applications*

- Operators doing local deliveries or providing utility services in London require considerable flexibility in driving range and payload to account for variations in traffic and terrain in different areas. Also, the effect of congestion means that routes are likely to be slightly slower and more stop-start in London than on routes in other parts of the country, even for long-distance trips starting or ending in the city.
- These factors mean that fleets do not have a high level of confidence that the performance and whole life cost data from manufacturers or from existing case studies

will reflect their London operations, and therefore London may not be the priority area for deployment of AFVs. This is particularly relevant for gas vehicles.

4. *Lack of motivation (internally or from customers) to go beyond Euro VI / 6 for commercial vehicles (especially HGVs) and (for those that are motivated), desire for guidance on which technologies will be supported by local and national government*
 - This relates to the absence of clear definitions and priorities for low emission commercial vehicles, and appropriate national policy incentives. For example, London's Ultra Low Emission Zone (ULEZ) will impose a charge on diesel vehicles not meeting Euro 6 / VI regulations, but there are no proposed measures to support operators going beyond these requirements.

Barriers for vehicle manufacturers

1. *Low demand and not enough policy support or clarity on timescales to provide confidence that technologies will be supported through to mass markets*
 - While many of the manufacturers interviewed have plans to increase their offer of AFVs in the UK (including gas, electric and hydrogen vehicles) the limited nature of current policy incentives and timescales for such incentives was cited multiple times as the primary barrier to faster product development and greater production volumes.
2. *High component costs (particularly for fuel cell, hydrogen tanks and latest battery technologies)*
3. *Current technology limits range and payload (e.g. energy density of batteries to date is not high enough to allow long driving ranges while maintaining payload, hydrogen tanks are only available in certain size and shapes)*

Barriers for infrastructure providers

1. *Difficulty establishing anchor demand to make business case*
 - Partly due to a lack of information on where and when fleets will adopt AFVs. The higher level issue behind this is that, like vehicle manufacturers, infrastructure providers are subject to uncertainty around the long term market development.
2. *Difficulty expanding the limited infrastructure network due to limited availability and higher cost of land in and around London*
3. *Length of planning permission process*

There are also a range of barriers to public and depot infrastructure deployment specific to each fuel type (see page **Error! Bookmark not defined.** for full details).

The lack of a clear policy framework for commercial vehicle emissions (beyond the move to Euro 6 / VI) is a major contributing factor behind the barriers outlined above. Options for

fleets seeking to adopt AFVs are limited by the available vehicle options, which is in turn partly due to a lack of long term policy commitment to financially support the developing market. Uncertainty around how the market will develop also contributes to the challenge of making public infrastructure financially viable, thus perpetuating the “limited infrastructure” barrier for fleets.

Recommendations to accelerate uptake of alternatively fuelled vehicles

High level recommendations for each set of stakeholders to address the barriers to AFV uptake are set out below.

Recommendations for policymakers (see p32 & p35 for full details)

National policymakers should aim to develop a consistent policy framework for commercial vehicle emissions. This process should include the following objectives:

- Define targets and timescales for commercial vehicle emissions reductions going beyond Euro 6 / VI standards;
- Define “low / ultra low emission” in a way that is applicable to a range of technologies;
- Implement policy at national and local level that is consistent and provides financial and non-financial incentives for use of AFVs that go beyond Euro 6 / VI standards.

Recommendations for fleet operators, vehicle manufacturers and infrastructure providers (see p40 for full details)

- Industry stakeholders should engage with policymakers to help define targets, timescales and measures that will support market development and reduce emissions
- Fleet operators and infrastructure providers should work together to align timings and locations of AFV adoption and infrastructure deployment. Where possible, vehicle manufacturers should identify spatial clusters of customers acquiring AFVs to help facilitate this process.
- Fleet operators and infrastructure providers should engage with and participate in trials of innovative technologies to demonstrate real-world applicability and provide evidence of cost and emissions savings
- Information sharing: fleet operators should share information on AFV performance and costs in specific applications; infrastructure providers should communicate fuel pricing; vehicle providers should advertise emissions savings in line with national definitions of low emission and ultra low emission vehicles.

LoCITY has already stimulated progress on information sharing: CNG Fuels began publishing a CNG price index in April 2016, following a discussion on this during an interview for this study.

Recommendations for LoCITY (see p38 for full details)

LoCITY should:

- Continue to act as a link between government and industry, supporting policy development by aggregating industry input and facilitating information exchanges

- Aim to support industry actions highlighted above by facilitating workshops and trials
- Work to provide a centralised resource of trusted, impartial information for fleets and other stakeholders, including: details of and case studies for different vehicle technology options; infrastructure locations; local regulations and incentives (and where possible, notice in advance of measures that support emissions reductions beyond Euro 6 / VI standards), and details of related national policy. This should be primarily applicable to fleets operating within London but also relevant to those operating nationally and as such, should endeavour to include relevant input from local authorities outside London (e.g. on details of Clean Air Zones).

Figure 2 summarises the key recommended actions and suggested responsibilities for three broad themes: policy framework, collaboration and information, and addressing specific barriers for vehicle and infrastructure deployment. Actions are not all expected to be implemented in the short term. For example, defining priorities, targets and timescales for commercial vehicle emissions reduction will take several months, whereas updating national policies and guidance could take a year or more. The figure below provides indicative timescales. Many of the actions identified for LoCITY are already underway or planned, indicating that this programme is well positioned to support the uptake of AFVs.

		Stakeholders should:	Short term	Mid term	Long term
Policy framework	National government	Define priorities, targets and timescales for emissions reduction from commercial vehicles	■		
		Update national policies and Corporate Social Responsibility guidance		■	■
	Local authorities	Update London-specific policies		■	
	Industry	Help policymakers to define targets, timescales, and measures;	■		
Advertise emissions benefits in line with national definitions				■	
Collaboration and information	OLEV LoCITY	Create a centralised website with resources for UK fleets and other stakeholders (for all AFV technologies)	■		
	LoCITY	Facilitate trials and workshops, acting as the link between industry and policymakers		■	
	Industry	Share information on AFV performance and costs in specific applications; communicate fuel pricing	■	■	■
Addressing specific barriers for vehicle and infrastructure deployment	OLEV	Liaise with EU legislators to facilitate public procurement of AFVs			■
	DCLG, national government	Issue alternative refuelling station guidance for planning authorities		■	
	Local authorities	Identify and highlight suitable public / private land for infrastructure	■	■	■
	OLEV LoCITY	Support the creation of a unified map for infrastructure locations and availability			■
	Industry	Seek to align infrastructure deployment with vehicle sales timing and locations; trial innovative vehicle and infrastructure technologies	■	■	■
	Industry	Provide a platform for 3 rd parties to suggest solutions to network connection & upgrade costs incurred by fleets for depot charging / refuelling	■	■	■

Figure 2 Key recommendations to achieve increased AFV uptake in London