SMMT
DRIVING THE
MOTOR INDUSTRY

New Car CO_2 Report 2013

The 12th report

THE SOCIETY OF
MOTOR MANUFACTURERS
AND TRADERS LIMITED

INTRODUCTION

The last five years have seen a dramatic change in the buying behaviour of UK motorists and consequently on the rate of CO_2 emission reduction. Since recession struck the UK in 2008, new car buyers have prioritised fuel efficiency more than ever and vehicle manufacturers have redoubled efforts to enhance efficiency and reduce emissions across all vehicle types.

Achieving 133.1g/km CO_2 in 2012 is testament to vehicle manufacturer R&D and to motorists who have embraced new technologies like never before. In the past five years alone the proportion of alternatively-fuelled vehicles registered has doubled. The industry has also cut 31.8g/km CO_2 off the average car's emissions, a 20% improvement, and we've seen the share of sub-130g/km CO_2 cars (the level targeted by the EU for 2012-2015) go from just 10.6% of new cars in 2007 to more than 55% in 2012.

With the typical new car emitting around 20% less CO_2 than the average car on the road, it's clear that the ongoing refinement of internal combustion engines has been a valuable process. This innovation, combined with increased uptake of diesel engines delivering lower carbon emissions than their petrol counterparts, has propelled the market to where it is today. However, this rate of improvement is not sustainable simply through these incremental changes.

In the short-term industry needs the support of government, incentivising motorists to continue making purchasing decisions that drive down emissions. Retaining the existing VED system is key to maintaining consumer confidence, and adapting it to the arrival of lower carbon vehicles will be important to sustaining government revenues.

In the future there will be wider choice of alternatively-fuelled vehicles across all vehicle types and sizes, and their importance will grow the nearer we get to the EU 95g/km target in 2020. In order to encourage the take up of ultra-low carbon vehicles, appropriate incentivisation from government will be important over the next few years.

Over the coming years it is imperative that targets, taxation and legislation strike a balance between the UK's environmental aspirations and its industrial needs. A strong, industrial strategy is required to maintain the UK's global competitiveness and any changes to environmental legislation and incentives need to be based on a clear understanding of the market and the country's industrial priorities.

This report, and the 11 previous New Car CO_2 Reports, provide a valuable annual snapshot and a detailed year-on-year log of the advances made by industry to meet environmental goals. The UK has played an important role in the worldwide development of ever cleaner technologies and, thanks to our engineering expertise, this is set to continue well into the future. Now, we need all parties to work together to deliver a thriving industry that continues to contribute to the improvement of the environment.

Mike Baunton,
Interim Chief Executive

Full details of the research, findings, data and analysis of the 2013 New Car CO_2 Report can be found online at: www.smmt.co.uk/co2report

SUMMARY – DELIVERING NEW CAR CO_2 REDUCTIONS

- **Average new car CO_2 emissions fall to 133.1g/km in 2012.**
- **Step change in performance post 2007.**
- **New powertrains and alternatively-fuelled cars (AFVs) and shift to diesels helped cut CO_2.**
- **EU New Car CO_2 Regulation sets out challenging future targets.**

UK average new car carbon dioxide (CO_2) emissions fell by 3.6% in 2012 to a new low of 133.1g/km. This was a 26.5% reduction on the 2000 fleet average. There has been a notable step-change in emissions performance since 2008. The average annual rate of reduction between 2000 and 2007 was 1.4%, between 2008 and 2012 it has been 4.3%. The 2012 performance was just below this recent five-year average. The largest annual reduction in CO_2 emissions took place in 2009, when it fell 5.4%, as the Scrappage Incentive Scheme and global recession distorted the market structure.

Table 1 Average UK new car CO_2 emissions and fuel type share

	2000	2007	2011	2012
Average CO_2 g/km	181.0	164.9	138.1	133.1
% change on year before	-2.2%	-1.4%	-4.2%	-3.6%
% change on 2000	-	-8.9%	-23.7%	-26.5%
Diesel share %	14.1%	40.2%	50.6%	50.8%
AFV share %	0.0%	0.7%	1.3%	1.4%
Share <=130g/km %	0.9%	10.6%	46.8%	55.4%

The recent rate of improvement follows across the board reductions from all sales types, segments and fuel types. This reflects manufacturers realising the benefits of long-term investment in lower CO_2 emitting technologies, in part designed to meet the EU New Car CO_2 Regulation which came into effect in 2012. Manufacturers have increased the choice to consumers of lower CO_2 emitting vehicles, across all vehicle types, and this has contributed to record shares of the market in low CO_2 vehicles. For example, 55% of the UK market in 2012 met the EU's 2012-2015 target of 130g/km, up from 10.6% in 2007.

Efficiency and lower running costs have also become more important to consumers, following the recession, rise in fuel prices and changes to CO_2 based motoring taxes, such as the introduction of the first year Vehicle Excise Duty (VED) rate. Manufacturers have competed to capitalise on this.

The market has seen a shift to diesels, which typically emit 10-20% less CO_2 than their petrol equivalents. Diesels took a record 50.8% share of the market in 2012. The introduction of more alternatively-fuelled vehicles (AFVs) helped these vehicle types record a 1.4% share of the market, after a 9.4% rise in volumes in 2012. Registrations of Mini and Supermini segments also rose in 2012, but so did demand for the Dual Purpose and Executive class vehicles, which curbed some of the progress on CO_2 reductions.

A new car emits around one fifth less CO_2 than the average car in use in the UK. The shift in composition of the vehicle parc to new, more efficient vehicles has contributed to total CO_2 emissions from all cars in use having fallen by 14% between 2000 and 2011. However, the decline in overall new car registrations since the recession has slowed the renewal rate of vehicles in the parc.

Each manufacturer must achieve further reductions in their own specific performance to meet the EU New Car CO_2 Regulation. By 2020 new cars in the EU must average 95g/km of CO_2. Achieving this target will require further gains in vehicle efficiency, through progress of traditional internal combustion engined (ICE) vehicles and the introduction of more AFVs. Manufacturers are investing in a range of technologies, including innovative powertrains as part of their effort to enhance market demand and meet the EU Regulations.

To achieve the EU targets it will also be necessary to encourage consumers to adjust their vehicle choices towards even lower emitting vehicles. The CO_2 targets will be challenging to meet, especially if economic growth picks up and curbs consumer appetite for low-emitting vehicles. Encouraging behavioural change will require support from other stakeholders, notably government and fuel suppliers.

Government should also look to ensure that both industrial and environmental ambitions can be met and the UK automotive sector can grow while reducing CO_2 and contributing to economic growth. The sector also faces the challenges of delivering improvements in air quality, increased focus on life-cycle analysis, revisions to the fuel efficiency CO_2 test procedure in an economically uncertain and turbulent global marketplace.

CHALLENGE TO REDUCE CO_2 EMISSIONS

- **EU New Car CO_2 Regulation sets out targets to 2015 and 2020.**
- **UK has legally binding emissions targets, to which road transport must contribute.**
- **Consumers expect to see further technological progress, but will also need to be encouraged to adjust their vehicle choice to deliver emissions reductions.**

The EU New Car CO_2 Regulation (see text box below) sets out the targets for the average new car fleet across Europe to achieve 95g/km by 2020. There is no UK-specific new car CO_2 target. The EU targets are currently the most challenging in the world.

A car's CO_2 figure is derived from the New European Drive Cycle test. This test is designed to represent typical use and provide consumers with a way of comparing the efficiency of different vehicle choices. This test is being reviewed to try to make it closer to real world driving conditions.

The Commission is developing post 2020 EU new car CO_2 targets, but this can only be objectively done in 2017, when the new test cycle is fully defined.

Chart 1 Average UK new car CO_2 emissions and EU New Car CO_2 Regulation targets

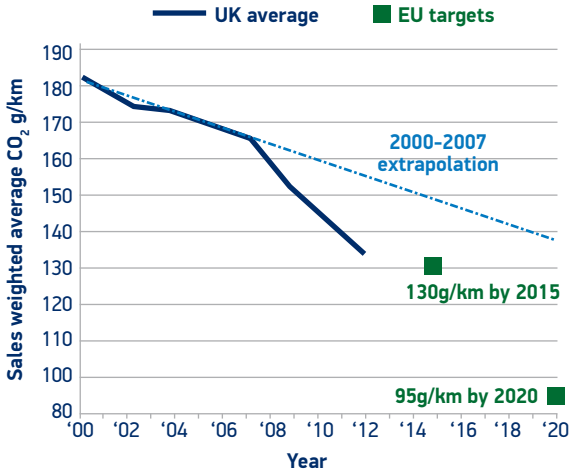


Chart 1 alongside shows the scale of the progress that must be made to deliver the EU targets. It also shows the step change in performance evident after 2007. Progress up to 2007 suggested the UK was on course to have emissions some 15% above the level actually achieved in 2012 (see extrapolation lines). Although Chart 1 suggests the market is on the right trajectory to meet the 2020 EU target, maintaining this rate of reduction will be extremely challenging as the technology involved becomes more difficult and costly to implement.

The UK has its own domestic, legally binding, target of an 80% reduction in greenhouse gases (GHG, of which CO_2 is a key element) by 2050. The Committee on Climate Change (CCC) anticipates cars and vans as having to be decarbonised by 2050 to achieve this target. This in turn would need new cars to be decarbonised by the mid 2030s. To achieve this, the CCC notes pure electric and plug-in hybrid vehicles would need to achieve a 16% share of the new car market by 2020. This represents a significant change from the 0.1% share these vehicle types achieved in 2012. ACEA, the European vehicle manufacturers association, believes the share will be lower, but even its range of a 2-8% uptake (across Europe) in a decade, will mean a step-change in uptake.

To encourage the uptake of electric and ultra-low CO_2 emitting vehicles, the UK government introduced the Plug-In Car Grant in 2010, a 25% - up to £5,000 - incentive for sub-75g/km vehicles, and zero rates on company car tax (CCT), vehicle excise duty (VED) and capital allowances. These measures should remain in place for a suitably long time to encourage market transformation. VED, CCT and fuel duties, as well as local measures such as the London Congestion Charge, will continue to shape the composition of the new car market.

EU New Car CO_2 Regulation

To achieve their 20% reduction in total CO_2 emissions by 2020 from a 1990 base, the EU has adopted the New Car CO_2 Regulation. This sets out to deliver pan-European sales-weighted average new car CO_2 figure of 130g/km by 2015 and 95g/km in 2020. The 2020 target is a 45% reduction from 2007.

Manufacturers each face their own specific target, which includes a weight based element to reflect the different composition of manufacturers' fleets. Manufacturers can use super-credits and eco-innovations to help meet targets and can apply for a derogation if they are a small-volume or niche producer.

If targets are missed then penalties apply – of up to €95 for each gram CO_2 missed multiplied by the EU-wide registration volume. The 2015 target includes a phase-in, so 65% of the manufacturer fleet must meet their target by 2012, 75% by 2013, 85% by 2014 and 100% by 2015.

DEVELOPMENT OF LOWER CO_2 EMITTING VEHICLES

- **Increased choice of lower CO_2 emitting vehicles delivered to the market.**
- **Focus on new powertrains and in recent years new propulsion systems.**

Vehicle manufacturers have invested heavily to bring more efficient, lower CO_2 emitting vehicles to market. This is being undertaken to ensure manufacturers remain competitive, meet consumer expectations and deliver the EU New Car CO_2 Regulation targets.

Manufacturers have all lowered their CO_2 emissions over time and made continuous improvements in vehicle efficiency across all segment and model types. These improvements have come from significant R&D expenditure on technology in both internal combustion engines (ICE - petrol and diesel) and alternative power trains (electric, hybrid, etc), as well as improvements in aerodynamics, weight-saving, energy recovery systems and more efficient components.

Typically, the largest step changes are made when a new drivetrain is introduced, but incremental improvements, for example to engine management systems, can be made at other times.

Improvements in CO_2 performance have had to be achieved alongside measures to reduce emissions of other air pollutants and improve vehicle safety, performance, comfort, refinement and reliability. Some of these attributes are difficult to progress in unison. For example, some safety measures may increase weight or drag, which impact on CO_2 efficiency.

As an example of the continuous improvement in vehicle efficiency, the CO_2 performance of the UK's best selling models over the past decade, the Ford Fiesta and Ford Focus, have seen a 20-25% reduction in emissions of each model variant between 2000 and 2012. Therefore, if buyers did not change their buying habits over time they would still have benefitted from improved environmental performance. If consumers had moved from a petrol to diesel model they would have seen an even larger CO_2 saving. A shift to an alternatively-fuelled vehicle would also have enabled them to move to a lower CO_2 emitting variant.

SMMT's CO_2 database can demonstrate how lower CO_2 emitting vehicles' availability has increased. At a model variant level (eg at engine and specific trim level) the growth in low CO_2 emitting vehicles below certain CO_2 thresholds has increased, see Table 2 for details. For example 2,425 variants (with at least one new registration) emitted 130g/km or less CO_2 in 2012, equivalent to 30% of the market. This was a 30% rise on the number in 2011 and five times the level in 2007.

Table 2 SMMT new car CO_2 database, number of variants by selected CO_2 bands

CO_2/g/km	0	<=75	<=95	<=100	<=130	Over 200	Total
2007	4	4	6	7	482	2,420	7,208
2011	10	12	85	172	1,848	797	7,610
2012	15	19	151	322	2,425	683	7,899

The growth in the number of cars emitting less than 100g/km - in the lowest band for VED, eligible for 100% writing down allowances and exempt from the London Congestion Charge - almost doubled in 2012 from 2011. 82% of these cars were traditional ICE vehicles. The lowest emitting diesel car in 2012 was the Hyundai i20 with emissions of 84g/km. The lowest emitting petrol car was the Fiat 500, with 89g/km CO_2 emissions. Compared with the lowest emitting diesel and petrol car in 2000, these vehicles have cut emissions by 25.7% and 23.7% respectively.

Cars emitting less than 75g/km are alternatively-fuelled vehicles, such as pure electric vehicles (PEVs), plug-in hybrids (PHEVs) and range extender electric vehicles (EREVs). Pure EVs emit zero emissions from the tailpipe. The best selling pure EV in 2012 was the Nissan LEAF. The Toyota Prius Plug-in emits 49g/km of CO_2 and the range extender Vauxhall Ampera and Chevrolet Volt models emit 27g/km of CO_2.

Petrol/electric hybrids can have CO_2 emissions up to 30% below their petrol or diesel equivalents. For example, the Toyota Yaris hybrid emits just 79g/km, compared with 104g/km for the lowest diesel Yaris in 2012. Diesel/electric hybrids appeared for the first time in the UK market in 2012. They have CO_2 emissions up to 20% below their ICE equivalent; the Peugeot 508 hybrid has CO_2 emissions of just 95g/km, compared with 104g/km for the lowest diesel Peugeot 508 variant.

AVERAGE NEW CAR CO_2 EMISSIONS & MARKET TRENDS

- **Average new car CO_2 emissions fell 3.6% in 2012 and by 26.5% since 2000.**
- **New car market grew by 5.3% in 2012, but is still below pre-recession volumes.**
- **Private/fleet purchaser balance shifted since 2007 - little impact on total CO_2 performance.**
- **Move to diesel and alternatively-fuelled vehicles in 2012.**
- **Market shift to small cars (eg Mini and Superminis) and niche vehicles (eg Dual Purpose).**

Average new car CO_2 emissions

New car CO_2 emissions declined 3.6% in 2012 to a new low of 133.1g/km. As shown in Chart 1 and Table 3, below, there was a step change in performance since 2008, with the annual rate of reduction averaging 4.3% since 2008, compared with 1.4% between 2000 and 2007. The 2012 reduction was just below the 2008-2012 average. Table 3 includes the 2020 EU target and the average rate of improvement this will require, for comparative purposes.

Table 3 UK new car average CO_2 performance, 2000-2012. EU target is 2020

	2000-2007	2008-2012	2012	*2020*
Average new car CO_2 g/km	172.2	147.5	133.1	*95*
Annual average % change	-1.4%	-4.3%	-3.6%	*-4.1%*
% change on 2000	-4.8%	-18.5%	-26.5%	*-47.5%*

The performance between 2008 and 2012 was not linear. Emissions fell by 5.4% in 2009 – the largest single annual fall. This corresponded with the recession and the introduction of the Scrappage Incentive Scheme. Cars registered through this scheme (of which three-quarters took place in 2009) had average CO_2 emissions some 10% below the market average and 30% below the vehicles they replaced.

Chart 2 below shows the new car market by VED band, indicating market shift into lower bands. Chart 3 shows how the market has moved since 2000 to sub 130g/km cars. Chart 4 shows how the sub-95g/km market has grown rapidly to almost 50,000 units in 2012, equivalent to 2.3% of the total market.

Chart 2 UK new car market by Vehicle Excise Duty band

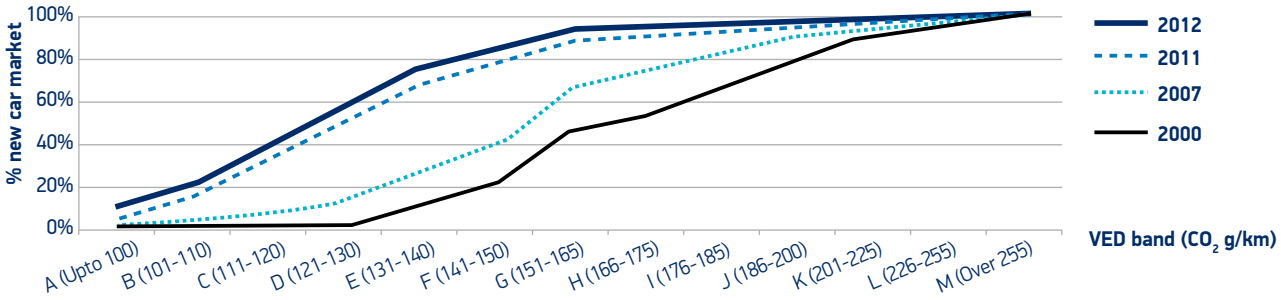


Chart 3 Market by CO_2 bands

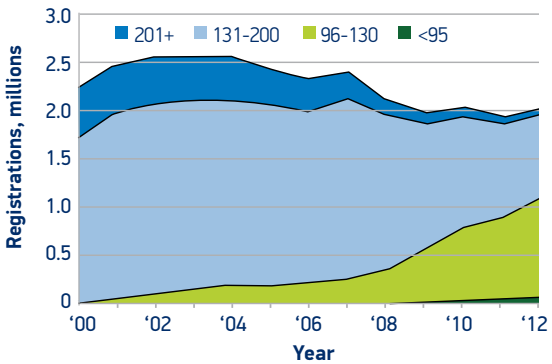
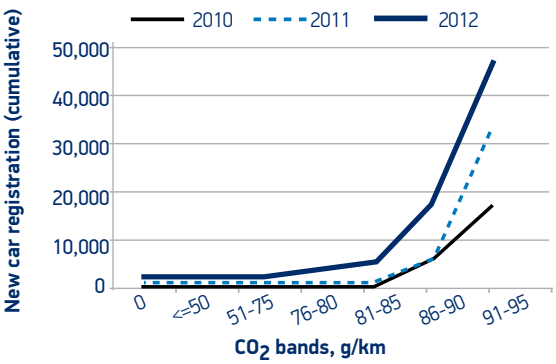


Chart 4 Sub 95g/km market



Trends in UK new car market

The new car market in 2012 rose by 5.3% on 2011 volumes to 2.045 million units. This rise, coupled with falling demand in mainland Europe, contributed to the UK becoming the second largest volume market in Europe, behind Germany and having overtaken France.

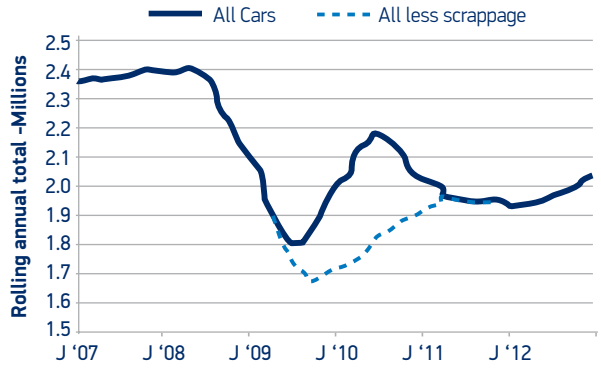
The 2012 new car market remained some 15% or over 400,000 units below the 2007 pre-recession market. The recession resulted in a sharp reduction in new car demand. The full year market has trended around two million units since 2009, although on a rolling 12-month basis the performance has been more volatile and supported in 2009 and 2010 by the Scrappage Incentive Scheme (see Chart 5 opposite). Almost 400,000 cars were registered through the scrappage scheme.

The scrappage scheme and squeezed household incomes helped demand for Mini/Supermini type vehicles rise, and for higher CO_2 emitting vehicles to fall. This led to exceptional rates of reduction in average new car CO_2 emissions in 2008 and 2009.

The overall new car market in 2012 grew after a 12.9% rise in private registrations. Private demand at the end of 2012 was 10% or 120,000 units above levels expected at the start of the year. The growth is likely to reflect market-specific factors, given the wider economic setting. Pent-up demand from past buyer cycles and a switch from used to new activity are likely to have been encouraged by attractive deals and offers from manufacturers, supported by exchange rate movements and the weakness of sales in mainland Europe.

Private buyers tend to buy smaller cars, Supermini and Mini segment vehicles, compared with fleet buyers. These vehicles tend to be petrol engined due to the size, cost and performance characteristics which influence private buyers' decisions. Given private buyers have a lower annual mileage compared with fleet drivers, they are less likely to financially benefit from the higher MPG typically associated with diesel-powered cars.

Chart 5 New car registrations, 2007-2012



With this mix of vehicle type/fuel type performance, the average new car CO_2 emissions of private and fleet buyers are broadly equal. The average CO_2 emissions of cars registered to private buyers was 134.4g/km in 2012, 1.8% above that of fleet buyers' 132.0g/km. The shift to private buyers will therefore have modestly reduced the overall rate of improvement in CO_2 emissions from the market total in 2012. Private average new car CO_2 emissions in 2012 were 23.8% down on 2000 and 3.6% 2011 levels; by comparison the average for fleet buyers was down 26.2% and 3.8% respectively.

The shift in the market between fuel types and segmentation (as defined by SMMT's MVRIS - Motor Vehicle Registration Information System) shows how the market has migrated towards more efficient vehicles. Diesels and AFVs, which are lower CO_2 emitting than equivalent petrol cars, took a record share of the market in 2012. Small cars (Mini and Supermini segments) also saw growth in volumes in 2012, supported by new model activity.

Table 4 Market share of private, diesel, alternatively-fuelled and small cars

Market share	2000	2007	2011	2012
Private	44.7%	43.5%	42.4%	45.5%
Diesel	14.1%	40.2%	50.6%	50.8%
Alternatively-fuelled	0.0%	0.7%	1.3%	1.4%
Mini and Supermini segments	33.3%	32.9%	38.4%	39.5%

Performance by fuel type

Diesel fuelled cars typically have CO_2 emissions some 10-20% lower than an equivalent petrol car, and alternatively-fuelled vehicles (AFVs) would tend to have emissions below either. The change in the market structure towards diesels and more recently to AFVs has helped change the market's CO_2 level.

In 2011, the share of diesel cars rose above that of petrol cars for the first time and in 2012 it achieved a new high of 50.8%, after a 5.8% increase in diesel registrations. Diesel cars accounted for 14.1% of the market in 2000 and 40.2% in 2007. Diesel share has risen due to the increased availability, refinement and development of diesel technology, as well as consumers' preference for enhanced fuel efficiency.

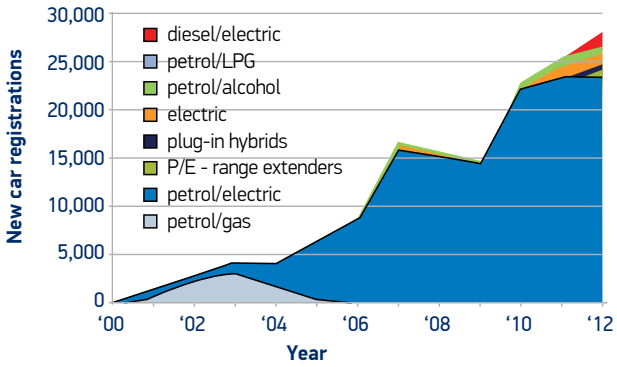
The growth in private demand and in small cars during 2012 limited the growth in the diesel market, given the diesel share in the Supermini segment is below 20% and Mini segment just 1.1%. Diesel uptake in the Dual Purpose, Executive and Upper Medium segments was over 85% in 2012. The different structures of the petrol and diesel markets have led to the registration-weighted average CO_2 emissions of petrol and diesel cars being very similar, see Table 5.

Diesel share is not expected to change significantly in the short-term, due to vehicle and fuel price differences between diesel and petrol, constraints on diesel fuel refining capacity, the market structure and concerns that diesel vehicle costs may rise to comply with tougher future Euro emission standards. The enhanced efficiency of other types of vehicles may also curb further demand for diesel cars.

Table 5
New car CO_2 emissions and registrations by fuel type (AFV = alternatively-fuelled vehicles)

Fuel type	Average CO_2 g/km	CO_2 vs average	2012 registrations	Regs change 2012 vs '11	Regs change 2012 vs '07
Petrol	133.7	0.5%	978,089	4.7%	-31.1%
Diesel	133.3	0.2%	1,038,679	5.8%	7.4%
AFV	101.2	-24.0%	27,841	9.4%	67.3%
• Petrol/electric	98.7	-25.9%	23,616	1.1%	47.9%
• Diesel/electric	104.5	-21.5%	1,284	5036%	-
• Pure electric	0.0	-100.0%	1,262	14.9%	217.9%
• Range Extender	27.0	-79.7%	522	12950%	-
• Plug-in hybrid	49.0	-63.2%	470	15567%	-
• Other	371.3	179.0%	687	-8.4%	152.6%
• Plug-in car grant	48.4	-63.6%	2,237	111.8%	-

Chart 6 Registrations of AFVs



AFV registrations rose by 9.4% in 2012 to a record 27,841 units. They have risen by 67% since 2007, following the introduction of new models and also new types of AFVs.

AFV market share remains low, at 1.4% in 2012, but has improved; from 1.3% in 2011, 0.7% in 2007 and 0.02% in 2000.

Petrol/electric hybrids represented 85% of the 2012 AFV market. It has taken almost a decade to reach volumes of 23,616 units. Toyota/Lexus accounted for 82% of the petrol/electric market in 2012. The new hybrid Toyota Yaris was key to the growth in 2012.

Pure electric car registrations rose 14.9% to 1,262 units in 2012. The Nissan LEAF accounted for 55% of this sector.

2012 also saw the sale of the extended-range electric Vauxhall Ampera and Chevrolet Volt and the Toyota Prius Plug-in, as well as diesel/electric hybrids available in the market for the first time. AFVs are now available in every segment, so meeting the needs of more consumers. AFV demand remains constrained by the relatively high initial purchase price of products, uncertainty over residual values and buyer caution over new technologies (eg range of electric vehicles). These issues will need to be overcome to enable wider market uptake.

Performance by segment type

SMMT's MVRIS divides the market into nine different segments, relating to the vehicle's size, body style and drivetrain. These segments are listed in Table 6, below. This shows segments A - D have average CO_2 emissions below the market average. It also shows how the market has moved from segments C and D (typically family saloons/hatchbacks) towards smaller cars in the Mini and Supermini segments and niche products, like the Dual Purpose segment. In 2012, the market growth in the Mini segment was supported by the new VW up! (and equivalent models from SEAT and Skoda), and the Dual Purpose segment growth followed strong sales of the Range Rover Evoque. The shift to small cars benefitted average new car CO_2 performance, but was in part offset by the market shift to niche segments.

Table 6
New car CO_2 performance by SMMT MVRIS segment, including registration volumes

Segment	2012 CO_2	CO_2 vs average	% ch CO_2 '12 v '07	2012 regs	% ch regs '12 vs '07
A - Mini	105.6	-20.6%	-17.8%	64,866	201.5%
B - Supermini	122.1	-8.3%	-13.9%	743,488	-3.5%
C - Lower medium	126.6	-4.9%	-20.2%	508,262	-29.6%
D - Upper medium	130.5	-2.0%	-22.8%	237,664	-38.5%
E - Executive	144.5	8.5%	-25.0%	117,292	12.3%
F - Luxury	213.4	60.3%	-22.1%	8,088	-38.4%
G - Specialist sports	168.8	26.8%	-24.7%	46,127	-29.8%
H - Dual purpose 4x4	175.4	31.8%	-23.1%	201,102	14.1%
I - MPV	147.7	11.0%	-17.8%	117,720	-18.2%
Total	133.1		-19.3%	2,044,609	-14.9%

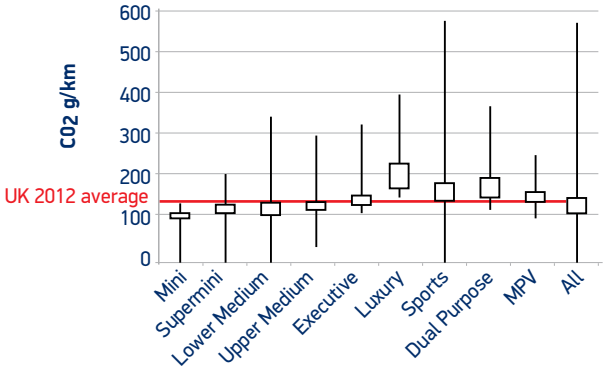
All segments have seen their average CO_2 emissions fall. This follows improvements across the board from new models and variants. The biggest percentage reductions since 2000 have come from segments seeing a switch to diesel powered models, in the Executive and Dual Purpose segments. Similarly fuel switching influenced the 2012 versus 2011 performance. The Upper Medium segment, which saw the largest reduction in average emissions over the year, saw AFVs take a relatively large 2.4% share of the segment. In segments such as Dual Purpose there has also been a downsizing as new models have been introduced. For example, in 1997 the Land Rover Discovery was the best selling Dual Purpose model, in 2000 it was the smaller Freelander and in 2012 the Evoque range. Use of smaller capacity engines in this, and other segments, can also help reduce CO_2 emissions.

CO_2 reductions in the Mini and Supermini segments have been constrained by the lower price and physical size of the models not lending themselves to dieselisation or hybridisation - although such variants are available. These smaller vehicles also tend to cover lower mileages and so their users are less likely to benefit from a shift away from petrol to other fuels which may be more efficient.

The relative size of the Supermini, Lower Medium and Upper Medium segments will mean these are important in reducing overall new car CO_2 emissions.

Chart 7
Distribution of CO_2 within segments

(Box = range where middle 50% of registration volume is



Encouraging a shift to more efficient variants of all models would contribute towards lowering emissions of the fleet.

The range and choice available in each segment ensures vehicles fit for the consumer's individual purpose are available. In every segment low CO_2 emitting choices are available, as seen in Chart 7 (the box highlights where 50% of the market by volume is).

Certain products will be necessary for particular consumer needs, eg requirements for space, load capacity or off-road ability. Typically, some of the higher-emitting models are used less frequently and so do not contribute significantly to overall emissions from cars in use.

UK new car CO_2 performance vs EU

Average new car CO_2 emissions in the UK remain above those in the EU, but have converged by falling at a faster rate since 2000. In 2011, the average across the EU15 was 135.1g/km and in the UK 138.1g/km.

Emissions in both the EU and UK have seen a step change in performance since 2007.

Portugal has the lowest CO_2 emissions in the EU, 11% below the UK's at 122.8g/km, closely followed by Denmark, Holland, Belgium and France. Germany has the highest average CO_2 emissions, over 5% above those in the UK at 145.6g/km.

UK emissions remain above the EU's due to different market structures. Registrations in some of the lowest CO_2 emitting markets are focused in the small car (Mini and Supermini) segments or where diesel cars take an above average market share.

Diesel penetration in the UK was 50.6% in 2011, compared with 56.1% in the EU15. In some countries diesel share is over 80%. Local taxes will influence the type of vehicle registered, such as fuel duty which in the EU is typically 23% lower for diesel than petrol, whilst in the UK the rates are the same.

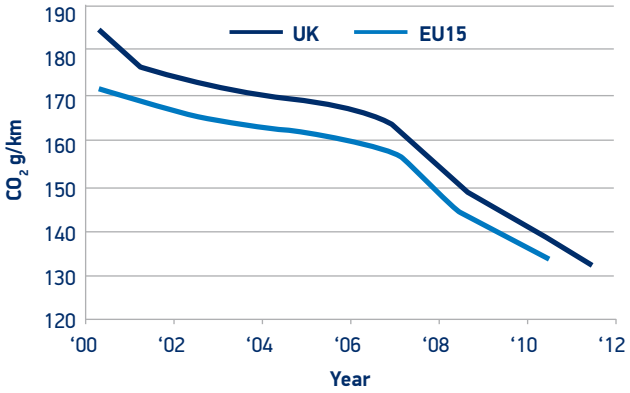
UK manufacturers' CO_2 performance

UK vehicle producers have seen output recover from the recession. However, market conditions, especially for those with a reliance on markets in mainland Europe, remained challenging. UK manufacturers have benefitted from having products that were recently launched and well received by the market, as well as increasingly exporting to markets outside the EU.

Vehicle manufacturers have communicated improved vehicle efficiency strongly, to encourage consumers to replace their vehicles and receive the benefits of lower running costs. Several of the UK manufacturers make best-in-class type products for the market. Toyota in Burnaston was the first manufacturer in Europe producing mainstream hybrid models. The hybrid Auris emits just 87g/km. The 1.4 litre diesel Auris also produces less than 100g/km of CO_2. Vauxhall's Astra, Honda's Civic and the MINI are also available in sub-100g/km variants. The Nissan Qashqai, offering Dual Purpose styling and driving position, is available in a 119g/km variant.

Production of the electric Nissan LEAF range will start in the UK in 2013. The LEAF is to be powered by batteries produced in Sunderland. Other UK manufacturers are developing hybrid models and several low-volume

Chart 8
UK and EU new car CO_2 emissions
(EU data source: EEA)



manufacturers are also developing electric vehicles. The industry in the UK is developing and producing some 2.5 million highly efficient internal combustion engines, with BMW's Hams Hall plant and Ford's plants producing some of the new efficient engines to be fitted into vehicles produced in the UK and also overseas. Ford's acclaimed new three-cyclinder engine was designed at the Dunton Technical Centre. The UK automotive sector also has a strong history in light-weighting with Jaguar Land Rover's use of aluminium and low volume manufacturers, such as Lotus and McLaren, using plastic composites and carbon fibre.

The UK motor industry is already well placed to help lead the development and manufacture of lower CO_2 emitting vehicles. It is imperative that environmental policy and industrial strategy agendas work together to ensure that while the UK moves towards a lower carbon economy and lower CO_2 emitting fleet, it is done by enabling domestic manufacturers to help support this transition. This will lead to job and wealth creation, benefitting the wider UK economy and also potentially support further growth in exporting technologies, UK produced vehicles and components to other markets.

TOTAL CO_2 EMISSIONS – INFLUENCES AND IMPACTS

- **New, lower CO_2 emitting, vehicles helping to reduce overall emissions from cars.**
- **Distance travelled and driver focus on efficiency also contributed to emissions cut.**
- **New cars are some 18% more efficient than the average car in use.**

Table 7
Total CO_2 emissions from all cars, fuel use, parc and distance travelled

	Total CO_2 cars $MtCO_2$	Fuel use Mt	Parc millions	Distance travelled Bn kms
2000	75.00	24.29	27.81	376.0
2007	73.34	23.93	31.11	397.9
2010	65.71	21.51	31.26	385.9
2011	64.52	20.91	31.62	387.4
'11 % change on '10	-1.8%	-2.8%	0.3%	0.4%
'11 % change on '00	-14.0%	-13.9%	12.8%	3.0%

Total CO_2 emissions from all cars in use (the parc) have fallen in every year since 2000, except 2004. Over this period emissions have fallen 14%. Since 2007 emissions have fallen by 10%, showing the step change over the past four years that is also evident in average new car CO_2 emissions.

The reduction in CO_2 emissions in 2011, at 1.8%, was the lowest since 2007 and reflected a rise in distance travelled. Distance travelled is estimated to have fallen in 2012.

Emissions of total CO_2 are related to the amount of fuel consumed. This in turn will depend upon vehicle use, including distance travelled, time of use and road conditions. The way the car is driven is also very influential on its efficiency – with eco-driving courses estimated to be able to improve efficiency by some 20% (Source: EST).

The vehicle used will also influence the emissions from the fleet. Replacement of the fleet with new more efficient vehicles will help drive down emissions.

Chart 9
CO_2 emissions from all cars in use, fuel, parc and distance travelled

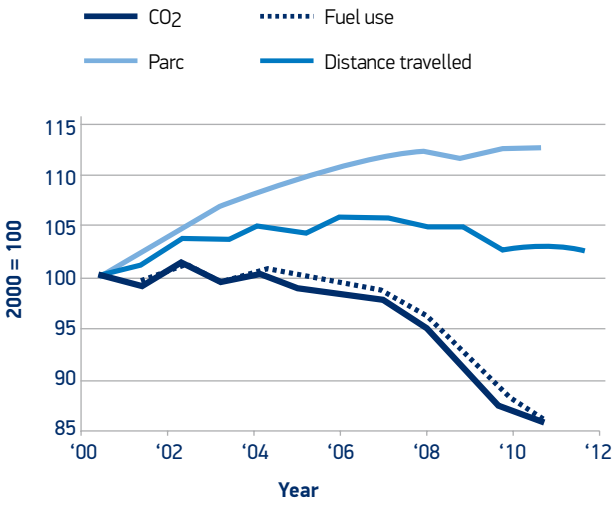
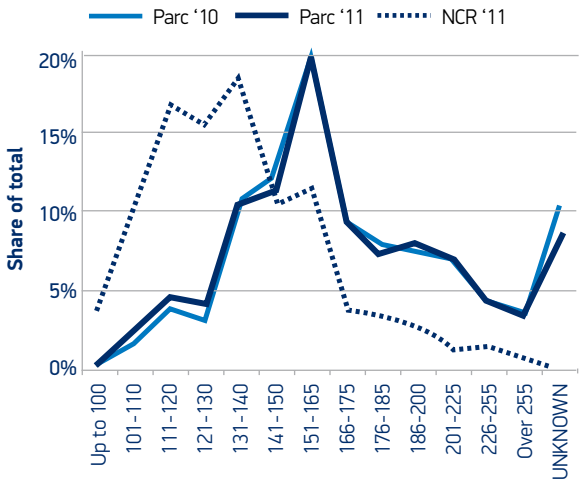


Chart 10
Distribution of parc, by CO_2



SMMT estimates that the average car in use emitted 168.4g/km of CO_2 in 2011. A new car is some 18% more efficient then the average car in use. Given a car typically has a 14 year lifetime before it is scrapped, a new car is some 30% more efficient than one leaving the parc.

In 2011, 11.9% of the car parc emitted less than 130g/km and 0.2% emitted less than 95g/km of CO_2. New cars registered in 2011 accounted for 26.7% and 58.5% of these sections of the parc, compared with a 6.2% share overall.

By 2011, diesel share of the parc had risen to 30.7%, from 12% in 2000. Alternatively-fuelled cars represented 0.4% of the parc, up from 0.2% in 2007.

Increasing the rate of vehicle replacement and enhancing the uptake, in particular of ultra-low emitting vehicles, will help improve the overall parc's CO_2 performance.

The improvement in the efficiency of the new car fleet is helping consumers to mitigate the impact of rising fuel costs and reduce their environmental impact. In turn this is helping to reduce the UK's dependence on imported fossil fuels.

The move to lower CO_2 emitting vehicles is, however, having an impact on government revenue. A more efficient fleet requires less fuel, and so contributes less to the exchequer in fuel duty revenue. The pace of progress in vehicle efficiency has also curbed revenue from CO_2 based taxes such as vehicle excise duty (VED) and company car tax (CCT). This has prompted government to announce plans to raise the CO_2 thresholds on CCT and also review CO_2 thresholds and rates on VED.

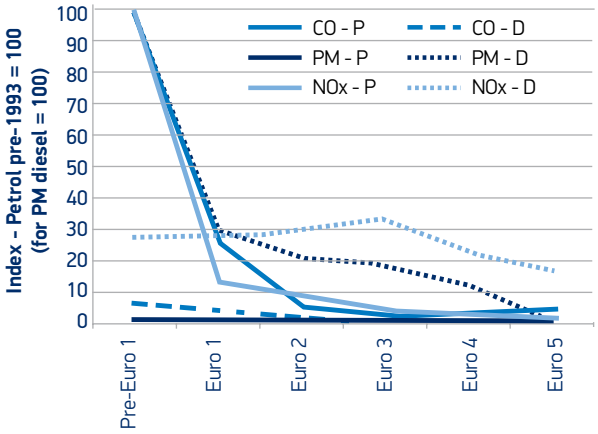
Given the subdued economic setting and need to maintain the replacement cycle in the fleet the automotive sector is concerned over radical changes to vehicle taxation, to which consumers and industry alike will not be able to react sufficiently quickly. Changes announced in the 2012 Budget to the CCT regime, notably on plans to remove the electric vehicle exemption in 2015, had an immediate impact on the market and unsettled demand. Electric vehicle volumes fell between April and August, before recovering and growing strongly towards the end of the year.

The replacement cycle has already slowed, due to the recession. The new car market is some 15% below pre-recession levels and is not expected back above 2007's 2.4 million unit total for several years.

There is the possibility that as the economy does recover, some of the progress in shifting consumer buying habits and driving styles might be reversed. Industry believes further effort should be made to raise awareness, promote the benefits, and ease concerns about ownership and use of innovative technologies, especially alternatively-fuelled vehicles. Measures to promote eco-driving and effective journey planning should also continue to enhance the progress made in reducing emissions from vehicles in use.

Chart 11 Euro emissions standards

(Index: Pre '93 petrol car no catalyst = 100, P = petrol, D = diesel)



Industry is committed to tackling all emissions, not just CO_2. EU Euro standards which regulate exhaust emissions of carbon monoxide (CO), nitrogen oxides (NOx), hydrocarbons (HC) and particulate matter (PM). Euro 5 standards entered into force in January 2011 for all cars first registered and Euro 6 standards come into effect in September 2015.

These standards have already tightened up emission limits considerably (see SMMT's on-line report for details and Chart 11). The Euro 5 standard aligned petrol and diesel PM limits. Department for Transport statistics show that at a UK level, PM10, NOx and CO emissions have fallen between 2000 and 2010 by 24%, 59% and 77% respectively.

Urban air quality targets have become an increasingly significant issue across the EU. With 2013 being the EU's 'Year of Air', there will be an increased focus on improving air quality, for example through the review of the EU thematic strategy and related policies. This could put particular emphasis on emissions associated with diesel vehicles and a discussion on how a shift to alternatively-fuelled vehicles can also offer solutions to air quality, as well as CO_2 emissions.

The shift to new fuels has caused wider interest in the life-cycle emissions of a vehicle and well-to-wheel or tank-to-wheel type analysis. Vehicle manufacturers can influence tank-to-wheel emissions, but not well-to-tank emissions. SMMT supports government plans to decarbonise the electricity supply sector, as this will impact life-cycle emissions associated with plug-in electric and hydrogen fuel-cell electric vehicles.

The industry estimates that 85% of the life-cycle emissions of a conventionally powered car are associated with the in-use phase. The automotive sector has also made significant progress in the energy associated with producing vehicles, as shown in SMMT's annual Sustainability Report - reducing emissions at vehicle assembly plants by over 40% on average over the past decade. At the end of a vehicle's life 85% by weight is reused, recycled or recovered. This is to rise to 95% in 2015.

Shifting consumer preferences, the need for and affordability of cars is also impacting the ways cars are owned and used. Growth in car clubs or mobility packages could be further tailored to help reduce CO_2 emissions. Population and demographic change and the total cost of motoring could also cause a change in the buyer mix, which may influence overall vehicle demand and the product mix, having impact on the CO_2 performance of new cars and the entire vehicle fleet.

HOW TO DELIVER FURTHER PROGRESS ON NEW CAR CO_2 EMISSIONS

- **EC New Car CO_2 Regulation sets new car fleet average target to 2020.**
- **Manufacturers developing lower CO_2 emitting vehicles to meet regulation and consumer demand.**
- **Integrated Approach can support push to lower carbon transport.**

The EU New Car CO_2 Regulation has set the pathway for new cars to deliver 95g/km CO_2 fleet average, across the EU, by 2020. Achieving this target will be very challenging and likely to require a significant change in the type of vehicle bought, either with engine downsizing or a shift in propulsion type (eg to alternative fuels) becoming more widespread.

A pick-up in economic growth or a reduction in fuel prices could undermine progress, if this leads to vehicle efficiency becoming less important to consumers. Conversely, greater consumer confidence and spending power would enable a shift to innovative low CO_2 emitting technologies, which may command a price premium.

Industry remains committed to improving the efficiency of vehicles and is the largest spending sector on R&D in Europe. Improvements continue through reducing vehicle weight, aerodynamic and mechanical drag and more efficient ancillary devices and components.

Achieving the target will depend on improvements in both traditional internal combustion-engined vehicles (petrol and diesel) and the wider availability and uptake of alternatively-fuelled vehicles.

The industry is developing a wide range of alternatively-fuelled vehicles including pure electric, plug-in hybrid, range extender electric vehicles, hydrogen fuel cell electric vehicles and conventional engine/hybrid vehicles. The focus at present is on pure electric and plug-in vehicles, but the future uptake of new models is very difficult to gauge. It will be dependent upon the price, running costs, residual values, fuel costs, consumer acceptance of new technology, comparable performance, range and ease of refuelling compared with traditional petrol and diesel-fuelled cars. Petrol and diesel vehicles will also see further improvements in CO_2 performance, making comparisons constantly variable.

Integrated Approach (IA)

The shape of the new car fleet can be influenced by a number of factors and industry believes the Integrated Approach is the most efficient way of achieving the environmental goals. The IA is about all stakeholders - manufacturers, fuel providers, consumers, regulators and policy makers - moving cohesively towards aims which benefit society as a whole. Manufacturers need to develop and bring to market more efficient vehicles which meet consumer choice and are competitively priced. Consumers need to buy these products and be realistic in their expectations. Regulators and policy makers can provide a long-term and progressive framework to encourage market transformation (including any provision of infrastructure).

Long-term support for emerging ultra-low carbon vehicles

Industry also calls for policy makers to ensure the taxation system and other policies are long-term and support the development of the ultra-low carbon vehicle market. There needs to be an understanding that it will take time for new technologies to become widely accepted by the public, especially during a period of low economic growth and constrained consumer and business spending.

Support for low and ultra-low carbon vehicles is a key area which underpins the UK's efforts to be a lead market and industrial base for new technology. The UK has great potential to excel and develop an international competitive advantage in this field. Focussed work through the Automotive Council ensures that the industry has a co-ordinated strategy for the transition to low carbon technologies.

SMMT seeks confirmation from government on its cross-departmental strategy on low carbon vehicles. The strategy update from the Office for Low Emission Vehicles (OLEV) will be a key opportunity for government to demonstrate that it is pursuing a coordinated industrial, environmental and consumer agenda through the development and support of the low carbon vehicle market in the UK. A refocus of government policy on ultra-low carbon vehicle infrastructure is a priority for SMMT, with the current Plugged-In Places programme due to end soon. SMMT calls for government to look at a national charging network and ensure that its energy policy is fully aligned with the move to low carbon vehicles.

In March 2013 UK H_2 Mobility (a joint business and government group) is expected to report in detail on the potential for hydrogen transport in the UK, production pathways and distribution options, fuel cell electric vehicle supply, customer demand and the hydrogen refuelling station requirements. It will then move on to the business case for hydrogen.

There have been concerns that, given the state of public finances, the government may reduce the support for ultra-low carbon vehicles and push up motoring taxes. The industry recognises that motoring taxes are in place to influence vehicle purchase and use choices, as well as to collect revenue for general government spending. A clear, consistent, fair and long-term approach to motoring taxation and support for ultra-low carbon vehicles is necessary to help the market shift.

The Committee on Climate Change, like industry, has called for the Budget 2012 decision to remove the lower rates of Company Car Tax (CCT) for electric vehicles and ultra-low carbon vehicles to be reversed to help these sections of the market to take root. In 2012 over 80% of EVs were registered by fleets and business. These buyers are very sensitive to taxation measures and following the announcement there was a slowdown in EV registrations.

Industry also believes that there should be no radical reform of VED until at least 2020. In Budget 2012, government said it would review VED over the medium term. Industry believes VED should provide a gradual and predictable pathway encouraging lower emitting vehicles, but while the marketplace is fragile the government should not look to impose a financial burden on the sector nor disruptively revise the CO_2 bands. Industry has also called for the proposed change in 2013 to the Writing Down Allowance (from 160g/km to 130g/km CO_2) to be delayed by a year.

Business and consumers have broadly welcomed measures to postpone fuel duty rises, given the general increases in oil prices and concerns over the inflationary impacts of rising fuel prices on consumers and businesses. The announcement that the 3% penalty on diesels in CCT will be removed in 2016 was welcomed. There needs to be acceptance that measures to achieve tighter Euro standards limit the rate of future fuel efficiency.

Biofuels

Biofuels can also help the vehicle fleet deliver CO_2 savings. The Committee on Climate Change supports a rise to an 8% share of biofuel in the petrol/diesel mix (up from around 3% currently), as long as the fuel is sustainably sourced and does not detract from food supplies. Industry is developing cars capable of running on higher blends.

Government procurement policy

Government can also do more to support the move to lower carbon vehicles, through its own vehicle replacement programme, which legally must consider fuel consumption and emissions, and enhanced information provision to consumers.

Local agenda

Local authorities can influence the type of vehicle bought and used in their area, through measures such as CO_2-based road pricing or parking fees. London's Congestion Charge scheme is arguably the largest and most influential of these types of schemes. At present proposals to allow discounts to cars emitting less than 75g/km of CO_2, rather than 100g/km, are being consulted upon. This would significantly cut the number of eligible vehicles and focus the incentive on ultra-low carbon vehicles.

Car clubs and mobility schemes

Car clubs and mobility solutions are also changing the way people gain access to cars. They enable people to use a car fit for its specific journey purpose, rather than the single vehicle an owner would typically have at their disposal. Such innovative solutions could be designed to cut emissions from the car fleet. Similarly, fleet providers could become more influential in the type of vehicles they make available for users to choose from.

Technical solutions are only as good as the way in which the vehicles are used. There remains significant potential for real world CO_2 savings through ecodriving.

Summary

Industry is working to deliver more fuel efficient and lower CO_2 products. This will help contribute to improving the environmental profile of the vehicle fleet and their use will help deliver savings in total CO_2 emissions. The rate of progress and uptake of new technologies will be critical to achieving these aims. It is likely to require consumers to undertake step changes in their choice of vehicle, either through fuel switching or vehicle type, and also to maintain, drive and use that vehicle appropriately. Support for more significant switching of vehicles is likely to require a push by regulators and policy makers to shape consumer demand, but the pathway should be clearly set out and the development progressive rather than radical.

VANS AND CO_2 EMISSIONS

- **Average new van CO_2 emissions fell 4.9% to 188.7g/km in 2012.**
- **Market shift to larger, higher CO_2 emitting vehicles may limit progress in reducing emissions.**
- **EU targets for vans established and UK support for ultra-low emitting vehicles.**

SMMT has established a database for van (light commercial vehicles, LCVs, to 3.5 tonnes), and in 2012 99.2% of the registrations had a CO_2 value assigned to them by the vehicle manufacturer. The data shows a sales weighted average of 188.7g/km in 2012, down 4.9% from 2011's 198.4g/km. SMMT estimates that the complete market average would change by a small amount, eg 1g/km. SMMT previously estimated the 2009 market average at 209g/km, some 10% above the 2012 figure.

Vans are work tools, bought to do a job. Typically the specification of the vehicle will be determined by market need. Over the last decade there has been a shift towards heavier vans, which offer greater flexibility to the user with greater space and payload capacity. Operators would also be looking to minimise costs, as with any aspect of a business, and so aim to buy the most efficient product available, although reliability and residual values will also be important buyer considerations. As such 99.9% of LCVs are diesel powered.

Table 9 2012 average van CO_2 emissions, by type/weight and registration volumes

Van type (T=tonnes)	Average CO_2 g/km	CO_2 vs market average	2012 registrations*	Regs change 2012 vs '11
Total	188.7	-	239,641	-7.9%
• Light 4X4 utilities	269.1	42.6%	6,279	-6.0%
• Pick-ups	214.3	13.6%	24,555	-6.5%
• Vans to 2T	128.2	-32.1%	40,392	-11.4%
• Vans 2 – 2.5T	145.8	-22.7 %	31,017	-8.5%
• Vans 2.5 – 2.8T	188.9	0.1%	23,034	-17.5%
• Vans 2.8 – 3.499T	195.8	3.8%	51,100	-8.8%
• Vans 3.5T	225.1	19.3%	63,364	-0.9%

*Note this is total market, CO_2 database covers 99.2% of these vehicles.

The number of van registrations fell 7.9% in 2012 on 2011 volumes, to 239,641 units. This was some 30% below the pre-recession peak of 337,736 units in 2007. The van market grew rapidly at the turn of the millennium, as the number of home deliveries and small businesses grew. The rise in distance travelled by vans led to a 23.5% increase in CO_2 emissions from all vans in use between 2000 and 2007. Emissions from the van fleet fell during the recession, but have risen in each of past two years and could rise further as economic growth picks up.

As with cars, there is an EC New LCV CO_2 Regulation which imposes targets for each manufacturer to meet. The EU-wide target is to achieve 175g/km in 2014-17 (with a phase-in, 70% of each manufacturer's fleet will have to comply in 2014, 75% in 2015, 80% in 2016 and 100% from 2017 onwards) and 147g/km in 2020. The 2017 target represents a 14% reduction compared with the 2007 level (203g/km) and the 2020 target is more than a 15% improvement over the 2017 target. Manufacturers face the same fines as with the New Car CO_2 Regulation, and can also use super-credits, eco-innovations and apply for a derogation if registering less 22,000 units in the EU.

The market structure means that with 99% of vans below two tonnes emitting less than 147g/km, 22% of the market is already at the 2020 EU target, and 30% meets the 2014-17 target. However, it is getting the key volume markets - predominantly those over 2.8 tonnes - to improve CO_2 emissions that will be key to meeting the targets.

UK average van CO_2 emissions would need to improve by some 3% per annum to the meet the EU 2020 target, were it applied at the UK level. Achieving this goal will be made tougher given the market orientation towards heavier vans and high dieselisation. A move to smaller vans could risk meaning that more vans need to be used to undertake the same work, with net CO_2 emissions increasing. Alternatively-fuelled vehicles could make an impact in particular fields, such as local deliveries. These products are already on the market, but uptake has been slow. Technology transfer between cars and vans is not easy and progress will be impacted by requirements for range, payload and/or capacity.

To assist the transition to lower carbon vehicles, the UK government made electric vans exempt from the 'van benefit charge' (currently £3,000 per annum) for five years from April 2010 and the purchase of an electric van is also eligible for 100% first-year writing down allowance. In January 2012 the Plug-In Van Grant was introduced, which gives an incentive of 20% of the van's list price, up to £8,000, to qualifying vehicles emitting below 75g/km of CO_2.

Key Facts

- **Average UK new car CO_2 emissions fell to 133.1g/km in 2012, down 3.6% on 2011.**
- **Emissions fallen continuously and were 26.5% below 2000 levels in 2012.**
- **55.4% of the market had CO_2 emissions of 130g/km or below in 2012.**
- **Diesel cars took a record 50.8% share in 2012 and alternatively-fuelled cars a record 1.4%.**
- **Total CO_2 emissions from all cars in use fell 1.8 in 2011 on 2010 and by 14% on 2000.**

	2000	2007	2011	2012
Average new car CO_2 emissions	**181.0g/km**	**164.9g/km**	**138.1g/km**	**133.1g/km**
% change on 2000		-8.9%	-23.7%	-26.5%
Share of market with CO_2 emissions:				
Up to and including 95g/km	0.0%	0.0%	1.7%	2.3%
Up to and including 100g/km	0.0%	0.0%	3.7%	8.2%
Up to and including 130g/km	0.9%	10.6%	46.8%	55.4%
Total new car market	**2,221,647**	**2,404,007**	**1,941,253**	**2,044,609**
Diesel share	14.1%	40.2%	50.6%	50.8%
Alternatively-fuelled car share	0.0%	0.7%	1.3%	1.4%

	2000	2007	2010	2011
Total CO_2 emissions from all cars in use*	**75.0MtCO_2**	**73.34MtCO_2**	**65.7MtCO_2**	**64.5MtCO_2**
Total number of cars in use	27.8Mn	31.1Mn	31.3Mn	31.6Mn
Total distance travelled by cars**	367.8Bn kms	397.9Bn kms	392.4Bn kms	387.4Bn kms

Sources: All data SMMT unless otherwise stated (*DECC and ** DfT)

Key: CO_2 – carbon dioxide, g/km – grammes per kilometre, MtCO_2 – million tonnes of carbon dioxide, Mn – million and Bn kms – billion kilometres

SMMT CO_2 data is collated by SMMT's Motor Vehicle Registration Information System (MVRIS) and links the vehicles' CO_2 levels to the MVRIS new car registration database to create sales weighted figures. The CO_2 data is sourced from manufacturers' own CO_2 figures (as supplied on the vehicle's first registration document) and checked with type approval data from the Vehicle Certification Agency (VCA) to ensure accuracy.

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