LEX AUTOLEASE

FUEL CHOICE & VEHICLE EMISSIONS
WHITE PAPER

INTRODUCTION

Much has been made in the national press recently of levels of air pollution in the UK, and the detrimental impact that motor vehicles, particularly those powered by diesel, have on UK air quality. The phrase "dirty diesel" has been seen frequently in mainstream news headlines. This has given rise to some uncertainty amongst fleet operators and drivers about the future of diesel and petrol vehicles and their place in fleets of tomorrow. This paper seeks to set out the background and facts surrounding the current debate on vehicle emissions and discusses the options available to fleet operators.

A few decades ago fleet operators had quite a simple choice with regards to vehicle fuel types; cars were predominantly petrol, and commercial vehicles diesel. Growing concerns over global warming, and the impact that CO_2 emissions from vehicles was having, led to new EU legislation imposed on manufacturers to reduce greenhouse gas emissions. This led to significant investment in diesel technology by manufacturers which was typically more fuel efficient and hence released lower levels of CO_2 per kilometre. This investment resulted in new technology diesel engines with direct/common rail injection systems and turbo chargers which were more refined, more powerful, quieter and hence more acceptable for cars as well as commercial vehicles.

EU legislation at the time targeted vehicle manufacturers to meet overall sales weighted CO_2 emission targets for their vehicles sold in the EU. At the same time in the UK CO_2 based taxation was introduced for both Vehicle Excise Duty and Company Car Taxation. These two factors helped make diesel the fuel of choice for most company car and commercial vehicle fleets allowing them to reduce both CO_2 emissions and fuel costs. In the past 10 years, average CO_2 emissions have fallen by 27.3%[1] and today's new cars are more than 20% more efficient than the average used car on the road.[1]

Whilst this strategy was successful in reducing CO_2 emissions, the focus in recent months has switched to air quality, and in particular the effect that tailpipe emissions from diesel vehicles, especially particulates and NOx (oxides of nitrogen), have on air quality in urban areas.

This desire to reduce harmful tailpipe emissions is not new. The Euro Emission Standards were introduced in 1992 and were designed to ensure manufacturers reduced harmful tailpipe emissions (not CO_2). Over the years this has been very successful, with legal maximum NOx emissions from all new diesel vehicles reducing by 84%[1] since 2000. The current Euro 6 standard which all new vehicles have to comply with requires NOx emissions from diesel cars to be no higher than 0.08g/km, a reduction of 68%[1] from the Euro 4 requirements of ten years earlier and broadly in line with a petrol car (at 0.06g/km). The issue is however that although these reductions have been significant under the testing regime in real world conditions the NOx and particulates emissions are often higher and can change with ambient temperature and engine load (i.e. they are not a constant as CO_2 is with fuel economy). Technologies such as regenerative particulate traps, and urea systems (Ad Blue) have dramatically reduced NOx emissions although the results in real world driving can vary between different vehicle models. Further developments and tightening up of the vehicle testing regulations for both diesel and petrol engines are predicted to continue to reduce tailpipe emissions over the next few years.

EURO STANDARDS FOR CARS

Euro Standard	Introduction Date		Emissions Limits (g/km)		
	New Approvals	All New Registrations	Petrol NOx	Diesel NOx	Diesel PM
Euro-1	1-Jul-1992	31-Dec-1992	0.97*	0.97*	0.14
Euro-2	1-Jan-1996	1-Jan-1997	0.5*	0.9**	0.1
Euro-3	1-Jan-2000	1-Jan-2001	0.15	0.5	0.05
Euro-4	1-Jan-2005	1-Jan-2006	0.08	0.25	0.025
Euro-5	1-Sep-2009	1-Jan-2011	0.06	0.18	0.005
Euro-6	1-Sep-2014	1-Sep-2015	0.06	0.08	0.0045

* includes NOx and HC
** includes NOx and HC, direct injection

CLEAN AIR ZONES & PROPOSALS

In July 2017 the Government published its ***UK Plan for Tackling Roadside Nitrogen Dioxide Concentrations*** due to a number of UK cities significantly missing air quality targets set by the EU in 2008, and legal challenges over harmful emission levels within certain urban areas. This Plan identified the failings of the Euro Standard testing procedures, and also the localised effect of pollution. As a result it has put Local Authorities in the driving seat for strategies to reduce urban pollution, especially NOx and particulates.

Five UK cities (Southampton, Leeds, Nottingham, Derby and Birmingham) are already set to introduce Clean Air Zones (CAZs) in 2020 after which non compliant vehicles will be charged daily to enter these cities, or may even be excluded from entry. The UK Plan for Tackling Roadside Nitrogen Dioxide Concentrations will see other cities implementing similar schemes as well as improving road layouts, traffic controls, and flow to reduce congestion and stop start driving, also acknowledged for increasing emissions.

London is focusing strongly on its air quality issues implementing a "Toxicity ("T") Charge" zone in October 2017 which will charge all vehicles £10 per day that do not meet Euro 4 emissions standards (most cars registered before 2006) that enter the current London Congestion Charging Zone. The London Mayor is also looking to bring forward the introduction of an Ultra Low Emission Zone from 2020 to 2019 that would require all diesel vehicles that do not meet Euro 6 emission standards (typically those registered before 2015) to pay a charge, and wants to extend the zone to the Greater London Area. Euro 6 is the very latest emission standard so this would affect a large proportion of vehicles in London (in 2019 it would potentially be only 4 year old diesel cars and younger that would not pay the charge). There is a consultation process to go through but it seems fairly clear that future access to major cities could become expensive or restricted for older, more polluting vehicles. A key consideration here is that the focus is on the older vehicles which means many business fleet operators should only be impacted minimally as they typically operate the newest and cleanest vehicles on a typical 3-5 year replacement cycle.

THE RIGHT TECHNOLOGY FOR THE RIGHT APPLICATION

The automotive market is changing rapidly and we are now seeing viable alternatives to petrol and diesel cars, such as pure electric (EV), extended range electric vehicles (E-REV), plug in hybrids (P-HEV) and traditional hybrids. Many manufacturers are bringing out new plug in products in significant numbers in the next few years and some electric vehicles can now travel over 300 miles on a single charge. Despite this we still see a place for traditionally fuelled vehicles in the medium term, especially for commercial vehicles where there are far fewer viable alternatives to diesel at present.

NOx and particulates have the most damaging effect in urban environments where buildings "lock" in the pollutants, so in cities the use of electric or plug in vehicles with the ability to run in pure electric mode with zero tailpipe emissions can significantly help reduce this pollution. On A roads and motorways today's electric vehicles still have range limitations so diesels and hybrids can be more efficient from both a fuel economy and CO_2 perspective, and in these open non-urban areas the particulates can disperse safely and present a much lower health risk. The key here is to utilise the most appropriate technology for the journey patterns and drive cycles (i.e. high or low annual mileage and urban or extra urban driving).

For commercial vehicles, diesel is currently the most widespread fuel type, and there are few viable alternatives. Within the light commercial vehicle category there are now some pure electric vehicles available that are both cost effective and viable for local limited range operations but larger vehicles with high payload and mileage requirements have no real alternative to diesel currently.

There are some conflicts as a move from say, diesel to petrol would reduce tailpipe emissions, however for high mileage drivers would most likely increase CO_2 emissions, fuel consumption and hence cost. The move to electric could reduce fuel costs and emissions, but users may experience operational issues with battery range and recharging infrastructure before these vehicles become mainstream, whilst initial purchase costs are typically higher.

Understanding the transport requirements, where the vehicles are to be used (and in particular charged), the technology available, and the costs associated with the lifetime operation of these vehicles is key to ensuring a company's fleet is cost effective, fit for purpose and environmentally efficient.

CONCLUSION

It is clear that there is a growing focus on the harmful emissions from diesel vehicles. The primary concern is with older diesel vehicles which fleets should look to replace as soon as is feasible. New technology Euro 6 engines have helped reduce emissions significantly but there are still health concerns especially in urban environments. Our view remains that the most suitable vehicle technology should be used in the most appropriate applications i.e.

- For high annual mileages and predominantly motorway trips diesel is still regarded as the fuel of choice. Diesel technology is very efficient at constant higher speeds and on open roads where particulate matter and NOx can disperse easily. Emissions are still an issue, however high fuel economy, low CO_2 and low cost are deemed more important.
- In urban driving environments pure electric provides the best solution from both an emissions perspective and cost, as at low speed/stop-start driving electric vehicles are very efficient, can maximise the use of regenerative braking and are zero emission at point of use. Diesels have the worst environmental and health impact when used in urban areas.
- For mixed driving conditions, i.e. extra urban and urban, other solutions such as plug in hybrids can be used. Plug-in hybrids have the benefit of zero emissions in electric mode when in urban driving conditions, but do not suffer from range anxiety or limitations should longer journeys on motorways etc be required. Care is needed though to ensure that electric use is maximised and petrol use minimised. The cost and environmental efficiencies come from the electric drive mode so a PHEV with a limited range in EV mode will not be suitable for high mileage drivers for example.
- Petrol and full hybrid vehicles can be used in all conditions. They are not as fuel or carbon efficient in higher speed driving as diesels but they emit lower tailpipe emissions. In urban environments hybrids and petrol cars will have a lower environmental impact than diesel.

As business journeys within a company can vary, we would not usually recommend a single fuel company car policy. All fuel types should be considered on their merits based on where and how the vehicles will predominantly be used. We also recommend a whole life cost (WLC) approach in order to consider the purchase price, residual values, maintenance costs and fuel costs in order to assess which is the most cost effective solution, and that these calculations are regularly reviewed as the choice of vehicles or fleet requirements change. Electric vehicles often have a higher purchase price but much lower operating costs. One of the main reasons for diesel's continued popularity is the high real world fuel economy and cost effectiveness of these vehicles, especially at high mileages. But we will be seeing vehicle manufacturers bringing more and more plug in vehicles to market and with increasing electric ranges and reducing battery costs their popularity is sure to grow..

This growth in plug in vehicles will also be fuelled by access requirements to major cities and this may need to be factored into WLC calculations to decide whether an ultra-low emission vehicle (ULEV) may in fact be more cost effective due to CAZ and T Charges. Free access to major cities could soon start to play a significant role in vehicle technology choice, especially for commercial vehicles.

For further information, please contact a member of the Lex Autolease Fleet Consultancy team by emailing fleetconsultancy@lexautolease.co.uk

SOURCES

(1) www.smmt.co.uk UK car emissions testing