SMMT
DRIVING THE
MOTOR INDUSTRY

New Car CO_2 Report 2011

The 10th report

THE SOCIETY OF
MOTOR MANUFACTURERS
AND TRADERS LIMITED

Introduction

European legislation for new cars and, more recently, vans established a challenging set of short and medium term targets for the automotive sector leading to greater investment in research, development and new technology. The new products now coming to market demonstrate the potential for the sustained improvement of conventional powertrains, as well as the contribution hybrid, electric and hydrogen powered vehicles can make. The investment and commitment being shown by industry should reassure government and society more broadly that the objective of low carbon mobility is a shared ambition.

In developing a technology roadmap, the UK motor industry recognises the long-term challenges associated with the transition to ultra-low carbon vehicles. Technology will continue to provide incremental improvements but for future significant achievements to be made, a strategic approach, considering the full breadth of the issue, is needed at a national and international level.

Increasing fuel prices and political instability in key producing nations are adding new dimensions to the well-established environmental drivers for a low carbon future. Energy security and economic efficiency are rising up the political agenda. Escalating energy prices have a direct impact on citizens, making mobility, heating and lighting more expensive, but also adding significant costs to industry and reducing the competitiveness of the UK.

In the current uncertain economic and political conditions there will be those that want the process of de-carbonising transport to move further, faster. This must be a shared task, only sustained and very direct support by governments to incentivise an increased rate of technology development, the roll-out of new infrastructure and greater consumer demand can significantly alter the current pace of change. The establishment of new infrastructure, the de-carbonisation of energy generation, reducing the cost of technology and building consumer awareness, all take time.

The UK motor industry can play a key part in rebalancing the economy, creating high value jobs and leading the global transition to ultra-low carbon vehicles. The work of the Automotive Council, a collaborative partnership between industry and government, is making the UK a more attractive location for automotive investment. It is increasingly important that industrial, energy and environmental policy are closely aligned to secure the progress society needs.

Paul Everitt
Chief Executive

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EXECUTIVE SUMMARY

1. Average new car CO_2 emissions have fallen every year since SMMT began reporting the data in 1997. In 2009 and 2010 the pace of reduction was more than twice the rate averaged over the past decade and reflects the successful deployment of lower CO_2 technologies in the market place, government policy to encourage the take-up of lower CO_2 emitting vehicles and consumer preference shifting towards such vehicles. Average new car CO_2 emissions fell by 3.5% in 2010 and have declined by 20.3% since 2000.

2. These lower CO_2 emitting vehicles are making a real world difference, resulting in total CO_2 emissions from the car fleet (the parc) declining by 7.8% since 2000 and a 2.7% fall in 2009 alone. This improvement comes despite net growth in the number of cars in use and the average distance travelled since 2000.

3. Significant investment into lower CO_2 emitting vehicles has been made and ever more efficient vehicles are being brought to market. The marketplace looks set to see the introduction of highly innovative products over the next few years, with the expected growth of electric, hybrid and other alternatively fuelled vehicles. The industry also has tough environmental legislation to which it must adhere. However, the pace of improvement might be tempered in the short term as the impact of the Scrappage Incentive Scheme and the recession passes. There are also technological limits to the pace with which cars can continue to make further CO_2 improvements, without radical and high cost changes being introduced.

4. Measuring CO_2 levels from new vehicles is done during the type approval process, a pan-European assessment to ensure a vehicle meets all the safety, environmental and technological criteria for sale in the EU. Emissions tests are carried out over a drive-cycle (called the NEDC in Europe), which is typically done at a model derivative level for cars. The SMMT data is sourced from manufacturers' own figures and is cross-referenced with the Vehicle Certification Agency to ensure accuracy. This data is then linked to the SMMT's new car registration database to obtain a sales weighted average new car CO_2 figure. The data can then be analysed in further detail, such as by segment, sales type, and fuel type.

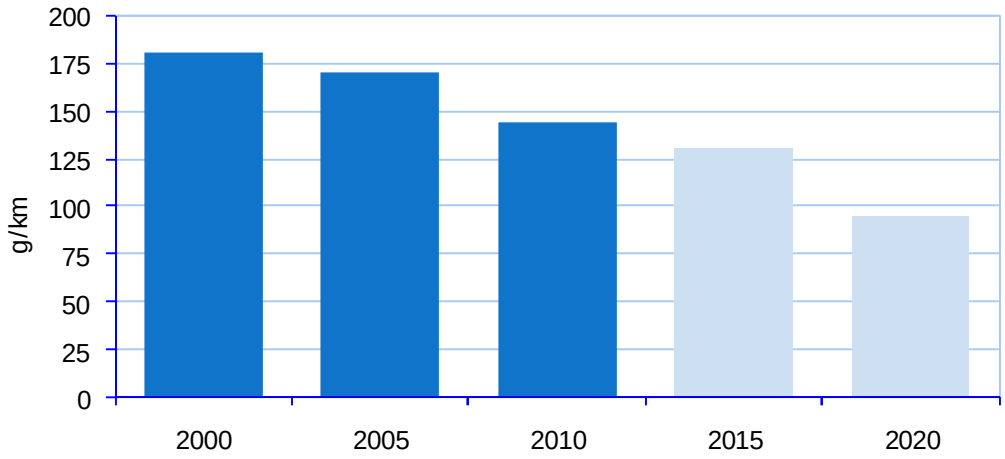
5. The data in 2010 showed a record proportion of cars below certain CO_2 thresholds, eg 140g/km, 130g/km and 100g/km. Diesel cars, which in this report are demonstrated to be some 5%-20% lower CO_2 emitting than their petrol equivalents, took a record market share in 2010. There were also record volumes for advanced propulsion and alternatively fuelled vehicles (AFVs).

6. The industry has made significant progress and more will be done. Collective action by all stakeholders - the automotive industry, fuel suppliers, government and other policy makers, consumers and other stakeholders - will achieve the goal of lower emissions. This integrated approach should enable the transition to a lower carbon transport system more efficiently and ideally at least cost.

7. There are very distinct differences between cars, vans and other commercial vehicles. Manufacturers are looking to reduce CO_2 emissions across all vehicle types.

8. There is significant potential to make further progress in reducing emissions, whilst at the same time making products that consumers desire. However, further reductions in CO_2 emissions are becoming increasingly challenging to achieve, requiring breakthrough technologies that face market barriers. Past progress in the UK and the pan-European new car CO_2 targets are presented in Chart 1, note the targets are EC-wide and not UK specific.

Chart 1 UK average new car CO_2 emissions, and EC-wide regulation targets (Source SMMT/EC)



Chapter One - Progress in reducing new car CO_2 emissions

Average new car CO_2 emissions

- Technological advances deliver reductions in CO_2 emissions across the market.
- Over half the market (56.4% by volume) is now under 140g/km.
- The sub 100g/km market doubled in 2010, as new lower carbon vehicles entered the market.

Table 1 - Average new car CO_2 emissions in the UK. (Source SMMT)

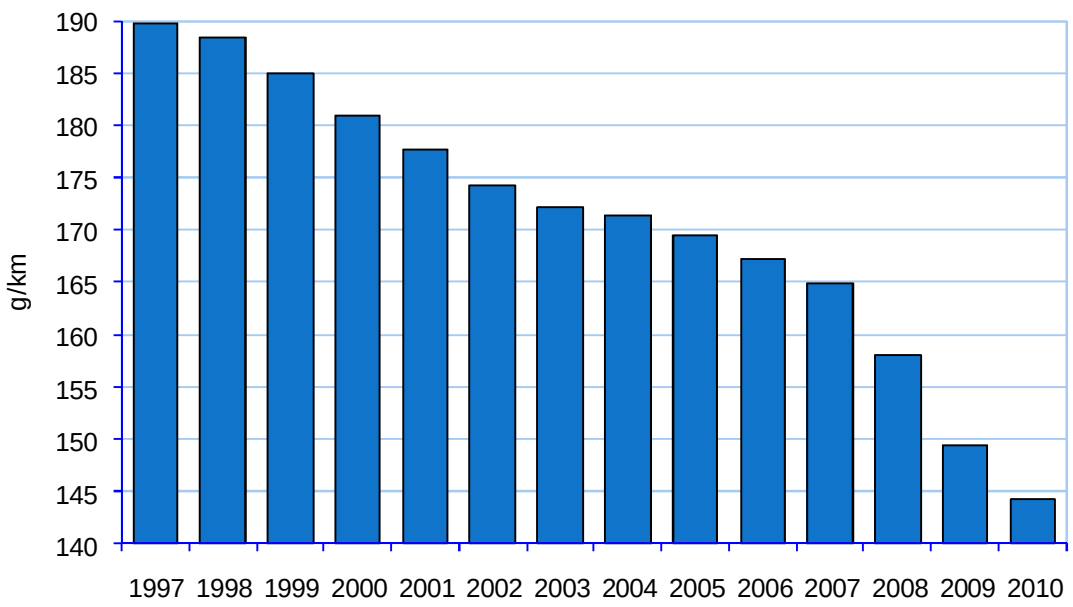
Year	Average CO_2 g/km	y/y % ch	% ch vs 1997	% ch vs 2000
1997	189.8			4.9%
2000	181.0	-2.2%	-4.6%	-
2009	149.5	-5.4%	-21.2%	-17.4%
2010	144.2	-3.5%	-24.0%	-20.3%

9. Continuous improvements have been made in average new car CO_2 emissions since 1997, when SMMT first reported data. The average new car emitted 144.2g/km of CO_2 in 2010, down 24% on 1997 and more than a fifth below the 2000 level. The 2010 figure is 3.5% below the level recorded in 2009, falling by almost twice the rate of reduction evident over the past decade.

10. The continuous improvement in average new car CO_2 emissions follows significant investment in lower CO_2 emitting technologies, government policy and changes in consumer behaviour. This has helped deliver a net reduction in total emissions from all vehicles in use. Official data shows total CO_2 emissions from all cars in use in the UK fell by 2.7% in 2009 compared with 2008, and were 7.8% below the 2000 level.

11. Further progress is expected. The EU new car CO_2 regulation, which comes into effect from 2012, will, alongside market demand and competition, be a driver in delivering lower CO_2 emitting products. The industry is making advances in traditional petrol and diesel engined cars as well as alternatively fuelled vehicles, with hybrids and pure electric cars becoming more mainstream. There is some concern that the pace of reduction might be tempered in the short term due to the effects of the Scrappage Incentive Scheme dissipating and the economy emerging from recession. In the longer term industry, government and other stakeholders will also have to work collectively to encourage the move to alternative power sources, such as electrification or alternative fuels, as the limit of what can be extracted from more traditional technologies in emissions reductions is approached.

Chart 2 UK average new car CO_2 emissions (Source SMMT)



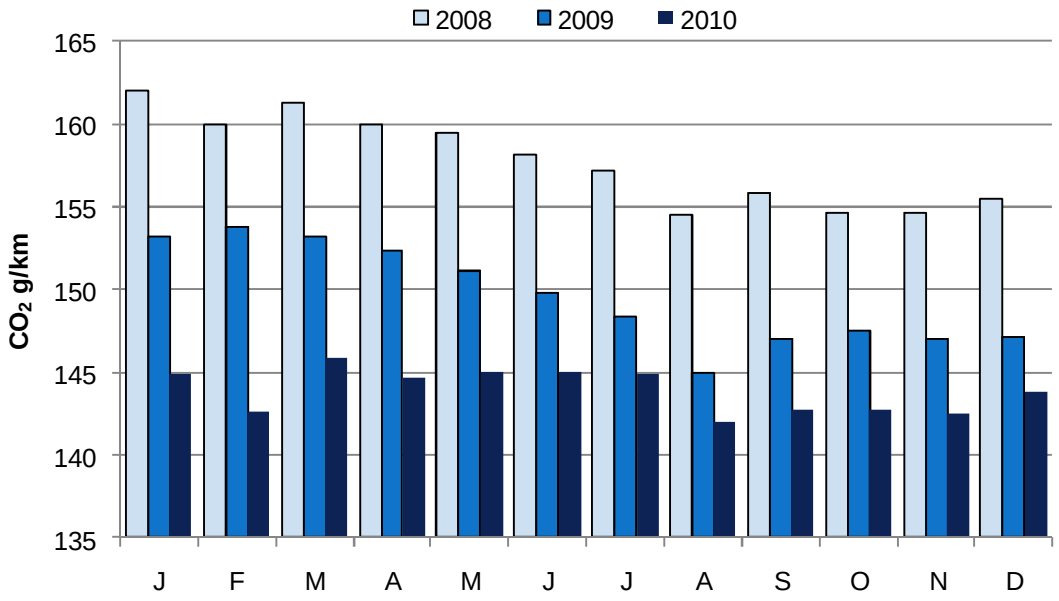
Average new car emissions

12. The recent increase in the pace of emissions reduction reflects the impact of the recession, the Scrappage Incentive Scheme (SIS) and manufacturers bringing to the market very low CO_2 emitting models (eg those under 100g/km) across the full vehicle range. Over the past decade technological gains in the product, CO_2 based taxes, higher fuel duty, greater public awareness of the environmental impact of vehicle use and increased market penetration of diesel models have been key factors for the improved performance.

13. There had been some concern that a shift in the market mix after the SIS ended might cause a slowdown or even reversal in progress made on reducing average new car CO_2 emissions. Monthly data, as shown in Chart 3, shows that this did not happen and that emissions continue to fall, although the pace did moderate marginally in the second half of the year, when the SIS ended and the market shifted away from traditionally lower CO_2 emitting segments, like mini and superminis.

14. 2010 saw diesel cars take a record 46.1% market share. Diesels, on a like-for-like basis, emit some 5%-20% less CO_2 than petrol cars (see page 20). 2010 also saw the introduction of more ultra-low CO_2 emitting vehicles, with a record volume of the market under 100g/km. Advanced propulsion and alternatively fuelled vehicles (AFVs) took a record 1.1% share of the UK market. Manufacturers also launched more, and saw higher registrations, of models designated as low CO_2 emitters, eg VW's Bluemotion and Ford ECOnetic ranges.

Chart 3 UK average new car CO_2 emissions by month, 2008-2010 (Source SMMT)



15. SMMT has published a New Car CO_2 Report since 2001 and over that period emissions have continuously declined. This version, unlike previous editions, reports market change since 2000, rather than 1997. SMMT has collected CO_2 data since 1997, although only 80% of the market then had a CO_2 value, whereas by 2000 it was 100%. 1997 to date data is available upon request (contact CO2@smmt.co.uk).

16. This section of the report looks at the combination of factors which have helped achieve the emissions reduction made over the past decade. It will then highlight how this has helped make a real improvement in overall emissions from the car fleet. This chapter will also look at how the UK's performance compares with that in other European markets.

17. The car is often cited as one of mankind's greatest inventions, allowing great personal mobility. Cars have become an integral part of society enabling the timely movement of people and their possessions. The type of car used for the journey can vary enormously - the car can be a range of sizes, body-shapes, have an array of different technology levels and be of different ages and state of tune. Why a particular vehicle is bought and used will depend on a variety of factors and these in turn will greatly influence the average CO_2 emissions of the new cars bought and the emissions of the entire vehicle fleet. In this report the different influences on emissions from new cars are split into technological progress, economic setting, government policy, consumer information and consumer preference.

Influences on emissions reduction

Technological progress

- Significant investment by industry in lower CO_2 technologies.
- Impressive improvements by petrol and diesel powertrains, which still represent 98% of the market.
- Advanced propulsion and alternatively fuelled vehicles now becoming more mainstream in the market.

18. Car manufacturers are the largest private investors in research and development in Europe, spending some €20 billion each year and a UK total R&D spend of £1.5 billion in 2010. Manufacturers have introduced over 50 CO_2-cutting innovations and the technology used in vehicles is constantly evolving.

19. The industry had a pan-European voluntary commitment to reduce average new car CO_2 emissions to 140g/km by 2008-09. While this target was ultimately not achieved, as several factors moved against the CO_2 goal, including increased weight of vehicles to meet ever more stringent demand on safety features, it did lead to significant progress towards lower CO_2 vehicles in all ranges and segments, as well as the introduction of new technologies such as hybrid and electric vehicles. The fruits of this investment continue to impact positively on the vehicle fleet and are on-going improvements.

20. There is a growing number of low carbon vehicles being introduced to the market, such as sub-100g/km petrol and diesel vehicles as well as electric and plug-in hybrids. The VCA database on models available in the UK (http://www.vcacarfueldata.org.uk/downloads/) showed that 19.4% of the 2010 listings were 140g/km or lower, 10.9% up to 130g/km and 0.5% up to 100g/km. This compares with 3.1%, 1.3% and 0.2% respectively in 2000.

21. Petrol and diesel engines still dominate the marketplace, accounting for over 98% of all new car registrations in 2010. The efficiency of those engines is constantly improving through measures such as improved engine management systems, direct injection systems, common rail injection, variable valves, downsizing of engine capacity, increased use of turbo-charging and/or supercharging and stop-start systems.

22. There has been a considerable shift to diesel cars. Diesels represented 14.1% of the market in 2000, and took a record 46.1% in 2010. Diesels typically emit some 5-20% less CO_2 than petrol engined equivalents (see page 20).

23. The industry has also been developing AFVs, notably petrol-electric hybrids, diesel-electric hybrids, plug-in hybrids and pure electric vehicles. There are a host of other technologies being developed (detailed more in Chapter Three) including biofuels, range extenders and hydrogen vehicles. Whilst some hybrids are now a common sight on our roads, these AFV vehicles are a very small, although growing, proportion of the new car fleet.

24. Vehicles are made up of a huge number of components and it is not just the engine that influences emissions. Vehicle size, weight, aerodynamics and resistance play a role. Manufacturers have looked to overcome these issues by the use of lighter materials, such as lightweight steel or other materials, such as aluminium, carbon fibre, carbon fibre reinforced plastics, plastics, etc. Better design has allowed aerodynamic drag to be lowered. Similarly, resistance between the vehicle and the road has been reduced by introducing low rolling resistance tyres and tyre pressure monitoring systems installed to tell the driver if their tyres fall below optimum pressure. Improved engine and gearbox lubricants have also been developed to lower emissions and are sourced from more sustainable origins. Optimised transmission systems, through the use of more gears and automated gearboxes, have been designed to help the driver change gear more efficiently and make better use of the engine's performance. Use of electronics can also enable better traction, so reducing unnecessary power use.

25. More efficient cooling and heating systems, re-use of engine heat, energy recovery from braking, lower energy lights, and adaptive cruise control have also been tailored to deliver lower emissions.

26. Drivers have also been given more information within the car to help them lower their real-world emissions. Use of smart navigation systems allow them to reach their destination more effectively, without getting lost and wasting fuel. Trip computers, in-use MPG indicators and gear-shift indicators have also been introduced to encourage more efficient driving.

27. In some cases, these technologies have had opposing issues to contend with. For example, the weight of vehicles has increased over the past decade as new safety features or creature comforts have been added. So, for example, air-bags, safety cells, electronic stability controls, and advanced braking systems have helped reduce accidents or enhance passenger safety in the event of an accident. Similarly, increased fitment of air-conditioning, better sound-proofing, more comfortable seats and electronic aids have made cars nicer places to be, but moved against efficiency drives. Finally, cars have generally got larger over time, in part to reflect the physical growth in the average person, but also to accommodate consumer desire for more space.

Influences on emissions reduction

Economic setting — including influence of the Scrappage Incentive Scheme

- Strong economic growth enables consumers to purchase higher emitting vehicles.
- Affluent owners also able to pay more for advanced technologies, like ultra-low carbon vehicles.
- Recession and scrappage schemes helped reduce average new car CO_2 emissions.

28. A strong economic setting helps ensure robust demand for new cars, which will ensure the latest technologies are entering the vehicle fleet. Keeping the replacement cycle short will help speed up the churn rate in the fleet and so ensure real world emissions are kept low by ever more efficient vehicles entering the car fleet and being used. However, it should be noted that with strong economic growth comes a sense of well-being and so the type of vehicle bought may be more powerful or well-specified and so higher CO_2 emitting than may otherwise be the case. At the same time new technologies often come at a price premium and so having affluent buyers is also a benefit to encourage the take-up of low carbon emitting models.

29. Having endured the worst recession for a generation when GDP fell by 4.8% in 2009, the UK economy grew by 1.4% in 2010. This growth was largely led by investment spending and re-stocking, with consumer spending rising a modest 1.2% in 2010. The economy is expected to strengthen in 2011, growing by around 2%, although there are considerable challenges to overcome - public sector spending will be dramatically cut, inflation is high and taxes will increase. This could constrain growth, particularly for consumers.

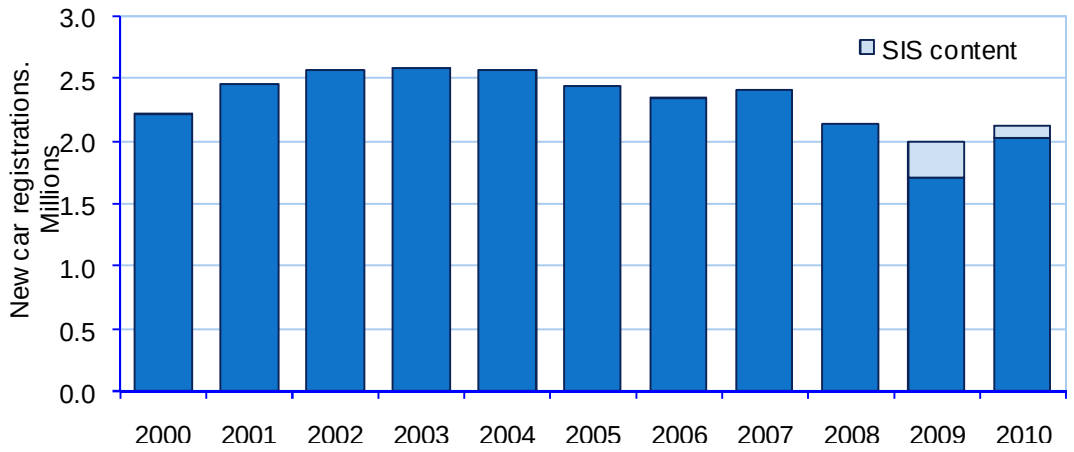
30. The new car market grew strongly at the start of the new millennium, and peaked at 2.579 million units in 2003. It remained above 2.4 million units through to 2007. The new car market then fell sharply in 2008, down 11.3%, and continued to fall in 2009, down a further 6.4%. The market moved from 2.4 million units in 2007 to 1.995 million units in 2009, a loss of over 400,000 units or 17%. The market stabilised in 2010, with modest 1.8% growth to 2.03 million units. The market in 2009 and 2010 was significantly strengthened by the introduction of the Scrappage Incentive Scheme (SIS). SISs were introduced to most European car markets during the recession.

31. The SIS in the UK opened on 18 May 2009 and ran until late March 2010, although manufacturers had up to four months after this date to deliver orders placed through the scheme. A £2,000 incentive was provided for a new car (or van) if a 10-year old vehicle was scrapped, with £1,000 funding coming from government and £1,000 coming from manufacturers. The SIS was introduced to reduce the impact of recession on the automotive sector and sustain employment. The UK scheme was not designed specifically to encourage low CO_2 emitting cars, but did result in lower CO_2 emitting cars being registered.

32. Chart 4 shows the annual market trend, with scrappage volumes identified. In the absence of official government statistics, SMMT collated information from participants in the scheme. In 2009 some 285,000 cars reportedly went through the scheme, 14% of the total and 20.7% of the May to December period. In 2010 over 100,000 cars were registered through the scheme, 5% of the total and 8.6% of the January to July market. Overall some 390,000 cars were reportedly registered through the scheme, 14.9% of the total market over this period.

33. SMMT linked 97% of cars reportedly through the scheme to its new car registration database. These cars had an average CO_2 level of 132.4g/km, 9.6% below the total market's average over the May 2009 to July 2010 period of 146.5g/km. New cars registered via the SIS were estimated to emit 27% less CO_2 than cars scrapped (based on the scrapped car being 1997 vintage and CO_2 emissions being segment weighted).

Chart 4 UK new car registrations 2000 to 2010, including SIS (Source SMMT)



Influences on emissions reduction

Government policy

- Vehicle taxation became CO_2-based in 2001/02.
- Higher fuel prices encourage greater efficiency.
- Advertising and information aimed to encourage take-up and use of efficient vehicles.

34. The government has a number of measures in place to encourage the purchase and use of lower CO_2 emitting vehicles. It uses soft measures such as information and advice, as well as hard measures like taxes, incentives and regulation.

35. Since 2001 vehicle excise duty (VED) has been based on a car's CO_2 emissions and since 2002 company car tax (CCT) has also been CO_2-based. These two measures add a cost to the ownership/use of a higher CO_2 emitting car. Neither of these two taxes relate to actual miles driven. Fuel duty is a tax on the use of a vehicle and adheres to the polluter pays principle. Duty on fuel has increased significantly over the past decade, as too has the underlying price.

36. All three of these taxes are classified as 'environmental' taxes by the government. The VED and CCT tax bands are also a focal point of sales literature and can be used by the salesperson to ensure the vehicle chosen is most suitable for the customer.

37. When VED for new cars first registered since March 2001 became CO_2-based it had four price bands. Over time more bands were added and in 2009 the system moved from a seven to 13 band system. For pre-March 2001 registered cars or for those without a CO_2 emission rating, the VED rate is based on engine size, with cars not over 1549 cc charged £125 in 2010 and cars over 1549cc charged £205.

38 In April 2010 a first year VED rate was also introduced. For cars emitting below 130g/km the first year rate is zero and so for cars emitting CO_2 between 101-130g/km, a tax saving over the standard VED rate is made. For cars emitting over 165g/km the first year rate is above the standard rate. For cars in the 'M' band, over 255g/km, the first year rate at £950 represents an increase of £515 or 118% over the standard rate. Table 2 shows the standard and first year VED rates.

39. Company car tax is a benefit in kind tax paid by those using a company car for private use. Since April 2002 CCT has been based on the car's list price including any accessories and VAT, its CO_2 figure and the fuel type. The standard CO_2 bands start at vehicles sub 135g/km equating to 15% of the car's list price, rising by 1% for each 5g/km CO_2 emitted, up to a maximum of 35%. The starting point (135g/km) has changed over time. In April 2008 a special 10% rate for cars below 120g/km was introduced and in April 2010 a 0% rate was introduced, for five years, for zero emission cars. Diesel cars pay a 3% surcharge, although the rate cannot go above the 35% ceiling. For example a low earner with a car emitting 130g/km and costing £10,000 will face a CCT tax charge of £345. This results from 15% (emissions of 130g/km) of a £10,000 list price multiplied by 23% income tax rate.

Table 2 - VED rates for cars registered from March 2001

VED band	CO_2 g/km	Standard rate*		First year rate
		2009-10	2010-11	2010-11
A	Up to 100	£0	£0	£0
B	101-110	£35	£20	£0
C	111-120	£35	£30	£0
D	121-130	£120	£90	£0
E	131-140	£120	£110	£110
F	141-150	£125	£125	£125
G	151-165	£150	£155	£155
H	166-175	£175	£180	£250
I	176-185	£175	£200	£300
J	186-200	£215	£235	£425
K**	201-225	£215	£245	£550
L	226-255	£405	£425	£750
M	Over 255	£405	£435	£950

** AFV get £10 discount on all bands. ** Cars over 225g/km registered between 01/03/01—23/03/06 in band K*

Influences on emissions reduction

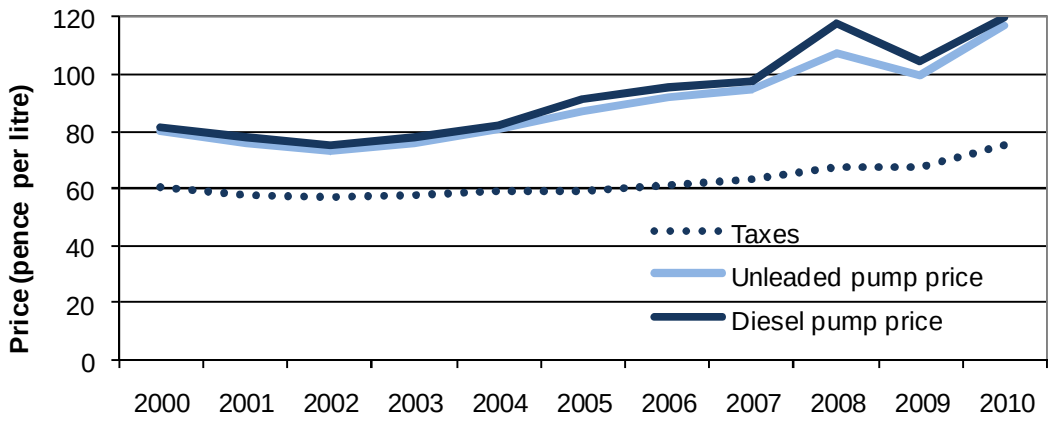
Government policy

40. The amount of fuel used directly relates to the CO_2 emitted by the vehicle. The price of fuel is therefore a significant factor in determining how many miles are driven and so CO_2 released. Higher fuel costs will encourage drivers to consider how necessary their journeys are, or look to switch to more efficient cars.

41. Unleaded petrol prices, on average, rose by 17.4% in 2010 compared with 2009, according to The AA's data (www.TheAA.com), while diesel prices rose by 14.7%. Between 2000 and 2010 fuel prices have risen by 47%. Chart 5 shows fuel duty rates and pump prices since 2000.

42. Fuel duty is a tax on each litre of fuel, paid at the pump by the motorist. VAT is payable on the duty. The duty rates for petrol and diesel fuels are the same in the UK. In 2010 over 60% of the pump price of fuel was tax - fuel duty and VAT. This has fallen from over 75% in 2000 due to the rise in underlying costs of the fuel. Underlying fuel costs (price at the pump minus taxes) rose by 130% between 2000 and 2010, while net taxes rose by just under 20% (17.8% for unleaded petrol and 16.6% for diesel).

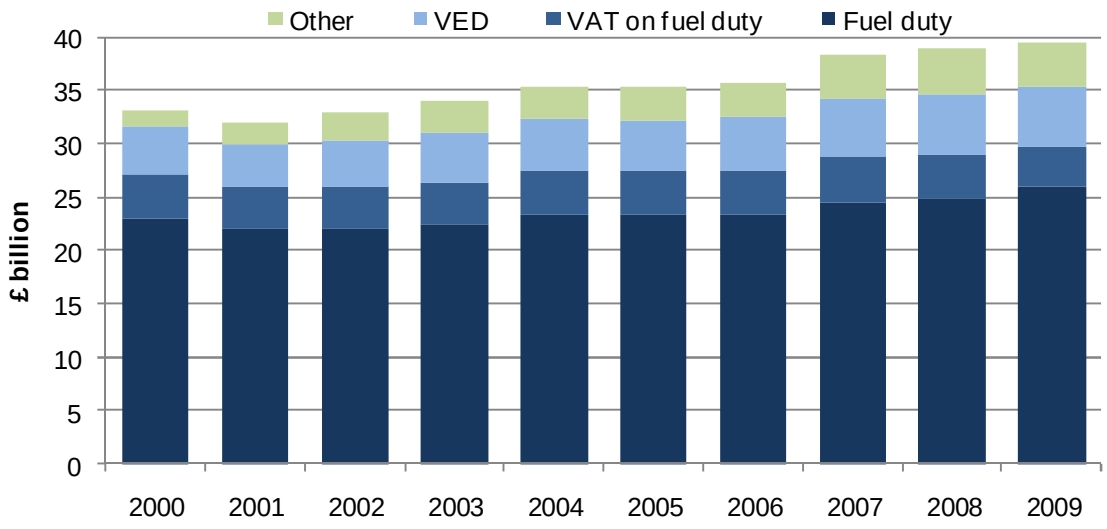
Chart 5 Fuel prices in the UK, pence per litre, including tax (duty and VAT) level (Source The AA)



43. Fuel duty is a significant revenue source for government used to pay for wider public spending, although it is classified as an environmental tax. Fuel duty generated over £27 billion in revenue in 2010, 4.3% more than in 2009. In the financial year (April-March) duty raised £26.197 billion in 2009/10, 6.4% up on the 2008/09 level and 19.5% higher than in 2001/02. Fuel duty represented 6.4% of all HM Revenue and Customs receipts in 2009/10 (total revenue £408.5 billion), close to the 6.8% share taken in 2001/02.

44. Tax from motorists (VED, fuel duty and VAT on fuel duty) represented 90% of all environmental taxes as reported by the government, with fuel duty and the VAT on duty representing 75% of all environmental taxes in 2009.

Chart 6 UK government revenue from environmental taxes (Source ONS)



Influences on emissions reduction

Consumer information

- Government, media and manufacturers offer information and advice on reducing emissions.
- New car fuel efficiency label voluntarily introduced in 2005 and used in 94% of showrooms.
- Eco-branded models increasingly available.

45. Most cars are bought as a compromise - a single vehicle to undertake a variety of tasks. The choice of vehicle will reflect those compromises as well as its price, the buyer's ability and willingness to spend. Price, utility, running costs, performance and reliability have long been established metrics to differentiate vehicles. Fuel consumption data has also long been recorded and MPG (miles per gallon) is a term well understood by consumers. Fuel consumption figures are linked to CO_2 values. CO_2 data for all new cars is also now widely available from websites, automotive magazines and the voluntary colour-coded label displayed on new cars at point of sale.

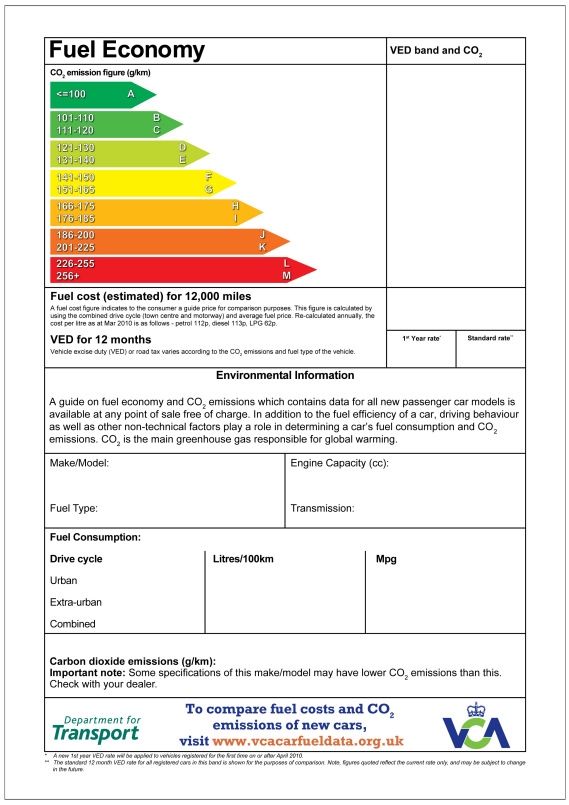
46. The Vehicle Certification Agency (VCA) runs a website to provide CO_2 data—www.vcafueldata.org. The Department for Transport (DfT) runs the Act on CO_2 campaign (see www.direct.gov.uk/actonco2) which details best in class models based on CO_2 emissions to provide consumers with further information.

47. The voluntary new car colour-coded fuel economy label (as shown in Chart 7) is a fridge-style label showing the car's CO_2 value and what VED band it sits in, as well as the typical annual fuel bill based on 12,000 miles driven. Independent surveys by the Low Carbon Vehicle Partnership (LowCVP) show that this label is on display in 94% of dealer showrooms. Industry, alongside LowCVP, VCA and the transport minister also launched a similar colour-coded used car label on 2 November 2009 to cover cars registered since 1 March 2001. In the first full year of the scheme, around a third of a million used-car labels have been displayed by some 1,300 dealers engaged in the scheme.

48. Manufacturers are required by law to display fuel consumption and CO_2 data for their cars in promotional material, including street advertisements, labels, guidebooks, electronic screens, posters and displays. Most manufacturers also display CO_2 ratings for individual models on their websites within just a few clicks of the homepage. The industry has also created best practice guidelines (http://www.smmt.co.uk/downloads/SMMT-Best-Practice-Environmental-Claims.pdf) to ensure emissions performances are effectively and consistently communicated to consumers.

49. Manufacturers are also increasingly signposting customers to low CO_2 emitting products by establishing green brands for their products, such as Mercedes Benz's 'BlueEfficiency' and Volvo's 'DRIVe' badged models. These enable customers particularly interested in buying the lowest CO_2 emitter in a range to find it easily (page 23 shows the uptake of these types of models).

Chart 7 New car fuel economy label (Source DfT)



Influences on emissions reduction

Consumer preference

- Motorists choose the vehicle the most closely matches their own criteria.
- Environmental factors are often low in consumer decision making criteria.
- Running costs and fuel consumption, however, remain important in vehicle choice.

50. Consumers ultimately are the ones who decide which vehicle to buy, although their preference can be influenced by availability, price, marketing and government policies.

51. Registration data shows how the market has transformed over time, but defining why it has changed is the big, and difficult to answer, question.

52. The King Review in 2007 detailed the importance of different factors to consumers when deciding what car to buy - see Table 3. This shows price and size are most important. Running costs and fuel consumption are in the most important category, but road tax (VED, which is CO_2 related), environment, vehicle emissions and alternative fuel are all in the least important category.

Table 3 - Factors influencing car purchase (as in King Review 2007)

Most important	Medium importance	Least important
Vehicle price	Performance	Depreciation
Size	Power	Sales package
Reliability	Image	Personal experience
Comfort	Brand name	Dealership
Safety	Insurance costs	Recommendation
Running costs	Engine size	Road tax
Fuel consumption	Equipment	Environment
Appearance		Vehicle emissions
		Alternative fuel

53. In past reports SMMT has demonstrated there is a direct relationship between fuel consumption and CO_2. MPG is perhaps a more widely recognised metric, but CO_2 g/km is now also well known. A vehicle's running costs would also be dependent upon many of the items listed in the least important category - such as depreciation and tax, as well as fuel consumption.

54. Anecdotal evidence suggests that as the recession hit and cost pressures mounted, consumers became less concerned about environmental criteria, and price and running costs became increasingly important.

55. Many of the measures highlighted earlier under influences on emissions reductions, such as information, are there in a bid to influence consumer behaviour and encourage the take-up and use of lower CO_2 emitting models.

56. Over time, and as shown in Chapter Two (page 25), the market has generally shifted away from traditional family cars either to supermini type cars, such as the Ford Fiesta and Vauxhall Corsa, or into niche products like Multi-Purpose Vehicles (MPVs, such as the Renault Espace or Vauxhall Zafira) and dual purpose segment cars (eg Land Rover). Greater choice and an improved product offering has enabled the take-up of such vehicles. By opting for diesel powered cars consumers have been able to transfer into niche products and at the same time lower their CO_2 emissions.

UK new car CO_2 emissions performance compared with EU15

- Average new car CO_2 emissions in the UK have fallen at a faster rate than the EU average.
- UK made best progress of the big five markets between 2000 and 2009.
- UK figure remains above EU average, reflecting consumer wealth, market structure and diesel share.

57. The European Commission annually publishes average new car CO_2 figures for EU member states on its website - http://ec.europa.eu/environment/air/transport/co2/co2_monitoring.htm. That data reports on the performance between 2000 and 2009.

58. Between 2000 and 2009 average new car CO_2 emissions in the EU fell 15.4% to 145.7g/km. The EU15 figure fell by 5.1% in 2009 on 2008, the fastest rate of decline in any year on record. The improved pace of reduction reflects not only the technological progress by vehicle manufacturers delivering more efficient vehicles to the marketplace - at and around the time of the close of the EU voluntary new car CO_2 agreement, but also as recession across Europe stifled demand for higher emitting products and the Scrappage schemes were introduced which boosted demand for smaller cars.

59. The EC data showed the average new car CO_2 emissions in the UK in 2009 were 149.7g/km. This is 0.1% above the 149.5g/km figure reported by SMMT. The difference is likely to reflect SMMT having a CO_2 figure for every model registered. The UK figure in 2009 was 2.7% higher than the EU average, but had declined by a better than average 19.3% since 2000 after posting larger rates of improvements than the EU averaged in each of the past five years.

60. The UK had the ninth lowest average new car CO_2 emissions in the EU15, down from 14th place in 2000. Among the EU27 the UK had the 11th lowest emissions. In 2009 France had the lowest average new car CO_2 emissions, at 133.5g/km they were 8.4% below the EU average and 10.8% below the UK's figure. France made a 4.7% improvement in average new car CO_2 emissions in 2009, to surpass Portugal, which had taken the top spot in each of the previous two years.

61. Since 2000 only Portugal and Denmark have made greater percentage reductions in average new car CO_2 emissions than the UK. Emissions in the EU's largest market, Germany, fell by 6.6% in 2009, thanks in part to their SIS, which boosted demand for cheaper, lower emitting products. Several of the European SISs included minimum CO_2 emission levels for cars bought through them. Neither the UK nor German schemes had such a requirement, but both posted above average reductions in CO_2 emissions in 2009. Average new car CO_2 emissions in Germany at 154.0g/km in 2009, were 5.7% above the EU average and 2.9% above the UK's.

62. In 2009 four countries - France, Portugal, Italy and Denmark - had average new car CO_2 emissions below the pan-European voluntary target of 140g/km.

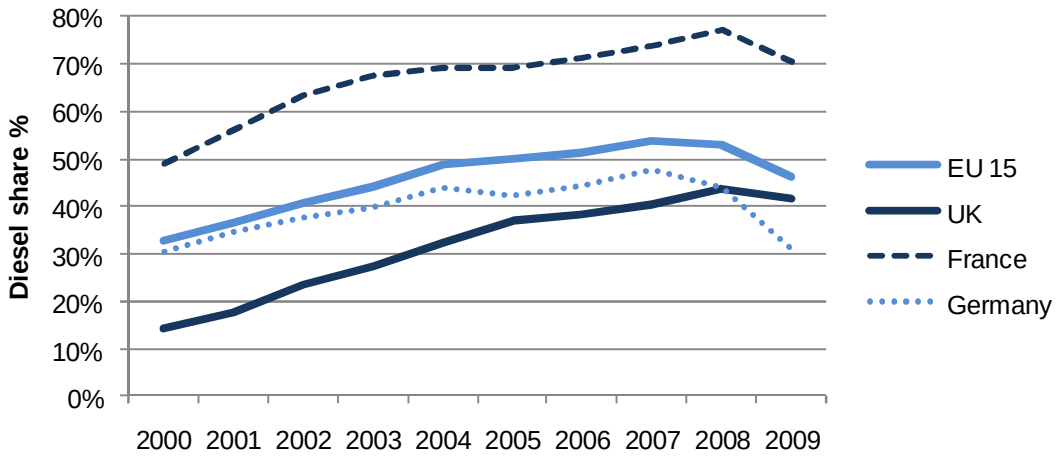
63. Ireland saw the sharpest downturn in average CO_2 emissions of any EU member state in 2009, down 7.9%. This is likely to reflect the impact of recession on the marketplace and a sharp reduction in sales of higher-end products. The Irish new car market declined by 62% in 2009.

Table 4 - Average new car CO_2 emissions in EU15 (g/km) (Source EC)

Year	2009	2008	2000	% ch '09 vs '08	% ch '09 vs '00
Austria	150.2	158.1	168.0	-5.0%	-10.6%
Belgium	142.1	147.8	166.5	-3.9%	-14.7%
Denmark	139.1	146.4	175.7	-5.0%	-20.8%
Finland	157.0	162.9	181.0	-3.6%	-13.2%
France	133.5	140.1	163.6	-4.7%	-18.4%
Germany	154.0	164.8	182.0	-6.6%	-15.4%
Greece	157.4	160.8	180.3	-2.1%	-12.7%
Ireland	144.4	156.8	161.3	-7.9%	-10.5%
Italy	136.3	144.7	155.1	-5.8%	-12.1%
Luxembourg	152.5	159.5	176.7	-4.4%	-13.7%
Netherlands	146.9	156.7	174.2	-6.3%	-15.7%
Portugal	133.8	138.2	169.2	-3.2%	-20.9%
Spain	148.2	148.2	159.2	0.0%	-6.9%
Sweden	164.5	173.9	200.0	-5.4%	-17.8%
UK	149.7	158.2	185.4	-5.4%	-19.3%
Total	**145.7**	**153.6**	**172.2**	**-5.1%**	**-15.4%**

UK new car CO_2 emissions performance compared with EU15

Chart 8 Diesel penetration of new car markets in the EU, 2000-2009 (Source ACEA)

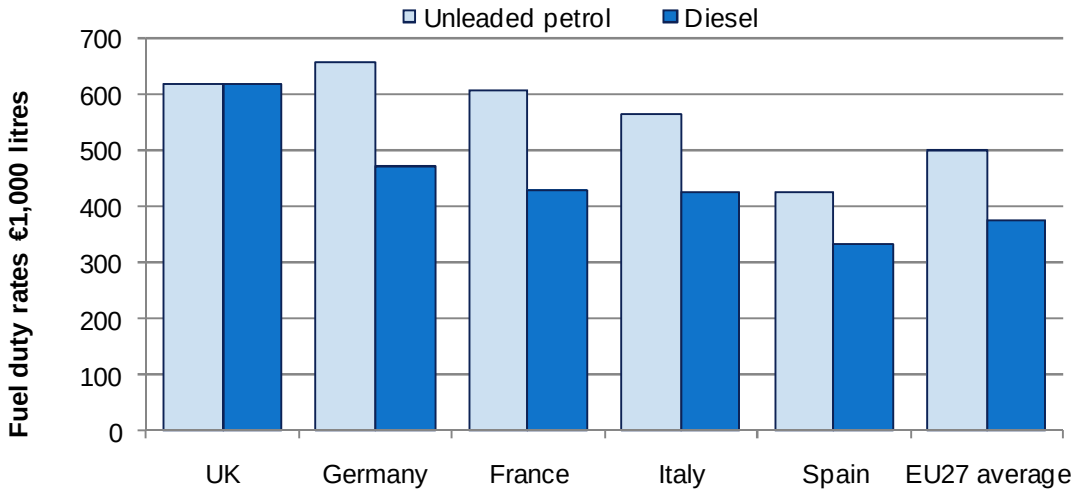


64. A key reason for the UK's relatively high average new car CO_2 emissions figure, relative to the EU average, is due to comparatively low diesel penetration in the UK (see Chart 8). This in turn reflects the fact that within the UK fuel duty on petrol and diesel is the same - unlike any other member state (see Chart 9). The UK has the fourth highest duty on unleaded petrol (behind Holland, Germany and Finland), but the highest duty on diesel. The UK's duty on diesel was 64.9% higher than the EU average (and 31.3% above the second highest, Germany), while duty on unleaded petrol is a more modest 24.1% higher in the UK than the EU average.

65. The differential in duty rates has contributed to diesel penetration rate being consistently higher in the EU than in the UK, although the gap has slowly eroded over time and closed considerably in 2009. In 2000 diesel penetration of the UK market was 14.1%, less than half the EU15 average of 32.8%. Diesel share peaked in the EU in 2007 at 53.6%, when in the UK it was only just breaking 40% for the first time. Diesel penetration then fell in the EU in 2008 and 2009, but only slipped in the UK in 2009, so ended the year at 46.1% in the EU15 and 41.7% in the UK - the closest in the past decade.

66. France, where average new car CO_2 emissions are the lowest in Europe, has one of the highest diesel shares in the EU, with a 70.4% share in 2009. The highest diesel share in the EU is in Belgium, where over 75% of the 2009 market was diesel fuelled, and average new car CO_2 emissions were 142.1g/km, the fifth lowest and 2.5% below the EU average. However, there is no clear trend between diesel penetration and CO_2 levels, as other characteristics of the market come into effect. In Italy diesel penetration is very low, yet so are average new car CO_2 emissions. Similarly Luxembourg has the second highest diesel share in Europe but only the 11th lowest CO_2 level.

Chart 9 Fuel duty rates in EU27, including selected countries - January 2010 (Source EC)



Total CO_2 emissions from the car fleet

- Total CO_2 emissions from all passenger cars in the UK have fallen in each of the past five years.
- Replacement of the fleet with lower CO_2 emitting new cars has led to reduction in total emissions.
- Reversal of growth in distance travelled and parc size also helped total CO_2 emissions fall in 2009.

Table 5 - Total car CO_2 emissions, distance travelled and UK parc size (Source DECC, DfT and SMMT)

Year	Total CO_2 ($MtCO_2$)	Distance travelled (bn kms)	Parc size (mn)
2000	76.3	376.8	27.8
2008	72.3	401.7	31.3
2009	70.3	400.7	31.0
% ch - '09 vs '08	-2.7%	-0.2%	-0.7%
% ch - '09 vs '00	-7.8%	6.3%	11.6%

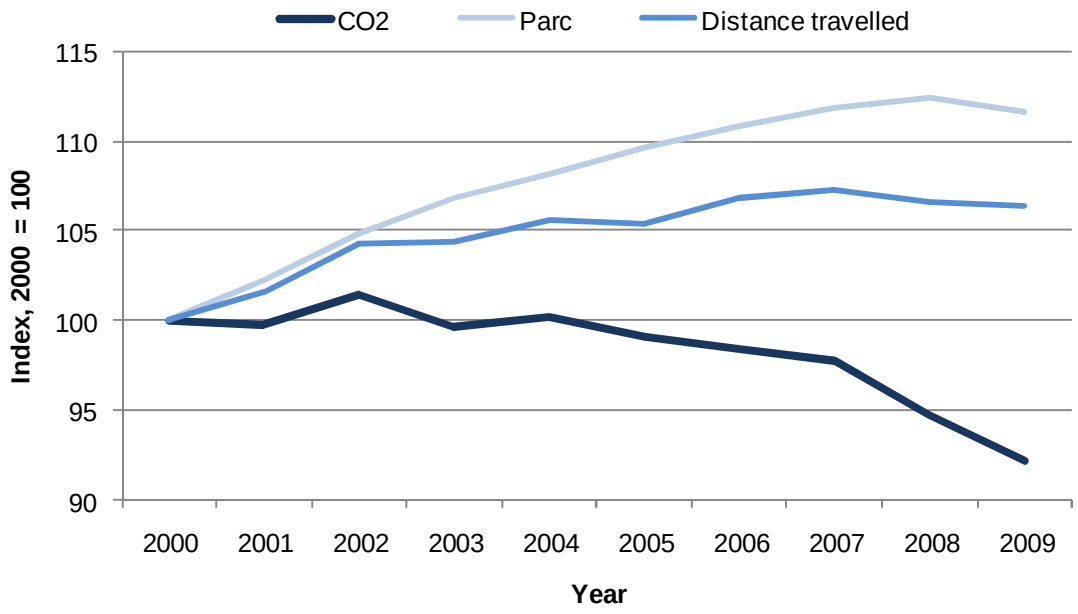
67. Total CO_2 emissions from the car parc (all cars in use) fell by 2.7% in 2009 to their lowest level since 1989, at 70.3 million tonnes of CO_2 ($MtCO_2$). Emissions have fallen in eight of the last 10 years. The pace of decline in 2008 and 2009 was steeper than recorded in previous years. The 2009 decline was on par with the 3.0% decline reported in 2008.

68. Between 2000 and 2009 total CO_2 emissions from cars fell 7.8%. This decline has been achieved despite an increase in the size of the parc and distance travelled. The parc fell for the first time on record in 2009, as the recession hit demand for new cars and the SIS ensured the volume removed from the fleet was sustained. The distance travelled also dipped in 2009, falling 0.2%.

69. The pace of decline in total CO_2 emissions reflects the improvement in new car CO_2 emissions and the steady replacement of the fleet with more efficient vehicles. The rise in fuel prices, recession and consumer campaigns have also encouraged people to drive more conservatively, using less fuel and so reducing net emissions.

70. As the economy picks up it is likely that the distance travelled will once again begin to grow. Population growth and increased wealth and mobility of the young and the old mean a greater population of motorists. This will mean that to reduce total CO_2 emissions from the car fleet, further improvements in the average car's CO_2 emissions, a pick-up in the rate of replacement in the fleet or measures to encourage fewer miles to be driven will be required. Working from home, internet shopping and improved public transport could also help curb emissions growth from motorists.

Chart 10 Growth in total car CO_2 emissions, parc and distance travelled (Source DECC/SMMT/DfT)



Car CO_2 emissions in context

- Cars accounted for 13.6% of total UK CO_2 emissions in 2009, up from 13.0% in 2000.
- Cars account for just over 40% of all transport CO_2 emissions.
- Cars account for over 60% of total road transport CO_2 emissions.

Table 6 - CO_2 emissions, from cars, road transport and total UK, $MtCO_2$ (Source DECC)

Year	Total UK	Road transport	Cars	Cars % total	Cars % road transport
2000	586.6	116.0	76.3	13.0%	65.8%
2008	570.6	117.1	72.3	12.7%	61.7%
2009	516.9	112.5	70.3	13.6%	62.5%
% ch - '09 vs '08	-9.4%	-3.9%	-2.8%		
% ch - '09 vs '00	-11.9%	-3.0%	-7.9%		

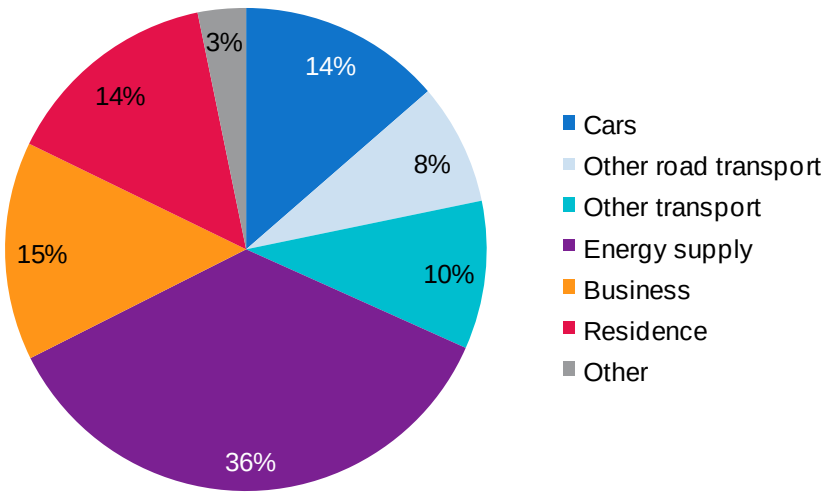
71. Total UK CO_2 emissions fell sharply in 2009, down 9.4% on 2008 levels, as the recession impacted. Total emissions are measured from source and include international aviation and shipping bunkers. Total UK CO_2 emissions had fallen in the preceding three years, but between 2000 and 2008 had only declined four times and shown a net decline of 2.7%. Between 2000 and 2008 car emissions by comparison had fallen almost twice as quickly, down 5.2%. However, the performance was reversed in 2009 with overall emissions falling by more than three times the rate at which car emissions fell as the recession impacted.

72. CO_2 emissions from industrial processes fell by over a third in 2009, those from business were down 13.1% and from energy supply by 11.5%. The recession resulted in UK vehicle production recording a decline in output of a third, with plants on temporary shutdown and reducing working hours. While motorists may have cut down on travel, as shown previously, the average distance travelled only fell marginally in 2010 and so emissions from vehicles could not keep up with the overall pace of emissions reductions in 2009.

73. Cars accounted for 13.6% of total UK CO_2 emissions in 2009. This was the highest share taken between 2000 and 2009 and whilst up on 13% share in 2000, it had been as low as 12.7% in 2008.

74. Cars represented 42.9% of all transport CO_2 emissions in 2009, up from the low of 42.1% in 2008, but down from 47.0% in 2000. Cars represented 62.5% of all CO_2 emissions from road transport in 2009, up from 61.7% in 2008 and 65.8% in 2000. CO_2 emissions from cars have fallen at a faster rate than overall road transport emissions since 2000, although in 2009, the pace of improvement was below that of total road transport, reflecting the impact of the recession and the downturn in goods being distributed.

Chart 11 UK CO_2 emissions, by source, 2009 (Source DECC)



Average CO_2 emissions of the UK car parc

- Average CO_2 emissions across the UK car parc fell by 1.3% in 2009 to 172.8g/km.
- The average car on the road has CO_2 emissions 15.6% above that of a new car.
- As new cars enter the market and replace old cars so the rate of improvement will pickup.

75. In 2009 new cars represented just 6.4% of the total number of UK cars in use - called the parc. The parc stood at 31,040,749 cars in 2009 according to the SMMT Motorparc database. SMMT has established CO_2 data for the UK car parc by cross referencing its MVRIS database to the Motorparc database and matching records for just over 27 million cars or 87.6% of the total.

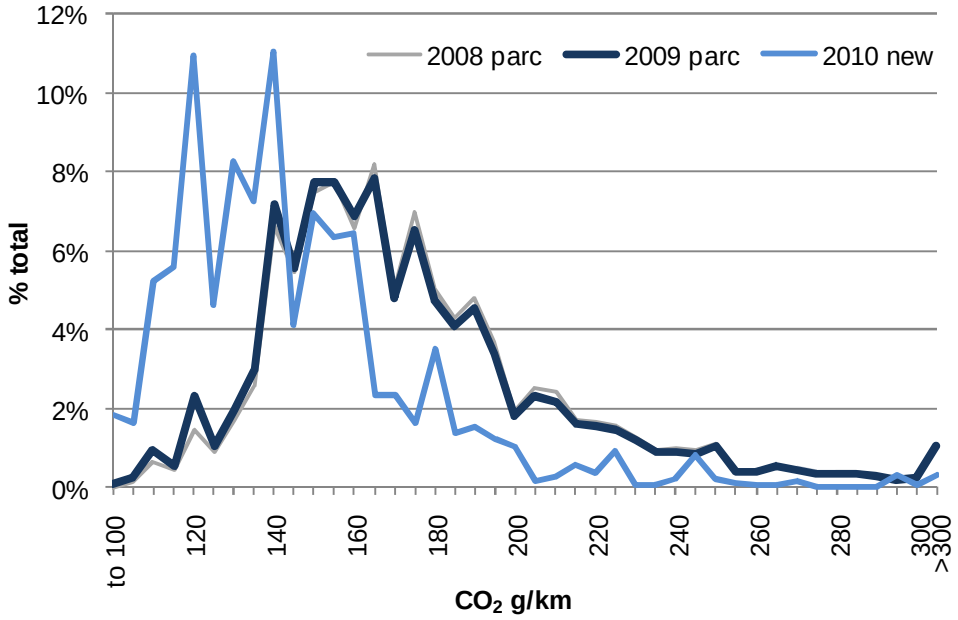
76. From this database SMMT calculates that the average car in use in 2009 had a CO_2 value of 172.8g/km. This is a 1.3% improvement over the 2008 figure (from the GB parc), but still some 15.6% above the 2009 new car CO_2 value of 149.5g/km and 19.8% above the 2010 new car average.

77. The distribution of the 2009 and 2008 car parc by CO_2 band is presented in Chart 12, along with the 2010 new car distribution. This shows how the new car market has many more cars in the lower CO_2 bands than the overall parc. In 2009 the average age of a car in use was seven years. Measures to speed up the replacement cycle of the fleet would have a positive impact on CO_2 performance, and so the amount of CO_2 emitted and fuel used. However, such environmental benefits need to be balanced against wider societal needs for personal mobility at a reasonable cost.

78. The data may over-estimate the average car's emissions, as older vehicles' performance may deteriorate over time unless properly maintained. It is recommended that cars are frequently serviced to ensure they retain optimum performance.

79. In 2009, 17.0% of the parc emitted 140g/km or less, up from 14.3% in 2008. However, in 2009 47.3% of new cars registered emitted 140g/km or less, which rose to 56.5% in 2010 - three times the parc's share. In 2009 new cars represented close to 98% of the volume of all cars in use emitting 100g/km or less of CO_2.

Chart 12 Distribution of CO_2 emissions in the car parc and new car market (Source SMMT)



Chapter Two—Detailed trends in new car CO_2 emissions

80. This section of the report studies the new car market by CO_2 performance in more detail. It looks at the breakdown by distribution, VED band, by fuel type, by model, by market segment and by sales type.

Overall distribution of the new car market by CO_2 emissions

- Shift into lower CO_2 emitting cars across the market, in part due to technological advances.
- Over half the market (56.5%) is now under 140g/km.
- The sub 100g/km market doubled in 2010, as new ultra-low carbon vehicles entered market.

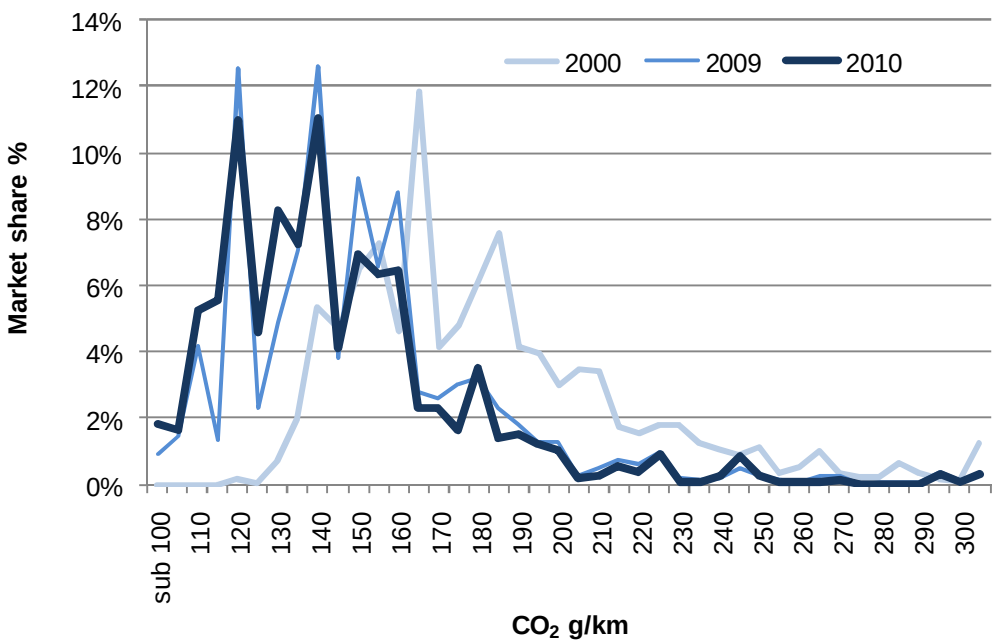
81. New lower CO_2 emitting technologies have been deployed across the marketplace and these, coupled with government policies and taxation measures, and changing consumer preferences, have seen the market continuously shift towards lower CO_2 emitting cars.

82. Chart 13 below shows the distribution of the market in 5g/km bands and shows a progressive shift to the left into lower emitting vehicles. The single peak in 2000 has also been replaced by two peaks. These two peaks reflect diesel and petrol sales concentrations, reflecting the growth of the diesel car market and diesels being some 5%-20% lower CO_2 emitting than the equivalent petrol powered car. The peaks are also influenced by segment trends and tax bands.

83. Manufacturers were aiming to achieve an EU-wide voluntary target of 140g/km by 2008/09. The highest peak on the chart is the 136-140g/km band. For the first time, in 2010 more than half of the market was under 140g/km, up from 47.3% in 2009 and just 8.2% in 2000. In 2010 38.2% of the market was sub-130g/km, up from 27.6% in 2009. In 2010 there was an increased availability of ultra-low carbon cars, and the number of sub-100g/km models doubled to 30. The sub-100g/km market between 2009 and 2010 rose by 103.8%, to 37,346 registrations.

84. Chart 13 shows there is a long tail of higher CO_2 emitting cars, although their share has fallen. These high emitting products are the result of particular vehicle types, which may focus in certain attributes, eg higher than average size or performance. Some models using automatic gearboxes or four-wheel drive systems also have above average CO_2 emissions.

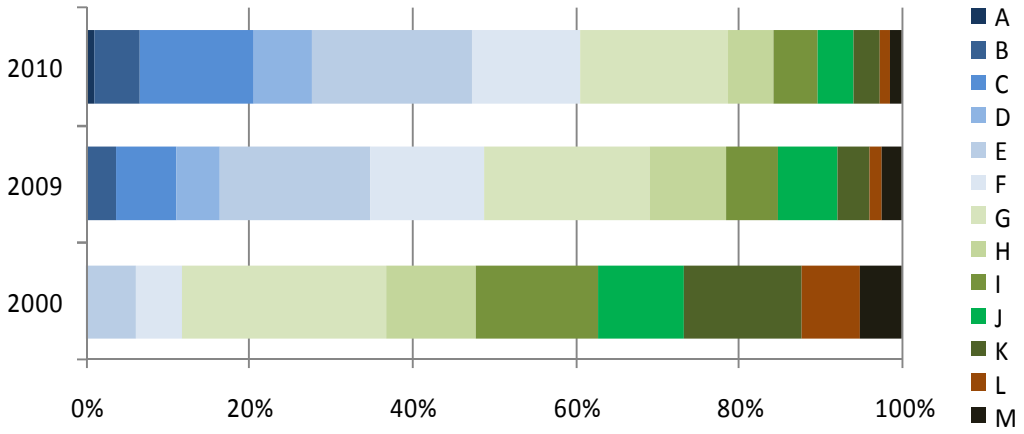
Chart 13 Distribution of the new car market by 5g/km CO_2 bands (Source SMMT)



Distribution of the market by vehicle excise duty (VED) bands

- Market shift to lower CO_2 bands, reflecting enhanced model performance and consumer choice.
- Band E (131-140g/km) was the most populated in 2010, as in 2009; in 2000 it was band G.
- More of the market was in the lowest CO_2 band (A) than in the highest (M) for the first time in 2010.

Chart 14 Distribution of the new car market by VED bands (Source SMMT)



85. VED is a tax on the ownership of a vehicle. Rates are applied as soon as a vehicle is first registered and then must be paid continually (see page 9 for rates) until a vehicle is deregistered (ie destroyed, exported, or taken off the road).

86. Since 2001 new cars have faced VED charges based on their CO_2 emissions, with earlier cars facing a two tier system based on engine size. The CO_2 based system has been refined over time into 13 bands since April 2009. The data shown in Chart 14 and Table 7 splits the market over time into these 13 bands.

87. The market has migrated into the lower VED CO_2 bands. In 2000 the G band (151-165g/km) was the most populated with 23.8% of the market. In 2000 57.0% of registrations were in bands H-M and 19.3% in bands A-F. By 2010 band E had become the most populated and only 17.6% of the market was in bands H-M - less than a third of the 2000 level. The A band (up to 100g/km) more than doubled in volume between 2009 and 2010 to represent 1.8% of the market. The 2010 band A cars represent 60% of all band A registrations since 2000, with that share rising to 90% when the 2009 volume is added.

Table 7 - New car market by VED band (Source SMMT)

VED band	Volume	Market share			
	2010	2010	2009	2000	2000-10
A (up to 100g/km)	37,346	1.8%	0.9%	0.0%	0.2%
B (101-110g/km)	139,925	6.9%	5.6%	0.0%	1.8%
C (111-120g/km)	335,822	16.5%	13.9%	0.1%	4.6%
D (121-130g/km)	261,761	12.9%	7.2%	0.7%	4.2%
E (131-140g/km)	371,726	18.3%	19.7%	7.3%	12.1%
F (141-150g/km)	224,738	11.1%	13.0%	11.1%	14.7%
G (151-165g/km)	306,180	15.1%	18.2%	23.8%	22.4%
H (166-175g/km)	80,482	4.0%	5.6%	8.9%	9.1%
I (176-185g/km)	99,288	4.9%	5.5%	13.8%	7.8%
J (186-200g/km)	77,056	3.8%	4.4%	11.1%	8.4%
K (201-225g/km)	45,371	2.2%	3.0%	11.9%	7.0%
L (226-255g/km)	30,131	1.5%	1.3%	6.4%	4.2%
M (over 255g/km)	21,020	1.0%	1.5%	4.8%	3.5%

Trends by fuel type

- Electric vehicles and hybrids offer CO_2 reductions over conventional fuels, but sales are low at present.
- Market remains dominated by petrol and diesel cars, with diesel share at record high in 2010.
- Diesels emit some 5-20% less CO_2 emissions than petrol equivalents.

88. Alternatively fuelled cars offer consumers a lower CO_2 emitting option. Pure electric vehicles have zero emissions from the tailpipe and many hybrids offer CO_2 emissions below 100g/km. Increasingly diesel models and even some petrol models are also available with emissions this low (see page 23).

89. The marketplace remains dominated by petrol and diesel variants, which collectively accounted for over 98% of 2010 new car registrations. Diesel cars took a record 46.1% market share in 2010.

90. Table 8 shows that diesels on average emit some 5-20% less CO_2 than their petrol equivalent. The models listed are the best selling model in each segment and a petrol and diesel version have been chosen to reflect an equivalent trim and power rate where possible. In several cases lower CO_2 emitting variants are available for the model ranges shown. The Hyundai i10 was the best selling mini segment car, but are all petrol powered. Currently only the Toyota Auris is available in hybrid, petrol and diesel variants. The hybrid Auris emits at least 28.8% less CO_2 than the diesel and 32.6% less than the petrol variants.

Table 8 - Examples of fuel type CO_2 difference in 2010 (Source VCA data)

	Diesel	Petrol	Difference
Supermini			
Ford Fiesta	107g/km	127g/km	-15.7%
Model	1.4 Duratorq TDCi	1.25 Duratec	
Lower medium			
Vauxhall Astra (3dr H/B)	138g/km	146g/km	-5.5%
Model	1.7 CDTi 16v	1.4i 16v	
Upper medium			
BMW 3 Series	119g/km	146g/km	-18.5%
Model	318D	318i	
Executive			
Mercedes Benz E Class	137g/km	169g/km	-18.9%
Model	E200 CDI BlueEFFICIENCY	E200 CGI BlueEFFICIENCY	
Luxury saloon			
Jaguar XJ	209g/km	249g/km	-16.1%
Model	2.7L	3.0L	
Specialist sports			
VW Scirocco	134g/km	147g/km	-8.8%
Model	2.0 CR TDI GT	TSI	
Dual purpose			
Land Rover Freelander	185g/km	225g/km	-17.8%
Model	2.2 TD4	3.2 i6	
MPV			
Vauxhall Zafira	139g/km	156g/km	-10.9%
Model	1.7 CDTi 16v ecoFLEX	1.6i VVT 16v	

Trends by fuel type

Table 9 - New car market by fuel type (Source SMMT)

Year	Petrol	share	Diesel	share	AFV	share
2000	1,908,098	85.9%	313,192	14.1%	357	0.0%
2009	1,147,580	57.5%	832,456	41.7%	14,963	0.8%
2010	1,071,574	52.8%	936,407	46.1%	22,865	1.1%

91. In 2000 petrol fuelled cars represented over 85% of the total market. That level has fallen towards 50%, reflective of the availability and improvements in diesel models and, more recently, the rise of AFVs.

92. As shown previously, diesel cars offer lower CO_2 emissions than the petrol equivalent. Diesels have also overcome issues of driveability, performance and image. Increased availability of diesel variants has also allowed the market to grow.

93. Diesel cars took a record 46.1% market share in 2010, after volumes rose by 12.5% on the 2009 market. Chart 15 shows how the diesel share grew continuously between 2000 and 2008. It then shrank in 2009 as the SIS boosted demand for smaller, cheaper petrol cars and the recession suppressed demand for larger, more expensive products.

94. Chart 19 on page 26 shows that diesel penetration is highest in the dual purpose, executive, MPV, upper medium and luxury segments - all of which saw diesel penetration at over 60%. Diesel penetration in the smaller car segments is lower, in part reflecting the size of diesel engines relative to petrol (ie their greater cubic capacity), but also the relative cost of diesels making them less advantageous to fit to lower cost, smaller products.

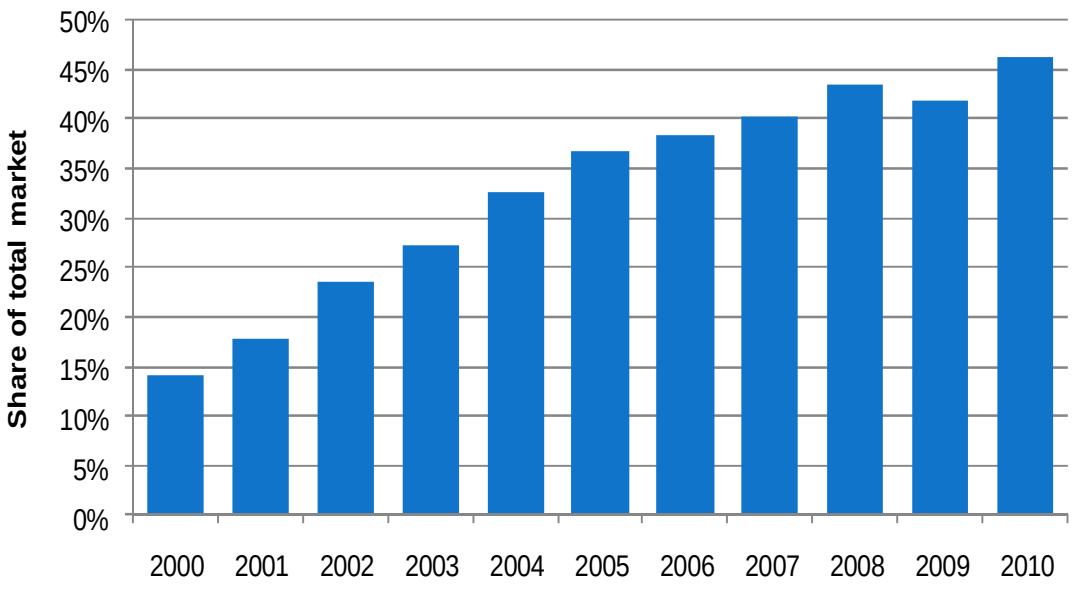
95.The fitment of diesels to relatively large vehicles has ensured that the sales-weighted average performance of both diesel and petrol engined cars is very similar. For diesel the average CO_2 emissions were 144.5g/km and for petrol it was 144.7g/km. Over time (as shown in Chart 16) the average petrol car has seen a slightly faster rate of improvement than diesel, but since 2007 they have been broadly on par.

96. By comparison the sales-weighted average hybrid (petrol/electric) vehicle had CO_2 emissions of 105.9g/km in 2010, 26.5% below the market average.

97. Registrations of AFVs rose by 52.8% in 2010 to 22,865 units. This was a record volume and equivalent to a 1.1% share of the overall new car market in 2010, up from 0.8% in 2009. In 2000 AFV registrations totalled just 357 units, a 0.0% market share.

98. Chart 17 shows AFV registrations since 2000. Hybrids (currently all petrol/electric) represented 96.9% of the total AFV market. Registrations of pure electric cars rose from 55 in 2009 to 167 units in 2010.

Chart 15 Diesel penetration of the new car market, 2000—2010 (Source SMMT)



Trends by fuel type

Chart 16 Average new car diesel and petrol car CO_2 emissions (Source SMMT)

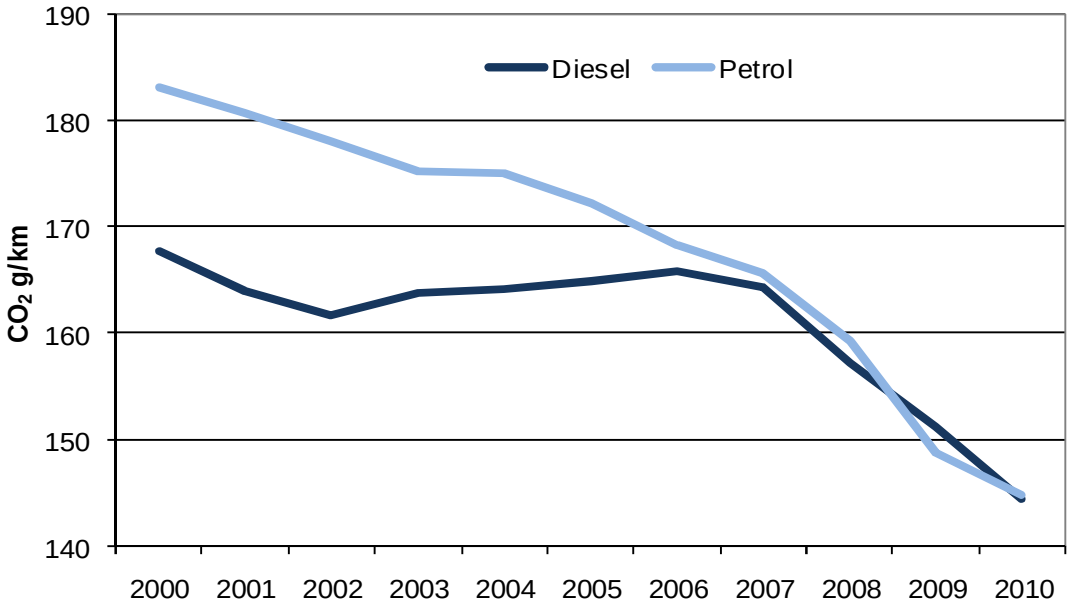
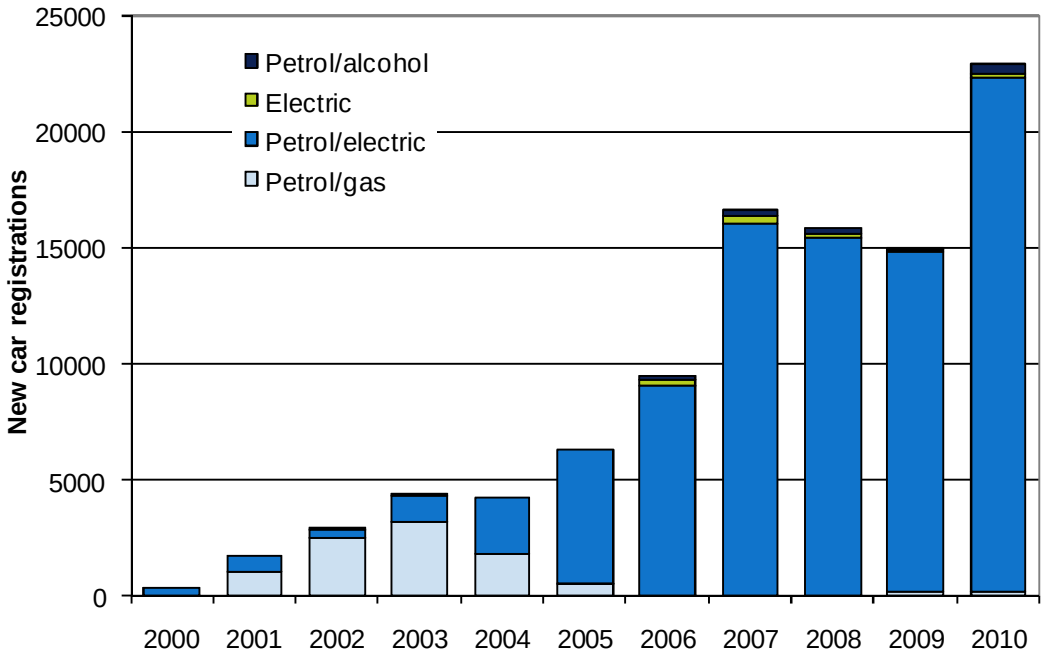


Chart 17 New registrations of alternatively fuelled/advanced propulsion cars (Source SMMT)



Trends by model

- The lowest emitting models are all electric vehicles.
- Hybrids and diesels fill out most of the remaining spaces of the lowest CO_2 emitters list.
- The models listed have CO_2 emissions at least 36% lower than the 2010 market average.

Table 10 - Top 10 lowest CO_2 emitting models (Source SMMT)

Rank	Model	Fuel type	CO_2 g/km
1=	Mitsubishi I-MIEV	EV	0
1=	smart fortwo	EV	0
1=	Tesla	EV	0
4	Toyota Prius	PEV	59
5	smart fortwo	Diesel	86
6=	Skoda Fabia	Diesel	89
6=	Toyota Auris	PEV	89
6=	Toyota Prius	PEV	89
9	VW Polo	Diesel	91
10=	Fiat 500	Petrol	92
10=	SEAT Ibiza	Diesel	92

Note: EV = electric vehicles, which have zero emissions at the tailpipe. PEV = petrol electric hybrids. Aixam, Microcar and Reva models are not listed as they are only type approved to B1 standard.

99. Electric cars have zero CO_2 emissions from the tailpipe and so these models feature as the lowest emitters. In 2010 there were three pure electric cars on sale in the UK. The volumes sold were very low, totalling 167 units, but with time, their market share is expected to rise (see page 29).

100. The new plug-in hybrid Toyota Prius has the lowest CO_2 emissions of hybrids currently on offer. Toyota and Lexus combined hybrid volumes equate to 74.1% of the total hybrid market and 71.9% of the AFV market in 2010. Honda represents over 80% of the remainder, with the Civic, CR-Z and Insight models. Hybrid volumes equalled 15.1% of all Toyota's UK registrations in 2010, 52.0% of Lexus and 8.4% of Honda registrations.

101. Cars in the top 10 had CO_2 emissions up to 92g/km. Registrations of cars up to this level (including volumes of other derivatives of models featured in the rankings to 92g/km) totalled 14,150 units in 2010, or 0.7% of the total market. With over 3,000 models and variants on the SMMT database, this is a relatively high number.

102. The Ford Fiesta was the best selling model in 2010, with over 100,000 registrations. The Fiesta's sales-weighed average CO_2 emissions were 127.2g/km in 2010, 21.1% lower than the 162.1g/km recorded in 2000. In 2000 the Fiesta's CO_2 figures ranged from 136-175g/km, in 2010 that range was 98-154g/km. In 2000 over 85% of Fiestas registered were in VED band G (151-165g/km), by 2010 over 90% were in VED band E or below (sub 140g/km), with 26.7% in bands A and B (up to 110g/km).

103. Vehicle manufacturers have introduced low CO_2 emissions technologies across their entire ranges. Some manufacturers have branded these lower CO_2 technologies, such as BMW's Efficient Dynamics System. While some manufacturers have branded particular low emitting model variants within their ranges, with names such as BlueMotion, ECOnetic, Ecodynamics and Greenline.

104. In 2010 registrations of these branded products and hybrids totalled over 170,000 units, a 57.8% rise on the 2009 figure. These models represented 8.4% of the total market, up from 5.5% in 2009. For some manufacturers the level is far higher, for example the BlueEFFICIENCY ranges accounted for over 70% of Mercedes-Benz's volume, the ECO range represented 17.5% of Fiat's volume and the BlueMotion range equated to over 10% of all VW's registrations in 2010.

105. In the first annual CO_2 report showing the 2001 market, aside from the 80g/km hybrid Honda Insight, the lowest emitting car was a Peugeot 206 at 113g/km. In 2010 there were over 55 distinct model ranges with CO_2 emissions of 113g/km or below variants. These models represented over 10% of the market with more than 200,000 registrations.

Trends by market segment

- All segments show decline in average CO_2 emissions in 2010 and over the past decade.
- Small cars have the lowest emissions on average, whilst niche and large cars made best reductions.
- Market growth in niche segments has been made, although overall market emissions have still fallen.

Table 11 - SMMT segment by CO_2 performance, g/km (Source SMMT)

Segment	2010 CO_2	% ch vs '09	% ch vs '00	Ch g/km vs '00
Mini	114.1	-1.3%	-25.8%	-39.7
Supermini	127.6	-3.3%	-16.6%	-25.4
Lower medium	140.6	-4.6%	-19.8%	-34.7
Upper medium	145.5	-5.8%	-24.4%	-46.9
Executive	169.5	-4.3%	-28.1%	-66.1
Luxury saloon	234.3	-6.4%	-19.9%	-58.0
Specialist sports	191.0	-5.1%	-13.4%	-29.6
Dual purpose	196.5	-5.1%	-24.2%	-62.9
MPV	159.6	-6.0%	-24.4%	-51.4
Total	144.2	-3.5%	-20.3%	-36.8

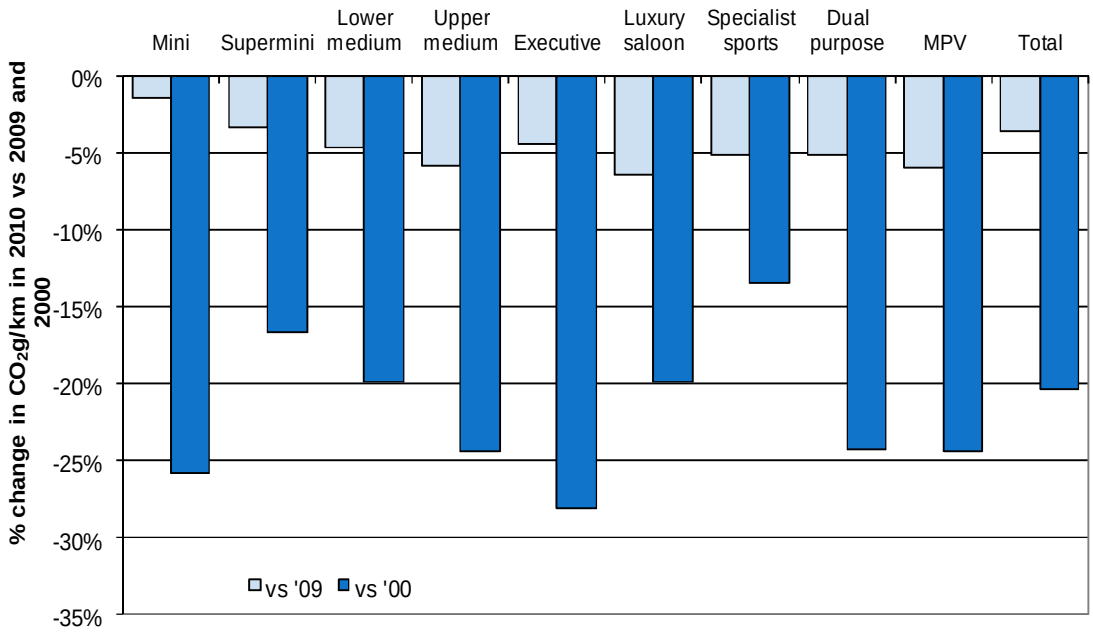
106. SMMT splits the market into nine segment classifications, these are detailed in Annex 2. Vehicles are broadly categorised by size and body type.

107. All segments have made improvements in their average CO_2 emissions since 2000 (see Table 11), with the luxury and MPV segments reducing emissions by over 6% in 2010 compared with 2009. The MPV and dual purpose segments have reduced emissions by around a quarter since 2000, along with the mini, executive and upper medium segments.

108. Mini and supermini segments have the lowest average CO_2 emissions of any segment, some 20.9% and 11.5% below the market average in 2010 respectively. In 2009 registrations of mini and supermini cars rose by 142.4% and 2.2% (in a market showing a net decline of 6.4%) due to the success of the SIS. Their volumes subsequently slipped in 2010, but in market share terms remained high compared to levels seen over the past decade (see Table 12).

109. In 2010 the MPV, luxury saloon and dual purpose segments showed the strongest rise in registrations. Lowering emissions, despite this switch to niche segments, has been achieved through diesel engined vehicles. Table 12, overleaf, shows the best selling model in each segment and the segment's share of the new car market in 2000, 2009 and 2010.

Chart 18 Change in CO_2 emissions by segment, 2010 vs 2009 and 2000 (Source SMMT)



Trends by market segment

Table 12 - SMMT segment classification and market share (Source SMMT)

Segment	Best seller	Mkt sh '10	Mkt sh '09	Mkt sh '00
Mini	Hyundai i10	2.6%	3.4%	2.3%
Supermini	Ford Fiesta	36.4%	37.2%	31.0%
Lower medium	Vauxhall Astra	26.6%	26.6%	29.8%
Upper medium	BMW 3 Series	13.1%	14.2%	21.5%
Executive	Mercedes-Benz E Class	4.9%	4.5%	4.7%
Luxury saloon	Jaguar XJ	0.4%	0.3%	0.5%
Specialist sports	VW Scirocco	2.3%	2.3%	3.0%
Dual purpose	Land Rover Freelander	7.6%	6.6%	4.5%
MPV	Vauxhall Zafira	6.0%	4.7%	2.7%

110. In 2010 the market still had a comparatively high level of mini and supermini registrations compared with the 2000 to 2010 average, although less than in 2009. The 2009 market for small car was boosted by the SIS. Over the past decade small cars have seen their physical size increase and significant improvements made in levels of refinement and safety features to make them much more comparable with larger cars. There has also been an increase in the number of models available.

111. Registrations of lower and upper medium cars accounted for 51.3% of the market in 2000, but this share fell to 39.7% in 2010. Buyers from these segments have 'downsized' into the supermini segment or moved into niche products, such as MPVs and dual purpose vehicles which offer space, practicality and a different image to more mainstream saloon/estate/hatchback style family-sized cars.

112. Since 2000 the share of the market taken by MPV and dual purpose segment cars has almost doubled, moving from 7.2% to 13.6% in 2010. There has been strong growth in the number of these types of models entering the marketplace and also greater diversity of the size of models on offer, with a general downsizing within the segments.

113. Consumers have largely been able to minimise, if not overcome entirely, the CO_2 penalty from moving into a larger vehicle by opting for a diesel variant. Diesel penetration of the dual purpose segment was 87.7% in 2010, and was over 70% in the MPV, upper medium and executive segments too (see Chart 19).

114. Chart 20 shows the range of models by CO_2 emissions in each segment, the mid-point line on each bar is the average for the segment. EVs are highlighted to show how this takes the lowest CO_2 emitting models down to zero g/km. The average emissions in each segment are typically at the lower end of the range. The top end CO_2 figures often show high end performance models, which tend to be sold in relatively small numbers.

115. Table 13 shows the lowest CO_2 emitting model in each segment. These are either pure electric, hybrid or diesel models. The lowest CO_2 emitting dual purpose and MPV models are both diesels and respectively have emissions 11.5% and 17.5% lower than the overall market average. If the lowest CO_2 emitter in every segment was always bought, the market's average CO_2 value would have been 87.1g/km, 39.6% below the actual level. It should be noted that these models may not suit every motorist, in terms of cost, functionality, style or dealer proximity.

Table 13 - Lowest CO_2 emitter in each segment (Source SMMT)

Segment	Average	Lowest	Make/model	Low vs ave
Mini	114.1	0	Mitsubishi I-MIEV/smart fortwo EV	-
Supermini	127.6	89	Skoda Fabia	-30.2%
Lower Medium	140.6	89	Toyota Auris	-36.7%
Upper medium	145.5	59	Toyota Prius	-59.5%
Executive	169.4	119	Volvo S80/V70	-29.8%
Luxury	234.3	174	Audi A8	-25.7%
Sports	191.0	0	Tesla	-
Dual purpose	196.5	129	Toyota Urban Cruiser	-33.3%
MPV	159.6	113	Citroën Nemo Multispace	-29.2%

Trends by market segment

Chart 19 Diesel share of the new car market by segment in 2010 and 2000 (Source SMMT)

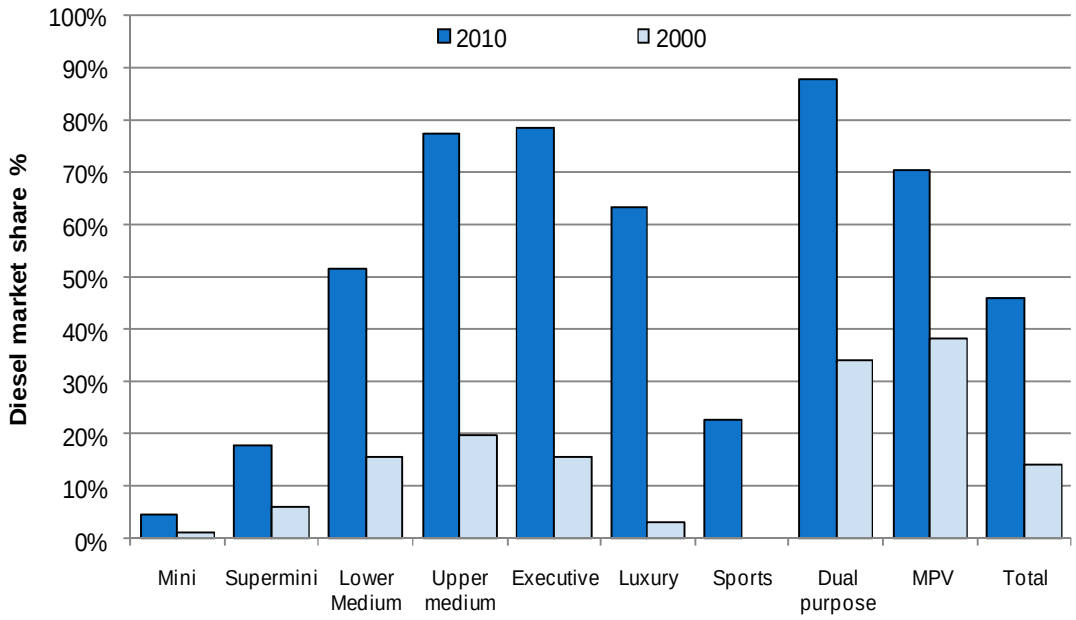
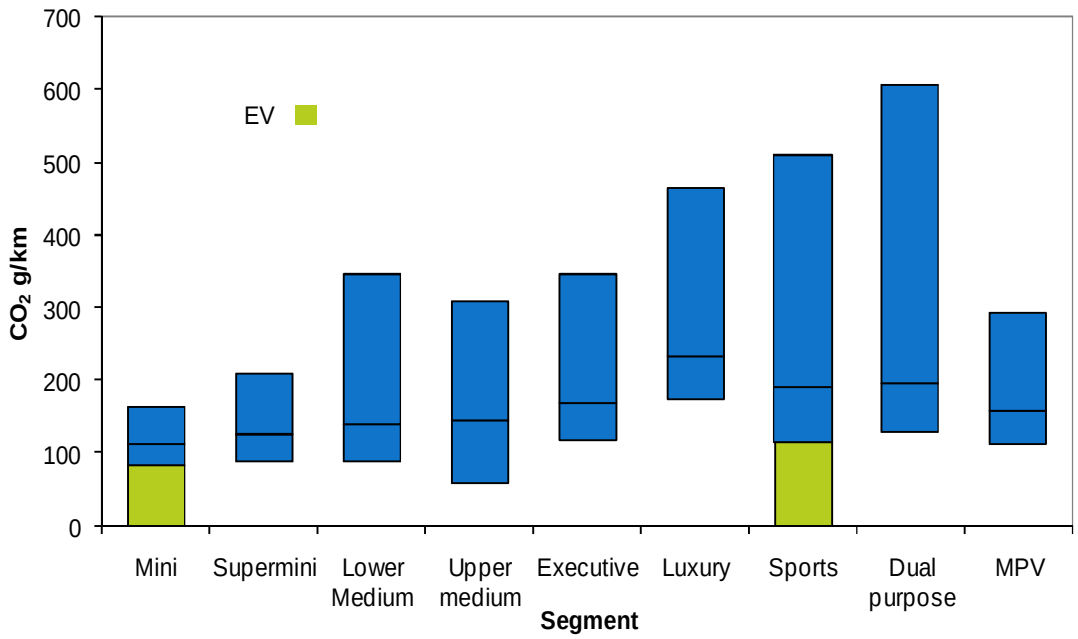


Chart 20 Range and average of CO_2 emissions by segment, 2010 (Source SMMT)



Note—light blue bars represent the CO_2 range in each segment. The average CO_2 in each segment is shown by the line dissecting this bar. The dark blue bar represents presence of an electric vehicle, which takes the CO_2 range to zero.

Trends by sales type

- Both private and fleet/business sales show encouraging reductions in CO_2 emissions since 2001.
- All buyer types impacted by new technologies, taxation and moral persuasion.
- Fleet buyers also impacted by company car tax.

Table 14 - New car CO_2 emissions by sales type, g/km (Source SMMT)

Year	Fleet	Business	All company	Private
2001	175.4	195.0	178.8	176.4
2009	150.8	154.2	151.1	147.9
2010	143.5	146.9	143.8	144.8
% ch '10 vs				
2009	-4.8%	-4.7%	-4.8%	-2.1%
2001	-18.2%	-24.7%	-19.6%	-17.9%

116. SMMT differentiates the market by sales type, using data supplied on the registration document by the dealer. There are three distinct sales type categories; fleets - vehicles registered at a business address with 25 or more vehicles, business - those registered at a business address with less than 25 vehicles, and privately registered accounting for the remainder.

117. Average new car CO_2 emissions from all three sales types have shown continuous improvement and reductions of some 18-25% since 2001 (Table 14) (SMMT only has CO_2 data back to 2001 by sales type). The total company (fleet and business combined) average CO_2 figure at 143.8g/km in 2010, was just 0.7% lower than the average private figure, having made slightly better progress since 2001.

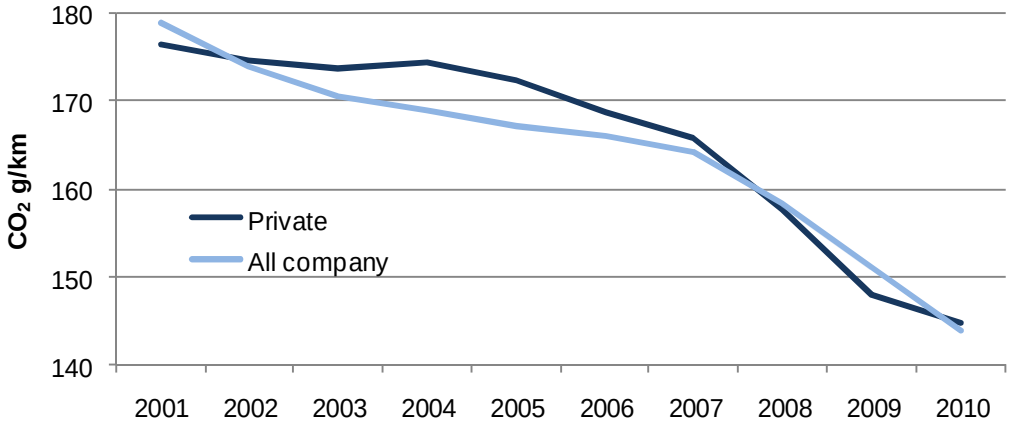
118. All buyers would benefit from improvements in new low CO_2 technologies and would face the same fuel and vehicle excise duty charges. Business users paying company car tax (CCT) would have a further incentive to opt for a more efficient vehicle. Companies may also have policies requiring their drivers to use vehicles emitting below a certain level.

119. Company car drivers tend to average a higher annual mileage (see DfT's Transport Statistics GB) so have a greater propensity to use a more efficient car. However, due to the nature of their business and high mileage company cars tend to be upper medium or larger sized vehicles, rather than smaller cars like superminis.

120. An individual's CCT liability (see page 9 for more detail on CCT) has been based on their vehicle's CO_2 emissions since 1 April 2002. HM Revenue and Customs (HMRC) estimates there were 1.1 million company cars in use in 2007. CCT has over time been adjusted to encourage more efficient vehicles and in 2009 it was announced that electric cars would face a 0% rate for five years.

121. Private buyers generated a very sharp decline in average CO_2 emissions in 2009, down 6.2%, as the SIS supported the uptake of smaller cars. Further progress was made in 2010, but given the rate of improvement in 2009 delivering such a sizeable reduction again was unlikely.

Chart 21 Private and all company average new car CO_2 emissions, 2000-2010 (Source SMMT)



Chapter Three - Outlook for car emissions

122. New car CO_2 emissions have already shown a very encouraging rate of reduction. Further declines are to be expected. The continued use of the integrated approach will ensure that all stakeholders move in the right direction to facilitate further emissions reductions. Alongside market demand and competition, one of the drivers to emissions reduction will be the EU new car CO_2 regulation. The UK also has its own legally binding targets for wider CO_2 emissions reductions and will target policies to help achieve those from the transport sector. This chapter outlines the EU regulation, UK government's targets and policy instruments and highlights opportunities and constraints on progress.

EU new car CO_2 regulation

- Regulation in place from 2012 to make cars on average achieve 130g/km by 2015.
- An additional 10g/km reduction from complementary measures is to be made.
- Target to move to 95g/km by 2020, subject to impact assessment.

123. The new car CO_2 emissions regulation (EC 443/2009) is widely expected to be the key driver to delivering lower CO_2 emitting vehicles. The regulation covers new passenger cars and sets a sales-weighted CO_2 target of 130g/km by 2015, with an additional 10g/km from complementary measures. This is a 9.8% reduction on the 2010 level, broadly equivalent to a 2% per annum change. The target is to be significantly lowered to 95g/km in 2020, subject to impact assessment, which represents a 27% decline on the 2015 level, or an annual rate of reduction of over 5%.

124. An individual manufacturer will face an EU-wide sales-weighted specific emissions target as a function of the car's mass (weight). The EC will monitor weight to ensure targets are not met by vehicles becoming heavier. Sales-weighted targets ensure that manufacturers can continue to offer a diverse product line-up to meet different consumer needs. The target will be phased in so in 2012, 65% of each manufacturer's new registrations will have to comply with their specific targets, rising to 75% in 2013, 80% in 2014 and 100% by 2015.

125. Manufacturers will also be able to use super-credits for cars emitting 50g/km or less (calculated as equal to 3.5 cars in 2012 and 2013, 2.5 cars in 2014, 1.5 cars in 2015 and one car from 2016 onward) to lower their fleet average. Certain innovative CO_2 reducing technologies will be granted credits, called 'eco-innovations'. The application and assessment procedure of these are still under development.

126. Low volume and niche manufacturers can apply for a derogation which means they will be set targets reflecting their individual technological and economic potential to reduce emissions. Niche manufacturers (defined as registering up to 300,000 cars in the EU per annum) will face a 25% reduction from their 2007 emissions average. Low volume manufacturers (defined as registering up to 10,000 cars in the EU per annum) will make individual applications to the European Commission.

127. Manufacturers will face significant fines if they fail to achieve their targets. These fines will be €1 for the first gram over target, €15 for the second gram, €25 for the third gram and €95 for the fourth and move grams over target, multiplied by the number of vehicle registrations. So, for example, a manufacturer with one million registrations in 2015 missing their specific target by just 1g/km will face a €1,000,000 fine. From 2019 the fine premium will be €95 for every gram over target.

The Integrated Approach (IA)

- IA aims to get all stakeholders working collectively to deliver the common goal of lower CO_2 emissions.
- Technology is just one element to achieving lower emissions.
- Wider buy-in ensures better progress and least-cost options taken up to achieve targets.

128. Past SMMT CO_2 reports have highlighted the importance of the IA and the need for collective action. While vehicle manufacturers will undoubtedly deliver increasingly lower CO_2 emitting models and technologies to the marketplace, their efforts alone cannot cost-effectively achieve the desired reductions in CO_2 emissions. Consumers need to buy and use lower CO_2 emitting vehicles.

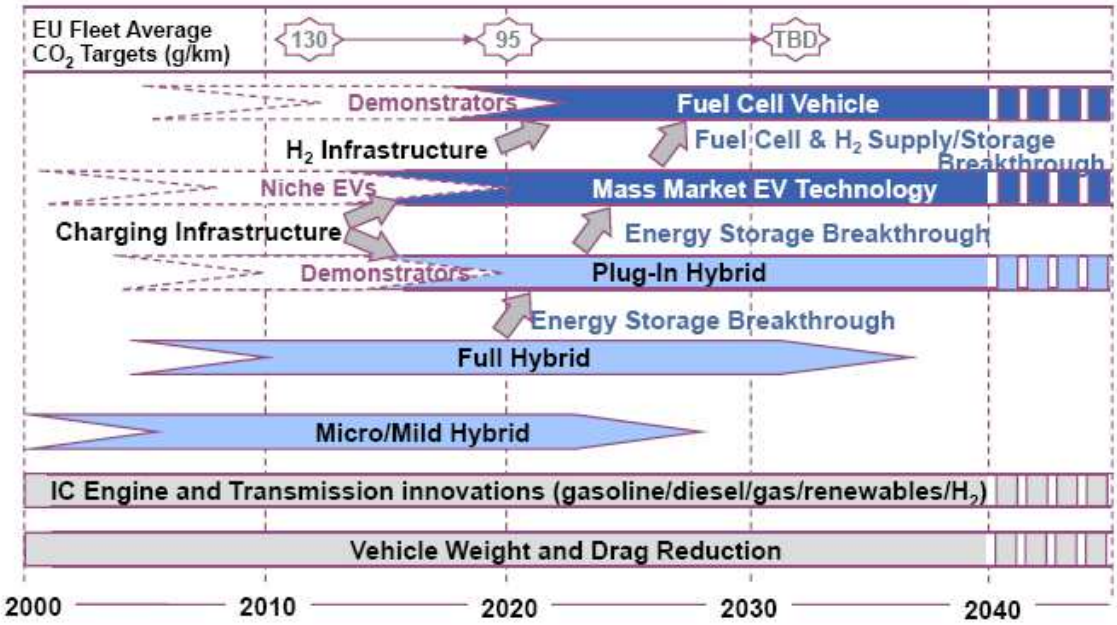
129. Increasingly, the more efficient vehicles require alternative fuels, which require a new refuelling infrastructure. Policy makers can help greatly by providing the right framework to encourage the provision and take up of these lower CO_2 emitting vehicles, whether through taxation, information provision or own-fleet procurement, ensuring a robust economic setting enabling consumers to feel empowered to buy new low CO_2 emitting cars and potentially encouraging and helping industry to deliver the technologies which will benefit society as a whole.

130. By having all stakeholders pulling in the same direction to achieve the common goal of a greater take -up of low-CO_2 emitting vehicles, and by looking at the least cost method of achieving this aim society as a whole is better able to deliver.

Roadmap for technological improvement

- NAIGT roadmap shows broad programme of future technological development.
- Petrol and diesel cars to make up bulk of new car market to 2020.
- Alternatively fuelled cars being developed, and may take 5-10% of 2020 market.

Chart 22 NAIGT technology roadmap (Source NAIGT)



131. The New Automotive Innovation and Growth Team (NAIGT) roadmap reflects the broad outline in development of new car technologies. This shows that by 2020 internal combustion engines will continue to be in place, but hybrids, electric and hydrogen vehicles will be entering the market.

132. The pace of uptake of these technologies is difficult to forecast, given the infancy of these markets and the challenges of not only developing and bringing to market the technology, but also the refuelling infrastructure and managing consumer acceptance of these new technologies.

133. The Committee on Climate Change suggests that electric vehicles and hybrids could achieve a 16% market share in the UK by 2020. If the market was assumed to be 2.5 million units at this time that would equate to 400,000 vehicles, up from less than 40,000 in 2010. JD Power (www.JDPower.com), an independent forecaster, believe these vehicles could account for 7.3% of the global market in 2020, which would relate to some 180,000 units in the UK. Carlos Ghosn, CEO and President of Renault-Nissan believes 10% of the EU new car market could be EVs and hybrids by 2020.

134. Mintel (www.Mintel.com), an independent market researcher, suggests the Alternatively Fuelled Vehicle (AFV) market could rise from 1.1% in 2010 to 1.5% in 2011 and reach 3.1% by 2015. Mintel suggests 7% of adults would consider buying an AFV as their next vehicle.

135. An AFV market of 5%-10% by 2020 means at least nine in 10 new cars being registered will be petrol or diesel powered. There is still plenty of scope for improvement in these technologies. The most efficient diesel car currently emits 86g/km of CO_2 and the lowest petrol car is at 92g/km. These are on par with the current crop of hybrids. As an example, Volkswagen has developed the XL1 diesel hybrid (using a two cylinder diesel engine and electric motor) to develop a car that produces just 24g/km, equivalent to 300mpg. By 2020 Volkswagen predicts its Golf will be emitting 75g/km, down from 128.0g/km in 2010.

136. Such performance will be achieved by downsizing of engines, increased use of hybridisation, as well as further developments of light weighting and aerodynamic improvements.

137. Table 15 shows the pros and cons of the various different technologies outlined in the technology roadmap. Developing and bringing to the market new technologies is expensive. The electric cars being brought to market under the Plug-In Car Grant scheme appear to be just under the £30,000 mark, before the incentive. With the incentive they will still be around twice the initial cost of a traditionally fuelled vehicle of similar size. Lower refuelling costs, lower taxes and benefits from local charging measures, like the London congestion charge, will mean that their running costs might be much lower. Another unknown with AFVs will be their depreciation and maintenance costs.

Roadmap for technological improvement

Table 15 - Pros and cons of different technologies/fuels

Technology	Pro	Con
Internal combustion Engine (ICE)	Technology already in place Consumers accept technology Proven technology - safe, reliable Further efficiency possible Refuelling quick and easy Refuelling infrastructure in place Service/maintence system in place	Alternatives seen as greener Price of fossil fuels high and may rise
ICE using Biofuel	Possible lower well-to-wheel emissions Can make use of variety of feedstock Can improve diversity of supply	Issue of sourcing of feedstock Public perception poor-food vs fuel Still produces CO_2, including indirect Fuel quality issues
Hybrid	Technology already in place Reasonable range Fewer tailpipe emissions than ICE	Expensive Complex Still has some emissions
Pure electric vehicle (EVs)	Zero emissions at tailpipe Cheap to recharge Easy to drive Fewer parts - cheaper to maintain Quiet	Where is the electricity sourced? Slow to recharge Expensive to produce batteries Infrastructure at early stage Use scarce materials to make batteries
Plug in Hybrid (PHV)	As EVs but removed range anxiety	As EV, but no recharging issue or need for new infrastructure
Extended range EVs (E-Rev)	As EVs but removed range anxiety	As EV, but no recharging issue or need for new infrastructure
Fuel cell	Zero emissions at tailpipe Hydrogen in plentiful supply Quick to refuel Provides fuel security of supply	Expensive to produce vehicle Expensive to produce hydrogen Energy intensive to produce hydrogen Need refuelling infrastructure

138. It is still to be determined how much CO_2 savings AFVs will ultimately deliver. For electric vehicles much will depend upon the power source for the electricity. Renewable energy would mean electric vehicles achieve zero well-to-wheel emissions. However, in the UK, given our electricity generation mix, it is estimated an EV produces CO_2 emissions of around 80g/km. In France, where the electricity is lower carbon, the CO_2 emissions of an EV are estimated to be less then 5g/km. It should be noted that there are also CO_2 emissions associated with the extraction, refinement and delivery of oil-based fuels used in petrol/diesel vehicles.

139. There are concerns over the increased demand on the grid that electrification of the vehicle fleet might require. Government is looking at myriad measures to encourage investment in new power generation and particularly in lower carbon generation. Recharging at night, when there is less demand on the grid, could make effective use of the existing power supply. Charging infrastructure could be put in place to encourage the timing of recharging. EVs also offer the capability of being interactive with the energy supply system and potentially storing energy which can be extracted by the main grid during times when the vehicles are not in use, provided they will be powered up in time for them to be driven.

140. Range anxiety has been cited as a key concern for motorists in the switch to Pure EVs. Pure EVs typically deliver around a 100 mile range and require a number of hours to recharge. Many petrol/diesel cars deliver 500 mile ranges from a tank of fuel and can be refuelled in minutes. While cars may only typically be driven well under 100 miles per day, EVs are at present not suited to long distance journeys. Battery technology is being developed to overcome these range issues. Alternatively some manufacturers are looking at battery exchanges as a way of overcoming the issue. Inductive power transfers (even while the vehicle is moving) are being explored as longer term solutions.

141. Manufacturers are looking at an array of models to achieve their fleet average targets under the EU regulations. This might entail them offering many different technologies or downsizing their products.

Roadmap for technological improvement

142. The motor industry is heavily committed to introducing lower CO_2 emitting models. Below are details of some of the models soon to be introduced or being developed.

Audi - has shown its e-tron Spyder, a hybrid capable of 120mpg and 59g/km CO_2.
BMW - building on the success of the Efficient Dynamics programme, BMW will roll out further CO_2 saving technologies, with the introduction of hybrid models (2011), electric cars (2013) and ultra light-weight carbon-fibre body shells (2013).
Chevrolet - will introduce the Volt electric car in 2012.
Ford - will introduce its first all-electric car, the Focus Electric to Europe in 2012. It is one of five new electrified vehicles. Ford of Europe is also bringing hybrid electric vehicles to market in 2013. A new version of the Mondeo ECOnetic will be available this year, featuring stop-start technology and CO_2 emissions of 114g/km.
Honda - already has three hybrid models on sale and is expected to widen further the number of models with this technology. The hydrogen-powered FCX Clarity fuel cell vehicle represents the long-term technology direction of the firm.
Hyundai - currently sells a electric version of the i10 in Korea called the BlueOn. The Ix-metro pure EV is expected to be launched this winter.
Nissan - the Leaf EV is on sale from March 2011. It has a 100 mile range, uses lithium-ion batteries and takes eight hours for a standard charge, but would get an 80% charge within 30 minutes on a rapid-charger.
Jaguar Land Rover - has developed diesel-electric plug-in hybrid models.
Mitsubishi - has the i-MiEV on sale already. This EV has an 80 mile range, takes six hours to charge which costs an estimated £1. Mitsubishi has entered a joint venture with PSA to produce an EV for Europe, possibly to be built in the EU.
MINI - 99g/km models through the MINIMALISM programme have been launched and more fuel-efficient models and engines are due.
PSA Peugeot Citroën - the Citroën C-Zero and Peugeot iOn electric car are both now on sale. Peugeot and Citroën have shown a number of electric concept cars, including the EX1, HR1, SR1, S, BB1, CCactus, Survolt and Revolte. A world first, diesel-electric hybrid Peugeot 3008 and a Citroen DS5 will be unveiled in 2011.
Porsche - has a hybrid Cayenne already and plans to launch sports cars using regenerative braking to charge a battery which provides additional power to the ICE.
Renault - have four EVs to be launched over the next two years, the Twizy, Kangoo, Zoe and Fluence.
Rolls Royce - has developed an electric Phantom.
Tata - its pure EV Vista was launched in 2011.
Toyota - has been the market leader in hybrid vehicles. Plug-in hybrid versions of the Prius have already been registered and the car is expected to go on public sale in 2012.
Vauxhall - will launch the Ampera in 2012. This is an extended range electric vehicle. It has a 40 mile battery range with an internal combustion engine to provide additional range to power an electric motor.
Volkswagen - has tested fuel cell vehicles combined with electric battery - the HyMotion product and is also developing plug-in hybrid vehicles, such as the Golf twinDRIVE which has a 50km range on pure EV .

Low volume manufacturers Westfield, Lightning, Morgan, Fisker, Ginetta and TH!NK are among those due to bring pure-EVs to the market.

UK government CO_2 targets

- UK has legally binding targets to reduce total UK GHG emissions by 34% by 2020 and 80% by 2050.
- No specific transport or car target, but transport will have to contribute to overall UK target.
- Committee on Climate Change says EU target could go to 80g/km by 2020.

143. The UK has set legally binding targets on greenhouse gas (GHG) emissions reductions of 34% by 2020 and 80% by 2050 from a 1990 base. These targets go beyond the EU targets, to make a 20% reduction by 2020 from a 1990 base. There have been calls for the EU target to move to 30%, but there is strong debate over whether these should only be applied if there is international agreement for other nations to reduce their emissions, to ensure the competitiveness of the EU is not undermined.

144. The UK government set up the Committee on Climate Change (CCC) (www.theccc.org.uk) to provide independent advice and Carbon Budget proposals. The government is not bound to adopt the CCC's proposals. The CCC's Fourth Carbon Budget was published in December 2010 and sets out the CCC's ambition for emissions reduction to 2030.

145. The CCC acknowledges that 'significant' reductions in new car CO_2 emissions have been made. The CCC says the EU new car CO_2 regulation should deliver continued improvement. However, the Committee believes that the UK will not reach the EU target through technology alone and proposes need for policy on consumer advice.

146. The CCC believes the EU target for new cars should be further tightened to 80g/km by 2020. The current proposal is 95g/km, subject to impact assessment. The CCC proposal is more than 15% more stringent and would mean that in 2020 the average new car would emit over 40% less CO_2 than the 2015 target - requiring an average annual rate of improvement of more than 7.5%. This would be significantly above any improvement previously achieved and heavily reliant on an optimistic uptake of EV and plug-in electric hybrids.

147. According to the CCC, battery electric and plug-in hybrid electric cars and vans can become cost-effective during the 2020s. The CCC forecast that by 2020 EV and plug-in electric hybrids could account for 16% of the new car market, and 5% of the total fleet with 1.7 million vehicles. The Committee suggests there is scope to achieve 60% penetration of the new car market by 2030. These levels are far above other expectations on the take-up of such vehicles.

148. The CCC suggests that government should make a target to achieve a particular EV share of the market. It notes that Japan has set such a commitment, at 15-20% by 2020.

149. The CCC said the proposed £400 million incentive package to encourage the take up of EVs and the necessary infrastructure was a 'welcome start'.

150. The level of incentive has subsequently been trimmed back, with the Plug-In Car Grant cut from £230 million to £43 million. The Plug-In Places infrastructure grant of £30 million has been retained.

151. There is acknowledgment that there needs to be a reduction in battery costs to make EVs competitive. There also needs to be improvement in the availability of electricity to cope with the additional demand from transport and to ensure that the electricity is generated from a clean source. The CCC says that at present an EV using electricity from a gas-fired power station is emitting around 80g/km of CO_2 - not that different from some of the cleanest petrol and diesel engined vehicles (note petrol/diesel CO_2 figures refer to the tailpipe only and do not include the CO_2 associated with the extraction, production and distribution of the fuel used).

152. The CCC believes further progress on reducing total CO_2 emissions from cars in use can be made through increasing biofuel use, by developing the electric vehicle market, through 'Smarter Choices', eco -driving and better land use/transport planning.

153. The Committee suggests biofuel use should rise from its current 2.9% to 8%, in line with the Gallagher Report findings. The renewable transport fuels obligation (RTFO) is for 10% of fuel to be from renewable sources by 2020. Increased biofuel use would come from all new cars being able to use a percentage blend, in addition to any vehicles which can run on much higher levels of biofuel (eg E85).

154. The CCC believes 'Smarter Choices' - local authorities working with employers and the public to provide help with travel planning, travel information (eg on car pooling, home working, switching to public transport) could provide CO_2 savings of 4-8%. It is unclear how this measure will be taken forward by local authorities facing budget cuts due to the austerity measures.

155. The CCC is also supportive of eco-driving, but suggests that the net reduction in emissions would be relatively small and costly to achieve if everyone in the population were to receive training. They believe heavy goods vehicle drivers and company car drivers, who do a higher than average mileage, would benefit most.

156. The CCC also notes the potential uptake of other alternative fuels, such as hydrogen. It suggests that the infrastructure costs of hydrogen will detract from significant uptake. It also notes that several vehicle manufacturers have test vehicles in place and that other nations, such as Germany, are set to invest significantly in infrastructure.

Government measures to reduce car CO_2 emissions

- Variety of measures put in place to encourage development and take-up of lower polluting vehicles.
- Special focus on electric vehicles, with Plug-In Car Grant and tax incentives.
- Industry and consumers seek longer term stable planning and pathways to achieve desired goals.

157. There are a variety of different measures in place aiming to encourage consumers into lower CO_2 emitting vehicles. Government also has a number of measures to help enable the automotive industry to deliver those vehicles.

158. The New Automotive Innovation and Growth Team (NAIGT) was established to provide stakeholders with a forum collaboratively to identify and agree a strategic view of the innovation and growth challenges facing the automotive industry. In 2009 the high level Automotive Council (www.automotivecouncil.co.uk) was formed to pursue the NAIGT agenda. The Council aims to encourage investment in the UK automotive industry, particularly in low carbon technologies, to develop further the technology roadmaps for low carbon vehicles and fuels (as set out by the NAIGT), to strengthen the supply chain, provide a stronger public voice for industry and ensure strategic, continuous conversation between government and the automotive industry in the UK.

159. The Technology Strategy Board is a business-led executive and non-departmental public body, established by government, to promote and support research into, and development and exploitation of, technology and innovation. Part of the £24 million awarded last September went on projects to develop new engines for the plug-in hybrid versions of Nissan, Lotus and Jaguar Land Rover vehicles.

160. The TSB helped introduce the Ultra-Low Carbon Demonstrator programme. This is a £25.5 million project to put 340 EVs (pure EVs and PHV emitting CO_2 <50g/km) and fuel cell vehicles into use better to understand how such vehicles would be used in real world driving experiences.

161. The Office for Low Emission Vehicles (OLEV) was set up in 2009 and is a cross-government team aimed at positioning the UK as a world leader in ultra-low carbon vehicles by bringing together existing policy and funding streams to drive and streamline policy delivery. It incorporates policies, people and funding from the Department for Transport (DfT), Department for Business Innovation and Skills (BIS) and the Department of Energy and Climate Change (DECC), with partners including the Energy Technologies Institute and Technology Strategy Board. As of December 2010 it had £400 million funding, including £300 million for consumer incentives, £80 million for R&D and £30 million for infrastructure support.

162. OLEV administers the Plug-In Car Grant (http://www.dft.gov.uk/pgr/sustainable/olev/grant1/). This is a £43 million fund to provide a 25% discount, up to a maximum of £5,000, for anyone buying a qualifying electric car or plug in hybrid from January 2011. The Plug-In Car Grant will be reviewed in January 2012.

163. Only new cars (M1 classified vehicles, not vans or quadricycles), emitting less than 75g/km of CO_2 and meeting minimum range (70 miles EVs, PHV electric range 10 miles), warranty, battery performance, safety and minimum top speed qualify for the Plug-In Car Grant. The discounts are given via the vehicle dealerships, so the consumer does not have to apply for a grant themselves.

164. OLEV publishes a list of the qualifying models, which to date includes: the Mitsubishi i-MiEV (available from January 2011), smart fortwo EV (January 2011), Peugeot iOn (January 2011), Nissan Leaf (March 2011), Tata Vista (March 2011), Citroën C-Zero (early 2011), Vauxhall Ampera (early 2012), Toyota Prius - plug-in (early 2012) and Chevrolet Volt (early 2012).

165. OLEV also administers the Plugged-In Places scheme, which aims to introduce the recharging infrastructure needed. In the first round of the scheme £8.8 million was given to London, Milton Keynes and the North East to put in 11,000 charging points within three years. The second round saw five regions - Midlands, Great Manchester, East of England, Scotland and Northern Ireland - get funding for a further 4,000 charging points. The Coalition Agreement gave a commitment to mandate a national recharging network.

166. The proposed Green Investment Bank, as announced in the 2010 Budget, has £1bn to invest in low carbon technologies. Details are still to be finalised but industry is hopeful it will cover investments in the automotive sector.

167. A number of local measures are also in place to lower CO_2 emissions from transport. The London congestion charge has a CO_2 element, whereby cars below 100g/km do not pay the charge. This equates to a £10 saving a day, some £1,700 per annum (noting discounts are available). Several councils also offer parking discounts to certain types of vehicles, for example EVs park for free in the City of Westminster.

168. To help offset the impact of recession the government introduced some crisis management measures, such as the Automotive Assistance Project (AAP) and the SIS. The AAP was a £2.3 billion programme designed to give loans and loan guarantees to low carbon investment projects. As an example of the AAP Nissan will get £20 million support to produce an electric vehicle in the UK, with output expected in 2013. The SIS (see page 8) was designed to help support jobs in the sector, but also resulted in higher registrations of low CO_2 emitting cars.

Government measures to reduce car CO_2 emissions

Taxation measures

- Fuel duty to rise by 1p above inflation, but rates set on a Budget-by-Budget basis.
- Company car tax set to reform. VED system has already undergone changes.
- Policies should be harmonised, provide long-term stability and send consistent messages.

169. The UK already has in place a number of different tax initiatives which are helping consumers to choose lower CO_2 emitting vehicles, as detailed earlier in this report. Only the tax on fuel use is directly related to the polluter pays principle and mileage driven. A linear based CO_2 tax system would encourage change at every level, rather than the current banded systems of VED and CCT.

170. SMMT supports clarity and certainty ahead and is mindful of the high level of taxes already placed on UK motorists.

171. Vehicle excise duty (VED) has been CO_2 based since 2001 and since then the number of bands has been expanded. In 2009 it was broadened to a 13 band system. In 2010 differential first year rates were introduced. Whilst SMMT supports a period of stability in the VED system, VED is a tax on the ownership not use of a vehicle. The first year rates are unnecessary and provide a negative signal to the purchase of cars over 150g/km. This could slow down the replacement of such vehicles, noting that whilst some vehicle types (eg larger vehicles or automatics) may necessarily have higher emissions than average, newer products are continuously lower emitting than older products and VED should not slow up the replacement of the vehicle fleet.

172. Company car tax (CCT) has been CO_2 based since 2002. The government has provided future rates several years in advance, which have provided consumers and businesses with a welcome pathway to plan against. The move in 2010 to ensure zero emitting cars paid a 0% rate for five years was very welcome. There was also the introduction of a new 5% rate for cars emitting 75g/km or less of CO_2. In 2011 the 15% threshold will come down from 130g/km to 125g/km and in 2012-13 the scheme will be revised further so that the 10% rate (currently on cars emitting 120g/km or less) will apply to cars with CO_2 emissions up to 99g/km, the rate of emissions for a 100g/km will be 11% and increase by 1% for each 5g/km up to a maximum of 35%. From 2015-16 the rate for zero emissions cars reverts to 9% and the special rule for cars emitting 75g/km or less will be abolished.

173. The changes due to be phased in should be respected, but SMMT would continue to press for the diesel surcharge (of 3%) to be withdrawn. This would align with a technology neutral approach and reflect current Euro standards in which emissions of particulates have already been significantly tightened (the surcharge was originally said to reflect concerns about other emissions from diesels). See Annex 3 for Euro standard levels and also how carbon monoxide, nitrogen oxide and particulate emissions from all cars in use have fallen over time.

174. Fuel duty is set to rise by 1p per litre above the rate of inflation in April 2011, and the following years to 2014. Setting a pathway for future rate changes is again helpful for planning. It is well recognised that fuel duty is collected to meet general government spending needs, but does help meet environmental aims too. It directly relates to the polluter pays principle. At a time when the underlying fuel prices (pump price less taxes) are high and rising, implementing the planned regular duty increases may be unnecessary to achieve environmental aims, but would be inflationary.

175. Removing the 20p per litre incentive for biofuels in April 2010 has unsettled the incentive to use higher blend biofuels such as E85 or Flexfuel. This could limit the development of such vehicles and may also jeopardise the achievement of the Renewables Transport Fuels Obligation (RTFO).

176. In 2009, government introduced a 100% first year writing down allowances for vehicles with CO_2 up to 110g/km, to encourage the take-up of low emitting vehicles, including electric powered vehicles.

177. Industry would like to see fiscal and charging instruments harmonised across markets, to ensure vehicle technologies can be designed to meet global needs, rather than a country specific set of environmental criteria.

178. Within the UK localised fiscal or charging measures, such as congestion charging or parking regimes, should also try to adopt harmonised rules to ensure industry and also consumers are not faced with disparity or confusion.

179. Road pricing is not expected to be introduced at present. A proposal to ration space on the roads could be linked with measures to encourage the shift to lower CO_2 emitting vehicles. It may also be welcome to boost revenues and overcome concerns over lost public sector revenue from electrification of the fleet. However, the net cost impact on motorists, the need for costly infrastructure and enforcement, as well as concerns over civil liberties all need to be overcome before road pricing could be nationally adopted.

Consumer action to reduce car CO_2 emissions

- Consumers can take action to reduce emissions immediately.
- Driving more efficiently, consumers would save money and lower emissions.
- Consumer actions could lower emissions without the need for expensive technologies.

180. Consumers can take a number of actions to reduce emissions from cars. These include:

- buying lower CO_2 emitting vehicles
- fitting energy-saving tyres
- maintaining the vehicle correctly
- reducing weight in the vehicle
- monitoring fuel consumption
- using journey planners/sat nav
- driving more conservatively
- driving less miles

181.Consumers could decide whether they need to make the journey in the first place. Working from home, internet shopping, etc could cut down on the need to drive.

182. Motorists could decide whether to use their car for specific journeys or whether an effective alternative exists, such as walking or public transport, that may offer a lower CO_2 emissions journey.

183. If the motorist does decide to drive, they could more effectively plan their journey to reduce mileage. Use of on-board satellite navigation systems would help achieve this aim.

184. Driving more optimally, known as 'eco-driving', can deliver significant CO_2 savings. This includes driving smoothly and changing gear at around 2,500 rpm (revs per minute as indicated on the rev counter) for a petrol car and 2,000 rpm for a diesel car. The Energy Saving Trust suggests 5-12% savings could be made from eco-driving. While some training might be needed, these actions would deliver immediate real world effects and not require costly technological changes to the vehicle.

185. Drivers are advised to drive modern cars straight from cold, as they do not need to warm up before use. Fuel can also be saved by switching the car off when stationary for more than a minute or two, as modern cars use virtually no more fuel when starting-up.

186. The vehicle manufacturers often provide information to consumers on how to use their products most effectively. Some manufacturers even provide driver training programmes. One such example is the Ford Econo Check service. In this specific scheme a data logger is fitted to the customer's vehicle for seven days and records driver behaviour - accelerations, speed, braking etc. A detailed report is then produced for the customer suggesting how they could improve their driving style and advising how much they could save in fuel costs. The scheme is open to all Ford cars up to 12 years old. Ford estimates that saving of up to 25% in fuel use can be achieved, equivalent to £470 savings given an annual consumption of 12,000 miles a year for the average motorist.

187. Monitoring fuel consumption, or emissions, would allow the motorist to understand better the impact of their actions and also enable them to assess how different journeys, time of journeys, vehicles and driving style influences their fuel usage.

188. Ensuring the car is properly maintained, tyres are correctly inflated, and not carrying excessive weight around with them (eg removing roof-racks or bike carriers when not in use) can also help motorists ensure their current vehicle is being used most efficiently.

189. Alterations could be made to the existing vehicle, such as fitting energy-saving tyres, to enhance efficiency further.

190. Consumers should also opt for 'best in class CO_2 performers' which fulfil their personal needs when choosing a new or used car. As detailed throughout this report there is a growing abundance of lower CO_2 emitting cars in every segment and vehicle type to choose from.

Chapter Four - Van CO_2 emissions

191. Commercial vehicles (CVs) make up 6.9% of total emissions from road transport, with vans representing over 40% of that (and 2.9% of the total). In February 2011 a new European van CO_2 emissions regulation was adopted. This chapter details this regulation, highlights the difference between targets for cars and vans, looks at progress made in emissions reductions and highlights how overall van CO_2 emissions have moved changed.

EU new van CO_2 regulation

- EU-wide van CO_2 emissions target of 175g/km in 2014-17.
- Target to be tightened to 147g/km by 2020, subject to review in 2013.
- Van market very different to cars, with diverse products to meet tailored business needs.

192. SMMT does not currently produce the same CO_2 market data for vans and other vehicles as it has for cars. As such, it cannot provide an average van CO_2 figure for the UK. Vans are light commercial vehicles (LCVs) up to 3.5 tonnes in weight.

193. The European Commission reports that the average new van in 2007 in the EU produced 203g/km of CO_2. The EU regulation sets challenging targets for a 14% reduction from this level by 2014-17 to 175g/km and a 28% reduction by 2020. The 147g/km target for 2020 is a 16% reduction from the 2014-17 level. As with cars, van makers face a mass-based target for the average CO_2 emissions of their new registrations across the EU. This will enable manufacturers to continue to sell a diverse range of models.

194. The 175g/km target will be phased in, as with the new car CO_2 regulation. 70% of each manufacturer's fleet will have to comply in 2014, 75% in 2015, 80% in 2016 and 100% from 2017 onwards. As with cars the same penalties will apply, €95 per gram over target, but with lower fines for the first 3g excess emissions. Also as with cars, super-credits will be awarded for vans below 50g/km, counting for 3.5 vehicles in 2014 and 2015, 2.5 in 2016, 1.5 in 2017 and then equivalence from 2018 onwards. An eco-innovation credit is also possible, up to 7g/km on a manufacturer's fleet target. Independent manufacturers registering less than 22,000 vehicles per year in the EU will be eligible to apply for a derogation for an individual target reflecting their economic and technical potential to reduce CO_2.

195. Determining CO_2 levels of individual vans is complex, as the base vehicles can be fitted with a number of different floor plans (eg short/long wheelbase) and, a number of different body styles (eg panel, van, flat bed, high roof). The payload will also have an impact on emissions.

196. As vans are used as work tools, operators are already very conscious of the costs involved with running them and look to improve efficiency wherever is possible. But they are also mindful vans tend to travel a higher mileages and have a strong need for reliability. The CO_2 savings potential for LCV is limited with conventional technology, as 99.5% of new vans are already equipped with diesel engines. Technology cannot simply be migrated from cars to vans, they are very different vehicles, as are the demands placed on them. Some technologies have limited potential in LCVs because of customer demands and requirements, eg engine downsizing or similar, that reduce power and so load volume.

197. Vans are very different to cars, in relation to who buys them, what drives that decision and what they use the vehicle for. Van purchasing and use is directly related to an economic activity and the particular vehicle chosen will have to deliver on certain parameters, eg having enough space, payload, access and so forth. Vans also tend to have a longer model cycle, reflecting the lower production volumes each unit achieves in comparison to cars. Vans also have a seven year development phase, in comparison to five years for a car.

198. New, lower CO_2 emitting technologies will be fitted to vans in the future, including alternatively fuelled vehicles such as hybrid and battery-electric vans. These technologies might first find application in niche markets, such as vehicles used purely in urban areas. In 2012 Ford will launch an electric Transit Connect van and other manufacturers will offer similarly innovative technologies.

199. The new van market in the UK grew by over 40% between 2000 and 2007, rising from 239,296 units to 337,636 units, averaging over 5% growth per annum (cars by comparison grew by just over 1%). The market though was severely hit by the recession, falling 45% in two years to 186,386 units in 2009. The market recovered in 2010, up 19.6% to 222,915 units. Since 2000 the van market has shifted towards larger vehicles, with over 80% of the market since 2006 over 2 tonnes, up from a third in 2000. The Scrappage Incentive Scheme, in 2009-10 had only a small impact on van sales, with just over 7,000 units, representing less than 3% of total van registrations.

200. In 2009 SMMT, in association with the DfT and VCA, produced a guide to inform users how to make the right choice when buying a van (see 'Right Van Man' at www.smmt.co.uk/publications) and also set up a database to allow buyers to search for a new van and compare CO_2 and fuel consumption data (see www.businesslink.gov.uk/vanfueldata).

201. Government made electric vans exempt from the van benefit charge (currently £3,000 per annum) for five years from April 2010 and purchase of electric vans is also eligible for 100% first-year writing down allowances (businesses can claim capital allowances to reduce the tax they pay on profits for the purchase of certain products or investments).

Van CO_2 emissions

Total van CO_2 emissions

- Van CO_2 emissions fell in 2009, reflecting the impact of recession as well as technological progress.
- Between 2000 and 2007, total van CO_2 emissions rose strongly, as van use increased.
- Van usage is directly related to economic activity.

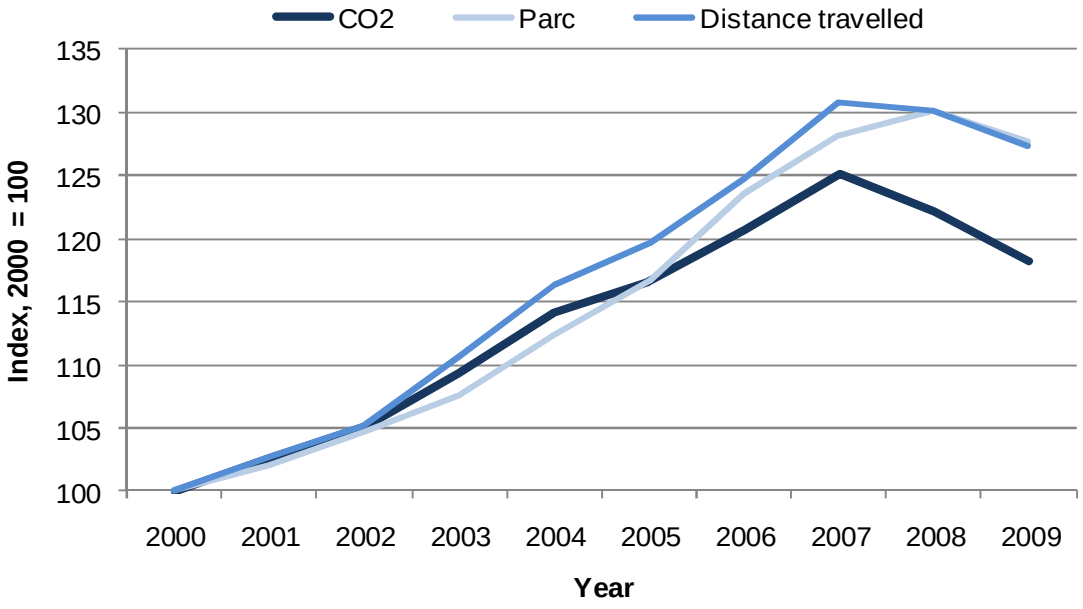
Table 16 - Total van CO_2 emissions, fuel consumption, distance travelled and UK parc size (Source DECC, DfT and SMMT)

Year	Total CO_2 ($MtCO_2$)	Distance travelled (bn kms)	Parc size (mn)
2000	12.8	52.3	2.8
2008	15.6	68.1	3.6
2009	15.1	66.6	3.5
% ch - '09 vs '08	-3.2%	-2.2%	-1.8%
% ch - '09 vs '00	18.2%	27.3%	27.7%

202. Vans are used as business tools. Their number and use will directly relate to the needs of the business community. Strong and stable economic growth, coupled with small business growth, the construction sector and increased home deliveries, all contributed to rapid growth in van sales, and so the total parc and distance travelled. Since 2000 the parc size and average distance travelled both increased by over 27%, despite recording declines in both 2008 and 2009.

203. Between 2000 and 2009 total CO_2 emissions from vans rose 18.2%. However, emissions have fallen in each of the past two years, with a 3.2% fall last year. This decline is largely due to the impact of the recession, which saw the total distance travelled fall. It is, however, notable that since 2000 CO_2 emissions from vans have not risen as sharply as the total distance travelled, but have fallen faster than distance travelled in the last two years (note the two lines diverge in Chart 24). This is likely to be the result of the technological progress that has been achieved, with increased use of more efficient diesel engines, as well as improvements in other areas of vehicle efficiency. While rapid progress is being sought in further CO_2 emissions reductions, the physical size and shape of vans may make progress difficult to achieve.

Chart 24 Growth in total van CO_2 emissions, parc and distance travelled (Source DECC/SMMT/DfT)



Annex 1 - Historical CO_2 data

204. SMMT has published an annual CO_2 report since 2000 and has new car CO_2 data from 1997 onwards. This 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. Since 2003 the low volume of missing data was estimated by using other models in the range or using models of a similar segment/engine size and type. SMMT believes its database is the most accurate and reliable available and therefore provides the best source for analysing the UK's performance. The data is collated by SMMT's Motor Vehicles Registration Information Service (MVRIS). It links vehicles' CO_2 levels to the MVRIS new car registration database.

Table 17 - Average new car CO_2 emissions in the UK (Source SMMT)

Year	Average CO_2g/km	y/y % change	y/y % change on 1997
1997	189.8		
1998	188.4	-0.7%	-0.7%
1999	185.0	-1.8%	-2.5%
2000	181.0	-2.2%	-4.6%
2001	177.6	-1.9%	-6.4%
2002	174.2	-1.9%	-8.2%
2003	172.1	-1.2%	-9.3%
2004	171.4	-0.4%	-9.7%
2005	169.4	-1.2%	-10.7%
2006	167.2	-1.3%	-11.9%
2007	164.9	-1.4%	-13.1%
2008	158.0	-4.2%	-16.8%
2009	149.5	-5.4%	-21.2%
2010	144.2	-3.5%	-24.0%

Annex 2 - SMMT MVRIS Segmentation

A	=	Mini	(eg Hyundai i10)
B	=	Supermini	(eg Ford Fiesta)
C	=	Lower medium	(eg Vauxhall Astra)
D	=	Upper medium	(eg BMW 3 Series)
E	=	Executive	(eg Mercedes E Class)
F	=	Luxury saloon	(eg Jaguar XJ series)
G	=	Specialist sports	(eg VW Scirocco, Porsche 911)
H	=	Dual purpose	(eg Land Rover Freelander)
I	=	Multi purpose vehicle (MPV)	(eg Vauxhall Zafira)

Segment A - Mini—Engine size normally <1.0 litre, body style 'miniature', length normally <3,050mm (10 feet)

Segment B - Supermini—Normally between 1.0 - 1.4L, body style bigger than Mini segment, length normally <3,745 mm (12.5 feet), performance greater than Mini segment car

Segment C - Lower medium—Normally between 1.3 - 2.0L, length of saloon <4,230 mm (14 feet).

Segment D - Upper medium—Normally between 1.6 - 2.8L, length of saloon normally <4,470 mm (14.9 feet).

Segment E - Executive—Normally between 2.0 - 3.5L, body style generally bigger than upper medium, normally four doors, length of saloon normally not exceeding 4,800 mm (16 feet) and usually more luxuriously appointed than upper medium.

Segment F - Luxury saloon— Normally above 3.5L and most luxurious available.

Segment G - Specialist sports—Sports coupes, sports saloons and traditional sports cars.

Segment H - Dual purpose 4x4 off-road (note, not all models in range may have 4x4 powertrains).

Segment I - Multi purpose vehicle (MPV) 4x2 or 4x4 estates with a seating capacity of up to eight people.

Annex 3 - Other pollutants

Table 18 - Euro standards

Standard	Date	Emissions limit		
		Petrol NOx mg/km	Diesel NOx mg/km	Diesel PM mg/km
Euro 0		1000	1600	no limit
Euro 1	1992	490 (-51%)	780 (-51%)	140
Euro 2	1997	250 (-75%)	730 (-54%)	100 (-29%)
Euro 3	2001	150 (-85%)	500 (-69%)	50 (-64%)
Euro 4	2006	80 (-92%)	250 (-84%)	25 (-82%)
Euro 5	2011	60 (-94%)	180 (-89%)	5 (-96%)
Euro 6	2015	60 (-94%)	80 (-95%)	5 (-96%)

205. Euro standards, or European emission standards, define the regulated limits of exhaust emissions of new vehicles sold in the EU. The standards cover carbon monoxide (CO), nitrogen oxide (NOx), hydrocarbons (HC) and particulate matter (PM).

206. The standards cover most vehicle types and are tested via the standardised NEDC test cycle. Table A shows the limits for all types of cars (typically new car approval types have to meet the limits one year in advance of all cars).

207. Table 18 shows that emission standards have generally improved by around 90% by Euro 5, compared with Euro 0 standards. Euro 5 standard had limits for petrol NOx down 25% on Euro 4 limits, 28% for diesel NOx and 80% for diesel PMs.

208. The introduction of these standards has helped air quality from all cars in use fall, as shown in Table 19. CO emissions were down over 60% between 2000 and 2008, NOx levels down over 50% and particulates down over 20%. These falls have been achieved despite the increased number of cars in use and higher annual mileages since 2000.

Table 19 - other selected pollutants from transport (Source TSGB)

'000 tonnes	**2000**	**2007**	**2008**	'08 vs '07	'08 vs '00
Carbon monoxide (CO)					
Passenger cars	3,421	1,501	1,362	-9.3%	-60.2%
Road transport	3,858	1,703	1,537	-9.7%	-60.2%
All transport	3,938	1,767	1,598	-9.6%	-59.4%
Nitrogen oxides (NOx)					
Passenger cars	359	187	172	-8.0%	-52.1%
Road transport	753	498	450	-9.6%	-40.2%
All transport	873	658	619	-5.9%	-29.1%
Particulates (PM10)					
Passenger cars	7.9	6.5	6.2	-4.6%	-21.5%
Road transport	33.7	25.8	24.1	-6.6%	-28.5%
All transport	38.3	34.5	33.6	-2.6%	-12.3%

Summary Statistics

- Average new car CO_2 emissions fell by 3.5% in 2010, on 2009, to 144.2g/km.
- Emissions have fallen in every year and between 2000 and 2010 fell by 20.3%.
- Over half the market (56.5%) in 2010 emitted 140g/km or below CO_2 emissions.
- Market share for sub-100g/km cars doubled between 2009 and 2010 to 1.8%.
- Total CO_2 emissions from all cars in use fell by 2.7% in 2009 on 2008 and by 7.8% on 2000.

	2010	2009	2000
Average new car CO_2 emissions	**144.2g/km**	**149.5g/km**	**181.0g/km**
% change on 2000	-20.3%	-17.4%	
Share of market with CO_2 emissions:			
Up to 100g/km	1.8%	0.9%	0.0%
Up to 130g/km	38.2%	27.6%	0.9%
Up to 140g/km	56.5%	47.3%	8.2%
Total new car market	**2,030,846**	**1,994,999**	**2,221,647**
Diesel share	46.1%	41.7%	14.1%
AFV share	1.1%	0.8%	0.0%

	2009	2008	2000
Total CO_2 emissions from all cars in use*	**70.3MtCO_2**	**72.3MtCO_2**	**76.3MtCO_2**
Total number of cars in use	31.0Mn	30.3Mn	27.8Mn
Total distance travelled by cars**	400.7Bn kms	401.7Bn kms	367.8Bn kms

Sources
All data from SMMT, unless otherwise stated (* DECC, ** DfT)
MtCO_2 = million tonnes carbon dioxide
Mn = million
Bn kms = billion kilometres

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