The Society of Motor Manufacturers and Traders New Car CO_2 Report 2010

Driving down emissions

Introduction

Future automotive technology will play a vital role in cutting CO_2 emissions from road transport, forming an integral part of the shift to a low carbon economy. Talk of electric cars, hybrids and hydrogen fuel cells dominate discussions but what is often overlooked is the rate at which average new car CO_2 emissions are already falling and the contribution conventional technology can still make.

2009 saw one of the biggest economic challenges the automotive industry has ever seen with global sales plummeting, plants cutting production and R&D budgets at considerable risk. But it was also the year in which average new car CO_2 emissions fell by their biggest ever margin – down 5.4% year-on-year to under 150g/km.

New car CO_2 emissions have fallen across the board with technological advances and the innovative use of lightweight materials making today's large family saloons more efficient than a decade old supermini. There is no doubt that the recession had a considerable impact, with the Scrappage Incentive Scheme a key contributor. The average emissions of a car bought through the scheme were just 133.3g/km, 9.8% below the market average and 26.8% below the average CO_2 emissions of the car being scrapped.

Since figures were first recorded in 1997, average new car CO_2 emissions have fallen from nearly 190g/km to less than 150g/km, a 21.2% improvement. The industry is well on its way to meeting EU regulatory targets of a 130g/km fleet average by 2015, but the current rate of improvement must be maintained. While economic factors may have contributed to 2009's success, in the longer term, slower fleet renewal and a reduced willingness to invest in new technology may undermine this progress. Building consumer awareness and delivering effective mechanisms to influence buying behaviour through a long-term environmental tax regime and government's recently announced ultra-low carbon incentive scheme, will become increasingly important.

Ultra-low carbon technology has a vital role to play not just in the continued drive to cut CO_2 emissions, but in the economic future of the UK motor industry. The UK must strive to attract global investment in the high-skilled areas of design, R&D and advanced engineering to guarantee our position at the forefront of environmental innovation and production. The pace of change is increasing; the competition for new investment is intensifying and in this environment, coordination and collaboration between government and industry is essential.

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Chapter 1—Summary of car CO_2 emissions

Average new car CO_2 emissions

- Average new car CO_2 emissions showed best gain on record in 2009, down 5.4%.
- Emissions have fallen in each of the past 12 years, with a 21.2% gain since 1997.
- Continued efforts by industry and negative economic conditions aided 2009 result.

Table 1 Average new car CO_2 emissions in the UK

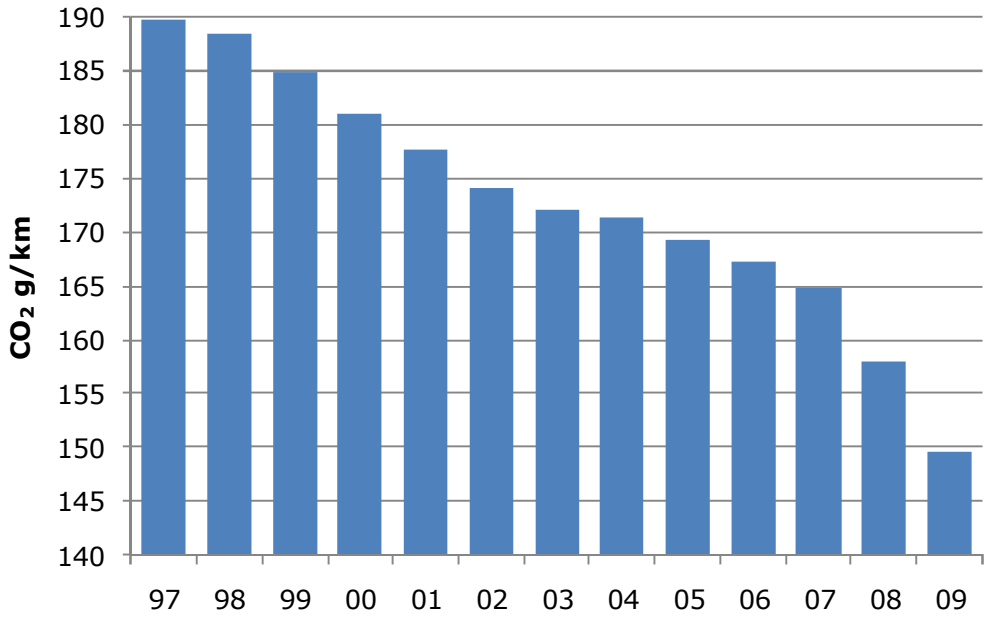
Year	Average CO_2 g/km	y/y % ch	y/y % ch vs 1997
1997	189.8		
2000	177.6	-1.9%	-6.4%
2008	158.0	-4.2%	-16.8%
2009	149.5	-5.4%	-21.2%

1. The combination of major investment and sustained improvement in vehicle technology, government policy and consumer behaviour has ensured continuous improvement in UK average new car CO_2 emissions. The 2009 performance also benefitted from a number of temporary measures, such as the introduction of the Scrappage Incentive Scheme and the impact of the recession.

2. Average new car CO_2 emissions fell by 5.4% or 8.5g/km between 2008 and 2009 to 149.5g/km. This was the best improvement since SMMT records began in 1997. In 2008 the pace of improvement had picked up, to a 4.2% gain, whereas in the previous five years the average rate had been 1.1%. Emissions have fallen in each of the past 12 years, with a 21.2% improvement or 40.3g/km since 1997 - an annual rate of 1.8% or 3.4g/km. Given that 85% of CO_2 emissions are associated with the in-use phase of a vehicle's lifetime emissions, these results are very encouraging.

3. Sustaining such progress will be tempered in the short term by economic recovery and the removal of the Scrappage Incentive Scheme. But as manufacturers respond to the challenge of the new European car CO_2 regulation, combined with national government policy measures and changing consumer sentiment, further gains should still result.

Chart 1 UK average new car CO_2 emissions (Source SMMT)



Influences on 2009 new car CO_2 emissions performance

4. Average new car CO_2 emissions have shown continuous improvement since SMMT first began reporting on the data. This section highlights and describes key influences on the reductions in emissions over time. Understanding the contribution each influence has made is far more complex and has not been undertaken.

Improved technology available

5. Ever since the car first appeared it has constantly evolved. Most recently that evolvement has focused on improving environmental efficiency, whilst at the same time delivering a vehicle that is safe, reliable, fit for purpose and reasonably priced.

6. Manufacturers have invested significant resource into improving conventional drive-train technologies as well as developing new technologies and bringing them to market.

7. Cars using internal combustion engines still account for over 99% of new car registrations. Increased down-sizing of engine capacity and use of turbo-charging or supercharging (or both) to maintain power levels have enabled emissions reductions. Improved direct injection systems and use of better oils to reduce friction have done a similar job. Improved and more efficient transmissions, more efficient components, such as air conditioning units and power steering, have meant more effective use of the power the engine is developing. Use of regenerative braking also provides an additional electrical power source, again ensuring less power is being drained from the engine to run ancillary components.

8. Use of hybridisation and alternative power sources for the engine have also been developed. Stop-start engines (where the engine automatically shuts down when not in use, and re-starts when needed) are often cited as the mildest form of hybridisation. Petrol -electric hybrids use an additional electric motor to power the vehicle. The electric motor can either power the wheels directly (eg as in the Toyota Prius) or provide an additional power source to the petrol engine (eg as in the Honda Insight). Petrol-electric hybrids accounted for 0.7% of UK new car registrations in 2009, with almost 15,000 units.

9. Electric vehicles and other alternatively fuelled vehicles are also being developed, although as yet have only appeared in very low volumes.

10. Use of improved aerodynamics and lightweight materials means reduced weight and less drag, so the engine can work more effectively. Light-weighting is a key area industry has been focusing on, but one that is often compromised by other factors, notably the move to enhanced safety features and consumer comfort. Crash cells, airbags, better brakes etc all add weight. Likewise, features to make the driving experience more comfortable, eg air-conditioning, electric seats, heated seats etc also add weight to the vehicle. The more weight a vehicle carries, the less efficient it becomes.

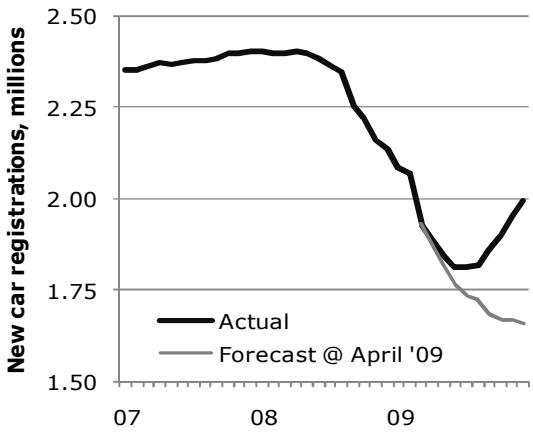
11. All manufacturers are adopting measures to reduce emissions across all their ranges. Some brands have increasingly 'signposted' models and variants as being particularly low CO_2 emitting (eg 'econetic', 'blue-motion' or 'greenline' badged ranges). These allow customers to identify quickly which models have been engineered for the lowest emissions.

Impact of recession on demand and emissions

12. UK GDP growth slowed from 2.6% in 2007 to 0.5% in 2008 and declined by 4.8% in 2009. The UK entered one of the worst recessions on record in 2008 and on a quarterly basis showed six consecutive declines until modest growth was recorded in Q4 2009. The recession caused a sharp drop in vehicle demand from both business and private buyers.

13. The impact of recession saw new car demand fall from 2.4 million in 2007 to 1.995 million units in 2009. Consumers and businesses alike saw their ability and willingness to buy constrained by the removal of cheap credit and concerns over the ability to sustain employment and income levels. The market decline would have been far more severe if not for the Scrappage Incentive Scheme (SIS). Chart 2 below shows the new car market on a rolling annual basis between 2007 and 2009, including the forecast made in April 2009, pre the SIS, when the market was expected to fall to 1.66 million units.

Chart 2 New car registrations



14. As new cars tend to be more efficient, the reduced market and slowdown in vehicle renewal rates will negatively impact the reduction in overall average new car emissions. Market shift to cheaper vehicles can have conflicting impacts on CO_2 emissions. On the one hand cheaper cars tend to be less well specified, so potentially lower CO_2 emitting. On the other hand some alternatively fuelled cars, or models that have been especially engineered to minimise emissions, may be more expensive to purchase. Sometimes the higher purchase price will be offset by lower running costs for low emitting vehicles. Competition has ensured that manufacturers have tried to reduce cost whilst improve efficiency. For example BMW's Efficient Dynamics and MINI's 'MINIMALISM' lower CO_2 technologies are not options and have been introduced at no additional cost to the consumer.

15. On balance, the impact of recession is likely to shift consumers into lower emitting vehicles and curtail demand for high-emitting models.

Scrappage Incentive Scheme (SIS)

16. Alongside other European countries, the UK government introduced a Scrappage Incentive Scheme (SIS) on 18 May 2009 to minimise the impact of recession on automotive manufacturing and employment. The SIS offered a £2,000 incentive, equally split between government and industry, to new car or van buyers scrapping a ten-year-old-vehicle. Final orders for new cars under the scheme are due to be taken by 31 March 2010, or earlier if the funds run out. Funds to allow up to 400,000 vehicles to participate were set aside by government. Further details on the SIS are presented in annex 1.

17. The UK scheme was not specifically designed to reduce emissions, but the improvements in environmental efficiency, across all market segments, over the last ten years meant the scheme had a positive impact on average new car CO_2 emissions, as well as on air quality, safety and security levels.

18.In 2009 approximately 285,000 cars were registered through the scheme. These cars represented 14.3% of the total market in 2009 and over 20% of registrations between May-December. The scheme appears to have largely served its main role of supporting the market and jobs in the automotive sector.

19. SMMT was able to link details of 85% of those cars registered through the SIS to the MVRIS database and show that those cars had an average CO_2 emissions figure of 133.3g/km. This was 9.8% below the average of all cars registered between May and December 2009 and some 27% below the 182g/km figure of the average scrapped car (based on segmentation of scrapped cars using the 1997 average CO_2 values). Chart 3 shows average CO_2 emissions of the cars registered through the SIS, total market (May-December) and cars scrapped through the scheme. The market was already moving en masse to lower CO_2 emitting models and even if all the SIS volumes were removed from the 2009 figures, the average CO_2 for the remaining cars was 152.2g/km, 3.7% down on the 2008 figure.

20. Some SISs that have been introduced elsewhere were conditional on the new car purchased having certain CO_2 or fuel consumption characteristics. However, the flat rate £2,000 discount in the UK scheme did promote the purchase of smaller, lower priced cars. Engines that are smaller are not necessarily more efficient. Cars bought through the SIS were predominantly petrol models, which have lower list prices but tend to have higher CO_2 emissions than diesel equivalent models. Downsizing is not the ultimate goal to tackling CO_2 emissions, as cars need to be fit for purpose and as chapter 2 will show, low CO_2 emitting cars can be found in many different sectors.

Chart 3 CO_2 emissions of cars—SIS new, scrapped and all new (May-Dec 09)

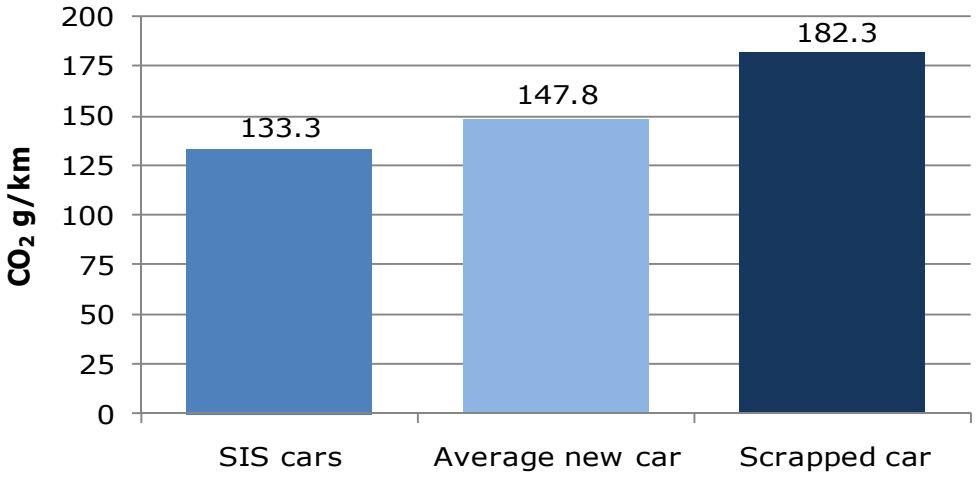
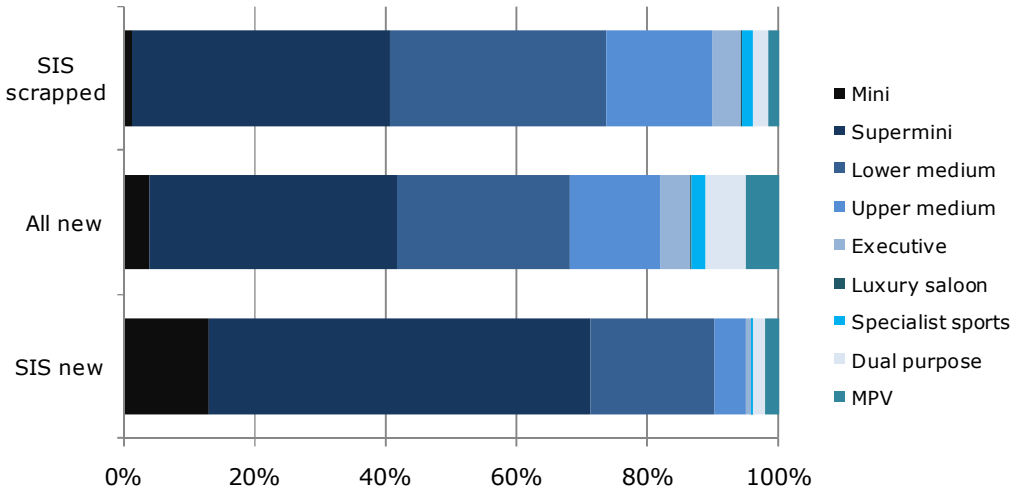


Chart 4 Market share by segment: SIS new, all new and scrapped (May-Dec '09)



21. New cars through the SIS were predominantly from the mini and supermini segments, with a 71.2% share of SIS volumes. Chart 4 shows the share of the market by MVRIS segment through the SIS, all new and cars scrapped through SIS (Annex 2 defines the MVRIS segments).

22. Based on a 50g/km improvement in CO_2 performance between the new and old car and average distance travelled by a private motorist (Transport Statistics GB 13,000km per annum in 2008) then CO_2 savings of 0.7 tonnes of CO_2 (tCO_2) per annum would be made. For the cars registered in 2009 through the SIS this equates to almost 200tCO_2 saved per annum or some one million tonnes CO_2 ($mtCO_2$) over a five year period. If 400,000 cars were to go through the scheme the effects would be a third higher, eg saving some 1.3$MtCO_2$ over five years. The size of the savings could be higher than calculated as older vehicles are more likely to be poorly maintained and not therefore operating as efficiently as they could. However, studies such as the Institute for Fiscal Studies (IFS—see http://www.ifs.org.uk/publications/4732) suggest the impact could be less as new cars may be driven further than the old cars they replace.

23. Replacing old cars with new will also ensure further environmental benefits in terms of air quality. Pre-1999 vehicles will have a Euro 2 engine as standard, or lower. A new car in 2009 would be Euro 4 or higher. These newer engines deliver at least a 50% reduction in harmful emissions (see Annex 3).

24. Besides these environmental benefits society would also see an improvement in the safety and security characteristics of vehicles in use. Most new cars now receive a four star or higher Euro NCAP safety rating (Euro NCAP provides independent assessment of safety performance. It uses a one-five star rating, five stars being the highest.). Newer cars also contain a large number of passive safety features, including better braking and traction systems, which should help prevent accidents occurring in the first place. New vehicles also benefit from better security features, which should cut down on the likelihood and therefore cost of theft.

Fuel prices

25. In 2008 petrol prices rose by 13.2% and diesel prices by 21.2% as the price of oil rose sharply, peaking at over $140 a barrel in July. Following the rapid rise in the price of fuel, demand for vehicles in particular segments of the market, such as the 4x4 dual purpose sector, fell sharply. While at the end of 2008 fuel prices eased, in 2009 they gradually built up again. Overall in 2009 petrol prices fell by 7.1% and diesel prices by 11.6%, but they ended 2009 25% higher for petrol and 11% higher for diesel than they started.

26. The rise in fuel prices in April 2009 onwards were a result of a combination of recovery in oil prices and also two rises in the duty rate. Planned increases in duty in 2008 were postponed due to the higher oil prices. In December 2008 duty rose to offset the cut in VAT to 15%. Duty rates rose again on 1 April and 1 September 2009. By December 2009 51.9% of the price of petrol and 51.1% of diesel was fuel duty, with VAT that share was 64.9% and 64.2% respectively. UK motorists pay the highest duty on diesel within the EU27 - 50% above the average, but the duty on petrol is a more modest 13.8% higher (Source: EC at 1 January 2009—see Chart 18 page 28).

Government policy, focus on taxation
27. Government policy, through taxation and moral suasion, has been to discourage buyers from higher CO_2 emitting models.

28. With fuel consumption and CO_2 emissions so closely linked, fuel duty acts as a tax on the direct use of a vehicle and adheres well to the polluter pays principle. The more fuel used the higher the amount of tax paid. Government also has in place a number of other taxes earmarked as having environmental attributes. Since 2001 vehicle excise duty (VED) has been based on CO_2 emissions for all cars newly registered. Since 2002 company car tax (CCT) has also been CO_2 based.

29. 2009 saw the VED rates move from a seven to 13 band system (see pages 14 and 28), in a move designed to encourage the shift to lower CO_2 emitting vehicles.

30. Further changes are due in 2010 with the introduction of a first year VED rate, which will see a top rate of £950 for those cars emitting over 255g/km and penalise all cars over 165g/km compared with the standard rate, while cars emitting below 130g/km will benefit from a zero rate first year VED charge. SMMT believes the first year VED rates should be deferred for a year, to provide stability to the market, rather than provide any reason to defer buying new.

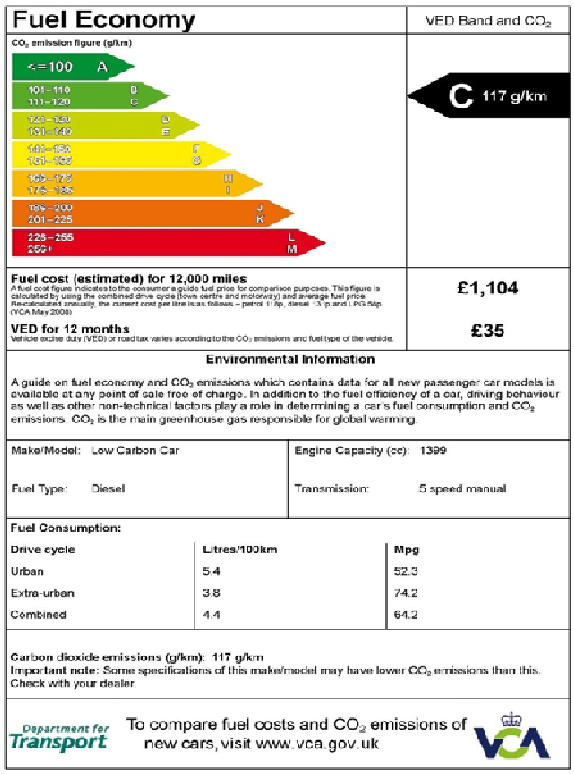
31. CCT was unchanged in 2009, but is set to be revised from April 2010, with the bands starting at lower CO_2 levels and incentives for electric vehicles being introduced. Further details on the forthcoming changes are given on page 29.

Consumer information
32. Choosing which vehicle to purchase is a complex process, with consumers determining choice on a range of factors, notably price and utility of the vehicle. Running costs are also a key factor, with environmental performance increasingly moving up the rankings. Fuel consumption figures are well published and are technically linked to CO_2 values. CO_2 data is also now widely publicised and can be easily obtained from a variety of sources, notably websites and automotive magazines, as well as from the colour-coded label displayed on new cars at point of sale.

33. The Vehicle Certification Agency (VCA) runs a website to obtain 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 CO_2 emitters to provide consumers with further information.

34. Since 2005 manufacturers have also voluntarily displayed a colour-coded new car fuel efficiency label (a fridge-style label) as shown in Chart 5. This provides consumers with information on the CO_2 figure of the vehicle, as well as its VED band, VED rate the car will face and annual fuel bill based on an assumed 12,000 mile use, at point of sale. 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. The first few months of this scheme, which is also voluntary, have been extremely successful with over 2,500 dealerships signed up and 50,000 labels produced. SMMT looks forward to the continued success of the scheme.

Chart 5 Fuel economy colour-coded label



35. Manufacturers are required by law to display fuel consumption and CO_2 data for passenger 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.

Consumer preference

36. SMMT data on new car registrations shows how the market has moved into 'smaller' cars (mini and supermini segment vehicles) and 'niche' products (dual purpose 4x4 and multipurpose vehicles - MPVs). Establishing why these trends have specifically occurred is more complex and a reflection of a broad array of factors. Vehicles have got bigger, so a supermini today may be as big as a lower medium segment car of a decade ago. The quality and creature comforts in a small car have also improved considerably, so they are much more comparable to a larger car. There has also been growth in the number of models available to chose from.

37. Similarly demand for niche vehicles has grown as more have been developed and brought to the marketplace. Dual and multi-purpose segment cars offer larger and perhaps more practical and flexible space for their platform size. They also offer a more lofty driving position, giving a better view and sense of safety than traditional family saloons or hatchbacks which have largely lost market share to these vehicles.

38. The shift to mini and supermini segment cars has helped reduce average CO_2 emissions, whilst the move to niche products has probably slowed the rate of progress. However, downsizing within the dual purpose and MPV segments and increased use of diesel engines has helped curb average new car CO_2 emissions.

39. Increased diesel penetration has also been a significant factor in lowering overall average CO_2 emissions. In previous SMMT CO_2 reports diesels were shown to provide 10-20% lower CO_2 emissions for similar engine power levels.

40. In 2009 the market saw a very noticeable shift towards small cars, largely as a result of the Scrappage Incentive Scheme. The scheme also halted the rise in diesel penetration, as small cars tend to be petrol rather than diesel-powered due to higher purchase prices of diesel variants. A move away from diesels will curb the pace of reduction in average new car CO_2 levels.

Outlook

41. The recession, following the fuel price increases, and a steady focus of government policy and motoring taxes on penalising higher CO_2 emitting vehicles, coupled with the Scrappage Incentive Scheme, saw a marked shift in the marketplace to lower CO_2 emitting vehicles.

42. Overall the new car market is expected to decline to some 1.82 million units in 2010. This will be the lowest annual outturn since 1993. It is expected to recover in 2011 and more so in 2012. Once the economy begins to improve the market could return towards cars fitted with larger engines or higher trim levels which may result in higher CO_2 emissions. A shift in the market towards larger or more niche segment cars could also potentially result in a rise in average CO_2 emissions.

43. The removal of the Scrappage Incentive Scheme will also cause a further disturbance to the marketplace. Demand for mini and supermini segment cars could fall, as demand for such products was so strong under the scheme.

44. The impact of the European new car CO_2 regulation, future technological gains and increased pressure from government are all likely to continue the downward trend in new car CO_2 emissions once any impact from scrappage or the recession pass.

45. The new car CO_2 regulation calls for cars to meet 130g/km by 2015 on an EU-level and sets a longer term target of 95g/km by 2020, subject to an impact assessment (see page 23 for more detail).

Total CO_2 emissions from the car fleet

- Total new car CO_2 emissions down 3.1% in 2008 on 2007 and 4.4% on 1997 level.
- Total amount of fuel consumed by cars fell by 4.3% in 2008, on 2007 level.
- Growth in number of cars in use and distance travelled curbed in 2008.

Table 2 - Total car CO_2 emissions, fuel consumption, distance travelled and parc size, GB (Source: DECC (CO_2), DfT (Fuel and distance), and SMMT(parc))

Year	Total CO_2 (tCO_2)	Fuel consumption (Mt)	Distance travelled (bn kms)	Parc size (mn)
1997	75.4	24.5	365.8	25.6
2000	76.2	24.7	376.8	27.2
2007	74.4	24.4	404.1	30.2
2008	72.1	23.4	401.7	30.3
% ch '08				
vs '07	-3.1%	-4.3%	-0.6%	0.4%
vs '97	-4.4%	-4.5%	9.8%	18.4%

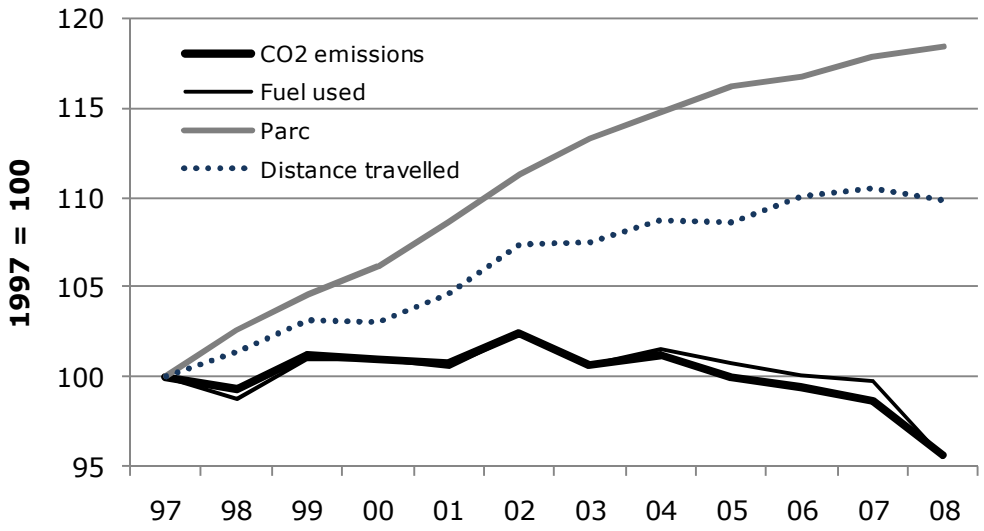
46. CO_2 emissions from all cars on the roads have fallen in each of the past four years, but in 2008 showed a much larger decline than in previous years, down 3.1%. This recent improvement in performance ensured that over the past decade emissions from cars have fallen by 4.4%. This net change is very similar to net fuel consumed by cars - see Chart 6.

47. The performance is all the more remarkable given the increases in parc size and distance travelled over the past decade, up by 18.4% and 9.8% respectively. The net gains reflect the general improvement in efficiency of the cars in use.

48. The 2008 performance reflects the impact of recession curtailing distances travelled as well as people driving more conservatively as fuel prices rose.

49. These trends are unlikely to unwind in 2009 and further progress in total CO_2 emissions from all cars is expected.

Chart 6 Growth in car CO_2 emissions, parc and distance travelled



Average CO_2 emissions of the GB parc

- Average car in use had average CO_2 value of 175.1g/km, 10.8% above average new car CO_2 figure in 2008.
- Data based on SMMT database of vehicles in use - Motorparc.

50. SMMT has matched parc, or vehicles in use, figures with the MVRIS new car registration data to establish a CO_2 value for 25.8 million or 85.2% of the 30.3 million car parc total. Please note MVRIS data is for UK and Motorparc data for Great Britain.

51. Based on this database SMMT estimates the average car in use in 2008 emitted 175.1g/km of CO_2. The average new car in 2008 had a CO_2 figure of 158.0g/km, 9.8% below the parc average.

52. In last year's CO_2 report, SMMT estimated the CO_2 figure for the average car in use in the UK in 2008 to be 173.8g/km, based on estimates about assumed survival rates and historical average new car CO_2 figures. This is within 1% of the parc-matched figure.

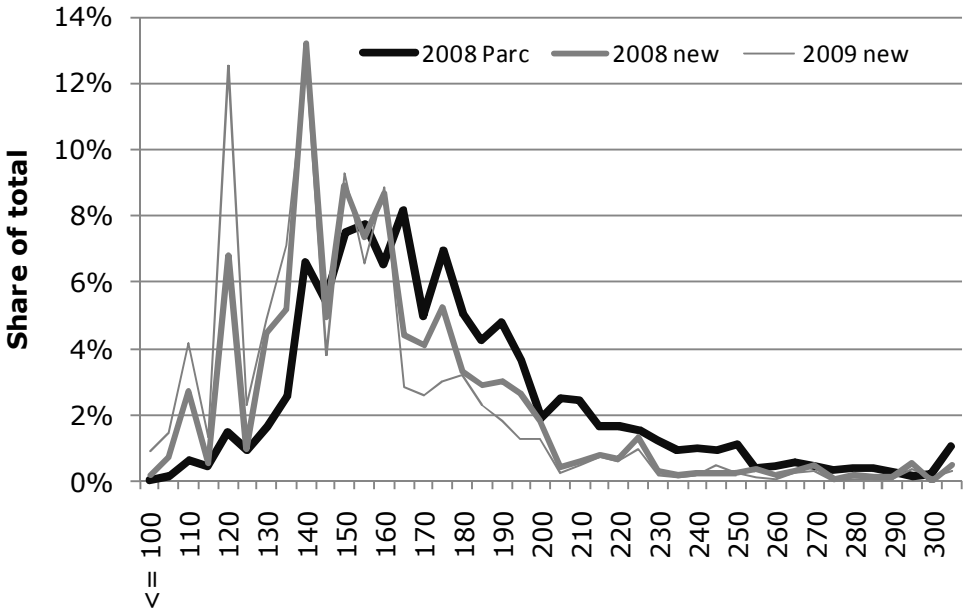
53. Based on the parc database just under 5,500 cars in use had an average CO_2 of 120g/km or below. Over 210,000 cars in use had average CO_2 figures of 130g/km or below and 1.366 million had average CO_2 emissions of 140g/km or below. These CO_2 break points represented 0.0%, 0.7% and 4.5% of the GB parc. This compares with 11.0%, 16.4% and 34.8% of the 2008 UK new car market and 20.4%, 27.6% and 47.3% of the 2009 market. The distribution of parc and average new car market by 5g/km CO_2 bands is shown in Chart 7.

54. New cars typically have an average CO_2 value 10% lower than the parc average. Therefore, measures to speed up the replacement cycle, such as the SIS, would help reduce fleet CO_2 emissions. However, policy makers need to balance environmental needs with the wider needs of society, eg penalising the use of older vehicles may adversely affect certain sections of society (ie those on limited incomes).

55. The data above assumes no deterioration in CO_2 figures by cars over time due to any lack of maintenance.

56. Average CO_2 emissions of all cars in use should improve in 2009 more rapidly as the Scrappage Incentive Scheme impacts, with additional volume of higher CO_2 emitting models removed from the parc and replaced with lower emitting cars.

Chart 7 Distribution of CO_2 emissions in car parc and new car registrations



UK new car CO_2 performance compared with EU15

- UK made better reduction in average new car CO_2 emissions than EU15 in 2008.
- UK average new car CO_2 emissions remain 3.1% above the EU15 average.
- UK made the third best net improvement since 2000, after Portugal and Denmark.

57. The European Commission publishes annual 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 2008.

58. Data from the EC showed the average new car CO_2 emissions in the UK were 158.2g/km. This is within 0.1% of the SMMT reported figure of 158.0g/km.

59. The UK performance remains above the EU15 average of 153.5g/km, although the gap has narrowed consistently. The UK had the tenth highest average new car CO_2 emissions among the EU15 in 2008, down from ninth in 2007, but an improvement from the 14th place ranking recorded in 2000 (the first year EC data was recorded).

60. The UK has outperformed the EU average rate of improvement in all but one year since 2000 and in each of the past four years. Between 2000 and 2008 the EU average new car CO_2 emissions fell by 10.9%, in the UK the EC report they were down 14.7%.

61. Portugal once again had the lowest average new car CO_2 emissions of any of the EU15. At 138.2g/km it was the only country to be below the 140g/km voluntary commitment, although France was just 0.1g/km above the target level. Overall the EU15 figure of 153.5g/km was 13.5g/km or 9.6% above 140g/km.

62. In 2000 Portugal was ranked only seventh in the list, and has seen its emissions fall by 18.3% since 2000. Only Portugal and Denmark have bettered the progress of the UK over this time period. In 2008, compared with 2007, Denmark and Finland recorded the best improvements, at over 8%, while France recorded a 6.3% improvement.

63. Germany, the EU's largest single market, has seen average CO_2 emissions reduced by 9.5% since 2000. The UK has out-performed the rate of reduction in average new car CO_2 emissions in Germany in every year except for 2002.

64. UK was one of the first member states to adopt CO_2 based taxes and this helped contribute to the improvement since 2000. Increased dieselisation of the fleet has also been an important factor. However, diesel penetration in the UK is only ranked 11th in the EU15, at 41.7% in 2009 compared with a 46.1% average share in the EU15. Diesel penetration fell sharply across Europe in 2009, from 52.9% in 2008, and was still over 70% in France and Spain.

Table 3 - Average new car CO_2 emissions in EU15 (g/km). (Source: EC)

Year	2008	2007	2000	% ch '08 vs '07	% ch '08 vs '00
Austria	158.1	162.9	168.0	-2.9%	-5.9%
Belgium	147.8	152.8	166.5	-3.3%	-11.2%
Denmark	146.4	159.8	175.7	-8.4%	-16.7%
Finland	162.9	177.3	181.0	-8.1%	-10.0%
France	140.1	149.4	163.6	-6.3%	-14.4%
Germany	164.8	169.5	182.0	-2.8%	-9.5%
Greece	160.8	165.3	180.3	-2.7%	-10.8%
Ireland	156.8	161.6	161.3	-3.0%	-2.8%
Italy	144.7	146.5	155.1	-1.3%	-6.7%
Luxembourg	159.5	165.8	176.7	-3.8%	-9.7%
Netherlands	157.9	164.8	174.2	-4.2%	-9.4%
Portugal	138.2	144.2	169.2	-4.2%	-18.3%
Spain	148.2	153.2	159.2	-3.3%	-6.9%
Sweden	173.9	181.4	200.0	-4.1%	-13.1%
UK	158.2	164.7	185.4	-4.0%	-14.7%
EU15	**153.5**	**158.7**	**172.2**	**-3.3%**	**-10.9%**

Chapter 2 - Trends within the UK new car market

65. 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, company car tax, by segment, by sales type, by fuel type and at model detail.

Overall distribution of new car market by CO_2 emissions

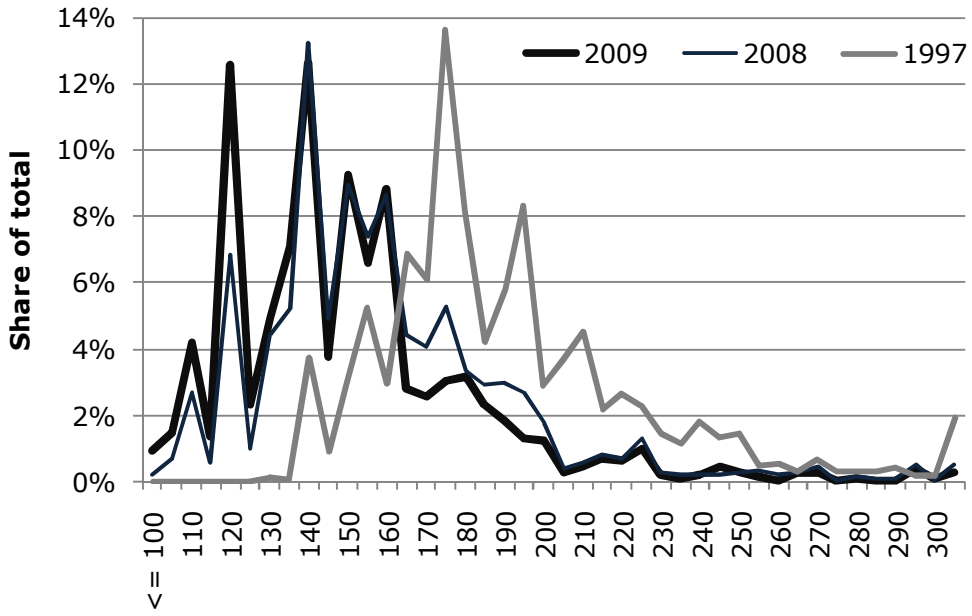
- Market shift into lower CO_2 emitting cars continues.
- Sub 100g/km market grows by 368% and over 20% market is now sub 120g/km.
- Technological gains, as well as market shift, key to the improvements.

66. Over the course of time, technology has improved, as too has the type of car consumers demand and, more recently, what they can be afford.

67. The overall average new car CO_2 figure has consistently fallen over time, as the market shifted towards lower emitting vehicles, shown in Chart 8 as a constant shift to the left in the distribution.

68. The UK remains a diverse marketplace, with car purchases driven by a host of competing factors which usually combine to create a compromise in the type of product chosen. The vehicle needs to deliver on a range of requirements - size, specification, performance, image, ease of driving/use, cost of ownership and the purchase price.
69 In 2009 47.3% of cars were below 140g/km, 27.6% were below 130g/km and 20.4% were below 120g/km. This compares with 34.8%, 16.4% and 11.0% respectively in 2008. In 1997 virtually no cars were registered below 130g/km and only 3.9% were sub 140g/km. There continues to be a long tail on the chart, reflective of certain types of vehicles that are required for specific reasons, but the proportion of cars over 200g/km has fallen from 28.1% in 1997, to 23.2% in 2000, 7.8% in 2008 and in 2009 to just 5.9%. In 2009 0.9% of the market was 100g/km or lower CO_2 emitting, up from 0.2% in 2008 and 0.0% in 2007. In volume terms the sub 100g/km market took 18,326 registrations in 2009, up from 3,917 in 2008 and only 544 in 2007.

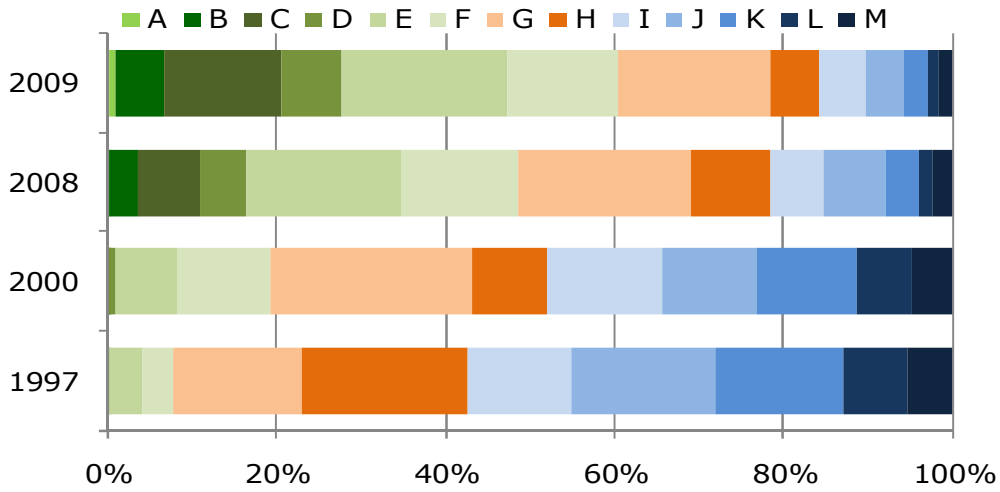
Chart 8 Distribution of the new car market by 5g/km CO_2 bands



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

- Market moving into lower CO_2 emitting bands.
- Band E (131-140g/km) was the most populated in 2008; in 1997 it was band H.
- Just 1.5% of market in the highest CO_2 band in 2009, down from 2.5% in 2008.

Chart 9 Share of new car registrations by VED bands



70. Chart 9 above, showing registrations by VED bands, shows how the market is shifting towards lower CO_2 emitting vehicles. VED is an annual tax on the ownership of a vehicle. Since March 2001, for cars registered after this date, the system has been based on CO_2 emissions. The bands have changed over time and in April 2009 shifted from a seven to a 13 band system. Chart 9 and Table 4 show historical data, based on the current 13 VED bands. The market has moved significantly into lower CO_2 emitting bands, with band E being the most populated in 2009, down from band G in 2008 and band H in 1997.

Table 4 - New car market by VED band

VED band	Volume	Market share			
	2009	2009	2008	1997	All
A (up to 100g/km)	18,326	0.9%	0.2%	0.0%	0.1%
B (101-110g/km)	112,435	5.6%	3.4%	0.0%	1.1%
C (111-120g/km)	276,891	13.9%	7.4%	0.0%	2.9%
D (121-131g/km)	143,715	7.2%	5.4%	0.1%	2.8%
E (131-140g/km)	393,150	19.7%	18.4%	3.8%	10.2%
F (141-150g/km)	259,964	13.0%	13.9%	3.9%	12.9%
G (151-165g/km)	363,315	18.2%	20.5%	15.1%	22.4%
H (166-175g/km)	112,008	5.6%	9.3%	19.7%	10.7%
I (176-185g/km)	109,953	5.5%	6.2%	12.3%	9.3%
J (185-200g/km)	87,089	4.4%	7.5%	17.0%	9.8%
K (201-225g/km)	60,779	3.0%	3.8%	15.3%	8.8%
L (226-255g/km)	26,681	1.3%	1.6%	7.6%	5.0%
M (over 255g/km)	30,693	1.5%	2.5%	5.2%	4.0%

Trends by market segment

- All segments report strong reduction in average CO_2 emissions in 2009.
- Shift towards mini and supermini segments helps UK average CO_2 performance.
- Mini segment made best gain in 2009 versus 2008; MPVs best since 1997.

Table 5 - SMMT segment by CO_2 performance, g/km

Segment	2009 CO_2	% ch vs '08	% ch vs '97	Ch g/km vs '97
Mini	115.6	-6.7%	-21.6%	-31.9
Supermini	131.9	-4.2%	-17.8%	-28.6
Lower medium	147.4	-4.1%	-19.7%	-36.1
Upper medium	154.4	-4.1%	-21.8%	-43.1
Executive	177.1	-4.7%	-24.9%	-58.7
Luxury	250.3	-6.0%	-21.7%	-69.4
Specialist sports	201.1	-6.3%	-8.5%	-18.8
Dual purpose 4x4	207.1	-5.5%	-27.4%	-78.2
MPV	169.7	-3.3%	-28.6%	-68.1

71. SMMT splits the market into nine segment classifications, these are detailed in Annex 2. This largely helps differentiate models by size, body-type and drive-train (eg 4x4).

72. The mini segment had the lowest average new car CO_2 emissions in 2009, with the supermini segment performance also below the market average. Data in Table 6 shows these two segments made up a 40.6% share of the total market in 2009, a record. Their share in 2009 in part reflected the impact of the SIS, although the market has been downsizing and moving into lower CO_2 emitting vehicles for some time as new models and brands have entered into those markets.

73. The impact of constraints on spending and concerns over running costs will also have benefitted the mini and supermini segments and at the same time, constrained demand for larger vehicles. It should be noted there is a difference between relative and absolute performance and some larger cars can be very efficient, especially considering the load and occupancy levels they offer.

74. Average new car emissions from all segments fell in 2009 and since 1997 all, bar the sports car market, have shown double digit gains. In 2009 the mini, sports car and luxury car segments all reduced average emissions by over 6%. Since 1997 the MPV segment has posted the best reduction in average emissions, down 28.6%.

Chart 10 Change in CO_2 emissions by segment, 2009 versus 2008 and 1997

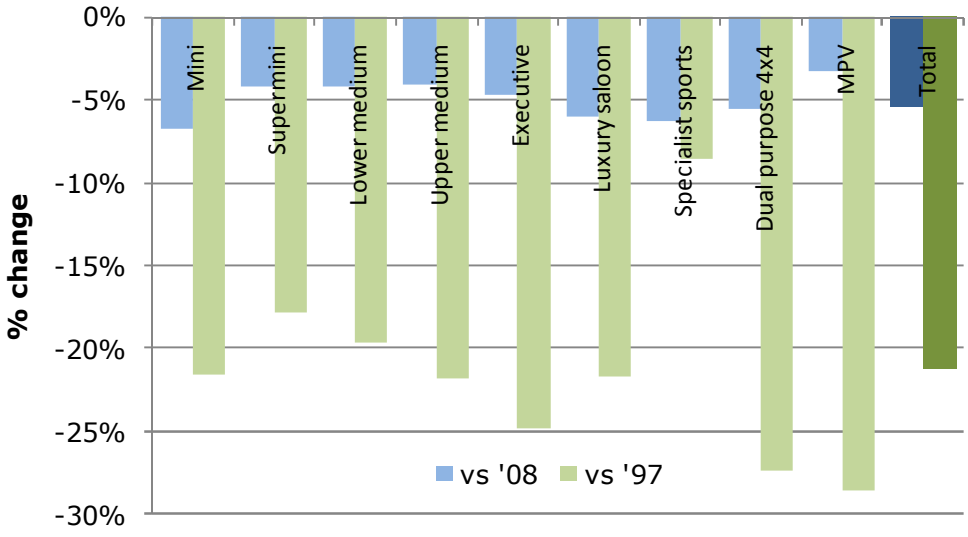


Table 6 - SMMT segment classification and market share				
Segment	**Best seller**	**Mkt sh '09**	**Mkt sh '08**	**Mkt sh '97**
Mini	Hyundai i10	3.4%	1.3%	0.7%
Supermini	Ford Fiesta	37.2%	34.1%	26.5%
Lower medium	Ford Focus	26.6%	28.4%	32.4%
Upper medium	BMW 3 Series	14.2%	16.0%	25.2%
Executive	Mercedes C Class	4.5%	4.6%	5.8%
Luxury	Mercedes S Class	0.3%	0.5%	0.7%
Specialist sports	VW Scirocco	2.3%	2.4%	2.9%
Dual purpose 4x4	Honda CRV	6.6%	6.4%	3.8%
MPV	Vauxhall Zafira	4.7%	6.4%	2.0%

75. The mini segment grew by 142.4% in volume between 2008 and 2009. The supermini segment was the only other segment to grow in 2009, up 2.2%. These two segments accounted for 40.6% of the market in 2009, up from 35.4% in 2008 and 27.2% in 1997. The strong growth in 2009 in the small car market was largely driven by the SIS. Chart 4 (page 7) showed the much higher level these two segments took of the SIS volumes, than the overall market took from May-December 2009.

76. The mini segment also benefitted from new models, with strong gains by the segment best seller the Hyundai i10, as well as the Toyota iQ, Suzuki Alto, Nissan Pixo and Vauxhall Agila. In the supermini segment the Ford Fiesta, Hyundai i20, Kia Picanto and Fiat 500 all saw strong sales growth, whilst the new Alfa Romeo MiTo added additional volume.

77. Since 1997 the overall market has also shifted into niche products, notably dual purpose 4x4 and multipurpose vehicle (MPV) segment cars, which offer space and practicality alongside a high seating position. As these segments have grown, so the upper medium segment, in particular, has seen volumes fall.

78. In 2009 MPV volumes fell away sharply, having sustained strong growth in 2008. The dual purpose segment recovered a little ground in 2009 lost during 2008, but both segments in recent years have seen their growth curtailed by sharp rises in vehicle running costs and impacts in the timing of model cycles.

79. The MPV and dual purpose segments have shown the best improvements in average CO_2 emissions since 1997, down 28.6% and 27.4% respectively, thanks to downsizing of products within the segments and switch to diesel products. But a wide number of segments have also seen over 20% improvements, suggesting the overall improvements in average CO_2 values across the market came from widespread technological improvements.

80. The range by CO_2 in each segment is shown in Chart 11. This reflects the differing model choices available within a segment, but also the different powertrain and specification options on offer.

81. The chart also includes the sales weighted average in each segment, the mid-point on the bars. This can be seen to be at the lower quartile of each bar indicating the models typically chosen are the lower emitting varieties. This is true of all but the mini and sports car markets where the presence of electric vehicles distorts this trend. The EV's zero CO_2 figures are shown in a lighter green on the chart.

82. Table 7 shows the lowest CO_2 emitting model in each segment. The models shown are all diesels, except the two electric vehicles (in the mini and sports car segments) and the Toyota Prius in the upper medium segment is a petrol/electric hybrid.

83. If the lowest emitting model in each segment was purchased then the average new car CO_2 figure would be 96g/km, 35.8% below the actual average of 149.5g/km. If the electric vehicles are replaced with the next best in the segment then the figure would be 101.9g/km. However, while this calculation shows what is possible at this point in time, some of the models may not give the characteristics certain buyers look for. For example they might be too expensive, too small, not have an automatic transmission, or not be supported by a local dealer.

Chart 11 Range and average of CO_2 emissions by segment

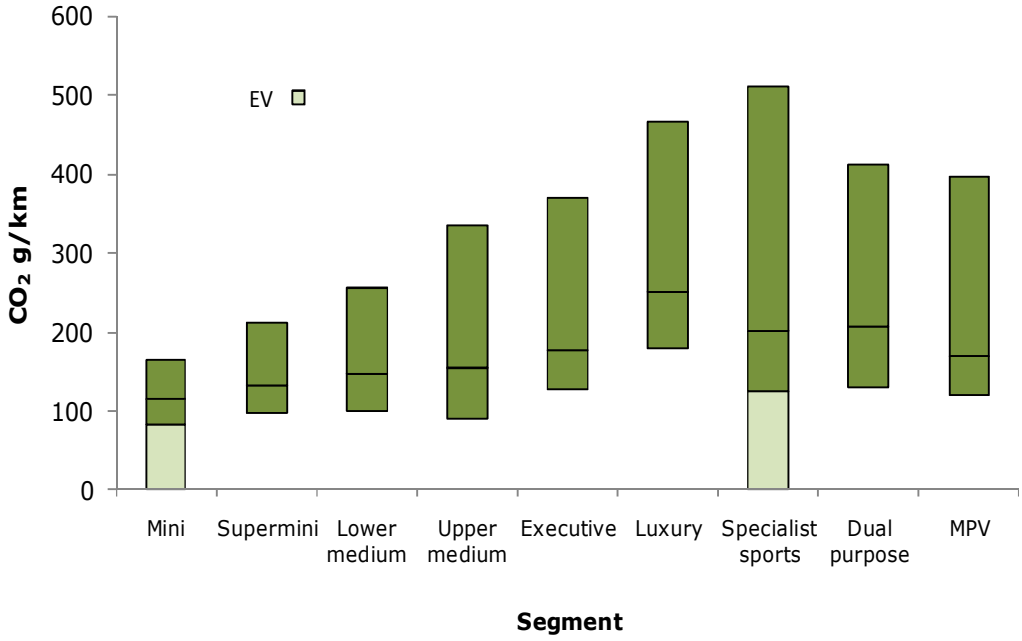


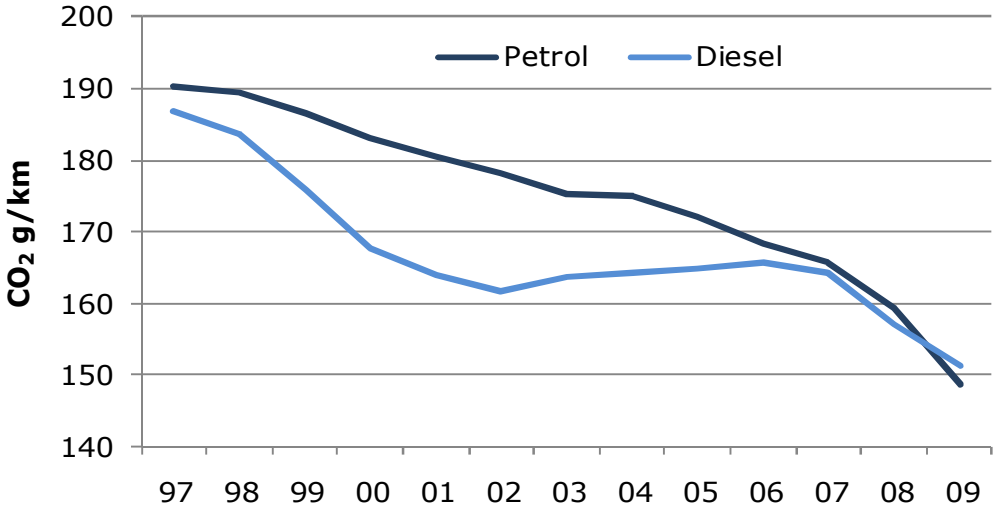
Table 7 - Lowest CO_2 emitter in each segment				
Segment	**Average**	**Lowest**	**Make/model**	**Low vs average**
Mini	115.6	0*	smart fortwo EV	-
Supermini	131.9	98	Ford Fiesta/SEAT Ibiza	-25.7%
Lower Medium	147.4	99	VW Golf	-32.8%
Upper medium	154.4	89	Toyota Prius	-42.4%
Executive	177.1	127	Mercedes C Class	-28.3%
Luxury	250.3	178	BMW 7 series	-28.9%
Sports	201.1	0*	Tesla	-
Dual purpose	207.1	129	Toyota Urban Cruiser	-37.7%
MPV	169.7	119	Citroen Nemo Multispace	-29.9%

** at tailpipe*

Trends by fuel type

- All fuel types saw gains in average CO_2 emissions; petrol now below diesel.
- Scrappage scheme supports market shift from diesel to petrol-fuelled cars.
- Alternatively fuelled and advanced propulsion vehicle market share rises in 2009.

Chart 12 Average new diesel and petrol car CO_2 emissions



84. In the 2008 CO_2 report it was shown that diesel variants, on a like-for-like power rating, emit 10-20% lower CO_2 than petrol-fuelled variants. However, on a sales-weighted basis the performance is very similar. In 2009 petrol cars had 0.5% lower average CO_2 emissions, at 148.7g/km than diesel's 151.2g/km. The gap had closed in recent years, but this was the first time that average emissions from petrol cars were below the diesel average (see Chart 12).

85. The sales-weighted performance is blurred by diesel engines typically being fitted to larger vehicles, while petrol engined cars are still largely the preserve of the supermini market. Chart 13 shows diesel penetration by segment.

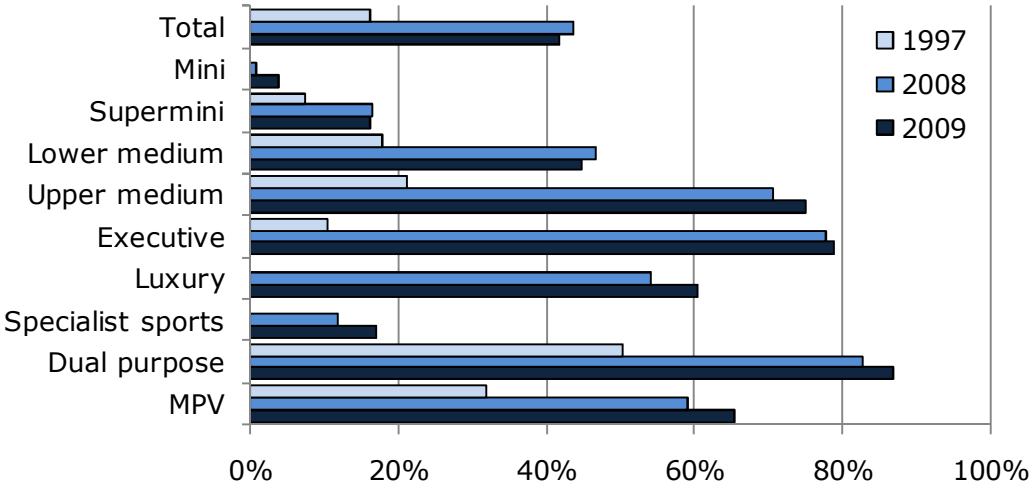
86. Average new car CO_2 emissions of petrol and diesel cars fell by 6.6% and 3.8% respectively in 2009, on 2008 levels. Since 1997 petrol car emissions have come down by 21.9% and diesel cars by 19.0%.

Table 8 - New car market by fuel type

Year	Petrol	share	Diesel	share	Other	share
1997	1,819,812	83.8%	350,913	16.2%	0	0.0%
2000	1,908,098	85.9%	313,192	14.1%	357	0.0%
2008	1,187,360	55.7%	928,605	43.6%	15,830	0.7%
2009	1,147,580	57.5%	832,456	41.7%	14,963	0.8%

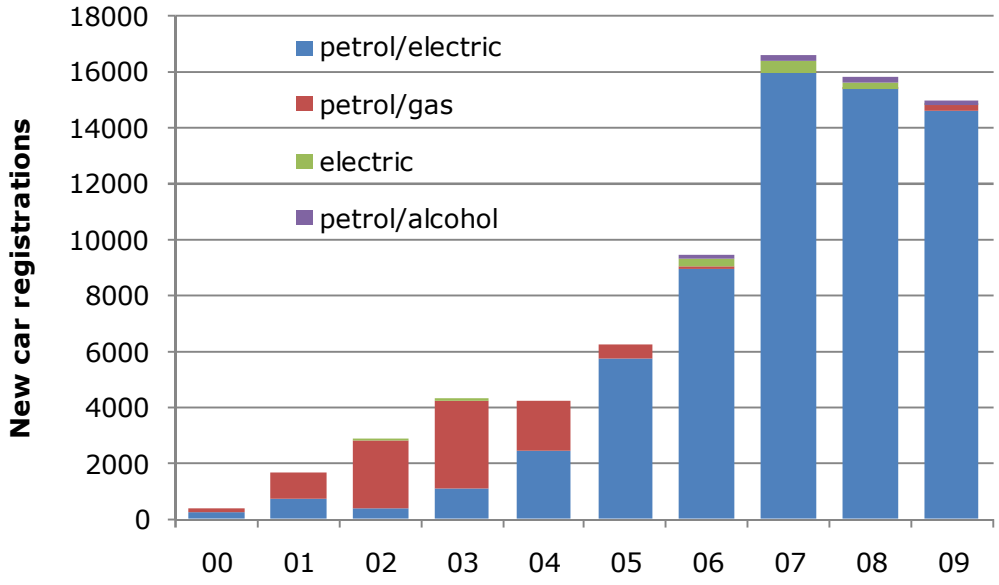
87. Since 2000 a key trend in the UK market has been the shift to diesels. However, in 2009 diesel penetration fell for the first time since 1999. The reason for the decline is largely due to the SIS. Diesels only accounted for 16.1% of cars bought through the scrappage scheme in 2009. Cars bought through the SIS (see Chart 4 page 7) were predominantly mini and supermini vehicles. As Chart 13 shows, diesel penetration in these segments is lower than average. This is because diesel engines are more expensive to produce and therfore buy. Small cars are typically bought for their value-for-money and so the diesel premium for some is too great. Diesel's higher purchase cost can be offset by lower fuel bills from higher mileage users. The scrappage scheme was focused at private buyers, who tend to do a lower than average mileage. Diesel demand would also have been unsettled by the gap in price between petrol and diesel at the pumps. Government having a more supportive policy position on diesels, as in other EU member states, could help negate higher vehicle purchase or fuel costs.

Chart 13 Diesel penetration by segment, 2009, 2008 and 1997



88. Whilst diesels have improved refinement and product diversity in recent years there are concerns over impact of future regulations on costs. To meet ever tighter Euro-emissions standards diesel may require more costly developments. Vehicle manufacturers are pursuing different work streams on future technologies and the rise of AFVs and development by petrol engines could limit a recovery of diesel car volumes in the market place. Proposals to base fuel taxes on carbon content may also work against diesel cars, if they came to fruition.

Chart 14 UK new alternatively fuelled/propelled car registrations



89. Registrations of alternatively fuelled vehicles (eg biofuels) and advanced propulsion technology vehicles (eg electric and hybrid) are in this report abbreviated to AFV. AFVs' market share rose to a new high of 0.8% in 2009, from 0.7% in 2008, despite a modest 5.5% decline in volumes to 14,963 units.

90. The AFV market was impacted by model changeovers, which ensured demand was weak at the start of the year although recovered strongly in the second half of 2009.

91. Petrol/electric hybrids dominate the AFV market, accounting for 97.9% of 2009 volumes. The Toyota Prius is the best selling petrol/electric hybrid, with 7,941 registrations in 2009 it represented 53.1% of the total AFV market. Prius volumes fell by 11.8% in 2009, but did recover strongly towards the end of the year as the third generation model entered the marketplace. The new Honda Insight recorded 2,471 registrations in 2009, to give it a 16.5% share of the total AFV market. Proton and Renault saw registrations rise of their petrol-gas and petrol-alcohol vehicles, albeit volumes remained very low.

92. The market for electric vehicles declined sharply again in 2009, down 69.3% to just 55 units, after weaker registrations of the smart EV. Tesla's electric sports car had four registrations in the UK in 2009.

93. Since 2000 over 76,500 AFVs have been newly registered in the UK, by comparison there were 23.6 million non-AFVs registered over the last decade. The 2009 AFV market represented almost a fifth of the AFV total since 2000. Petrol/electric hybrids represented 85.7% of all the AFV volume since 2000. Since 2000 less than 1,000 EVs have been registered.

94. AFVs tend to command a price premium, reflecting their innovative technology. The impact of recession is likely to have constrained demand. AFVs can however benefit from lower running costs, with for example lower emissions resulting in lower tax charges, or at a local level reduced or exempt charges on parking or the congestion charging. For example in London electric and electric-hybrid vehicles are exempt from the Congestion Charge.

Trends by model

- EVs remain the lowest CO_2 emitters, with zero tailpipe emissions.
- All of top ten now below 100g/km, compared with just top three in 2008.
- Besides AFVs, diesel-fuelled variants fill out the top ten low CO_2 emitters list.

Table 9 - Top ten lowest CO_2 emitting models registered in 2009

Rank	Model	Segment	Fuel type	CO_2g/km
1=	smart fortwo	Mini	Electric	0*
1=	Tesla	Sports	Electric	0*
3	smart fortwo	Mini	Diesel	88
4	Toyota Prius	Upper medium	Petrol/Electric	89
5=	Ford Fiesta	Supermini	Diesel	98
5=	Seat Ibiza	Supermini	Diesel	98
7=	Peugeot 207	Supermini	Diesel	99
7=	Toyota iQ	Mini	Diesel	99
7=	VW Golf	Lower medium	Diesel	99
7=	VW Polo	Supermini	Diesel	99
7=	Volvo C30	Upper medium	Diesel	99

Note: Aixam, Microcar and Reva not included as only B1 type approval
** zero at tailpipe, but will be some CO_2 associated with the electricity generation*

95. In the 2008 market the top ten lowest emitters included models up to 108g/km, in 2009 the top 24 models had CO_2 emissions at or below this level. The top ten list in Table 9 also shows the models come from a variety of different segments.

96. All manufacturers have developed strategies to reduce emissions across all models, but some have brought all strategies together in 'super' eco variants. These models have been signposted to consumers by using 'eco' names. For example Ford has the Econetic range or Volvo DRIVe. There were about 100,000 of these badged models registered in 2009, triple the number recorded in 2008. Within particular model ranges these greener variants typically took less than an 8% share, but for some ranges the proportions were much more significant - into double digits and for several, such as the Audi A6 (TDI E version), Fiat Panda, Mercedes C, E and M Classes and many of the Volvo ranges, over a third were badged as eco-models.

97. As an example of improvements within a particular model, the UK's best seller - the Fiesta, had a sales-weighted average CO_2 figure in 2009 of 129.5g/km. This was 6.2% below the level recorded by the model in 2008 and 23.5% below the level recorded in 1997 of 138.0g/km. The lowest CO_2 emitting Fiesta, the Econetic version, had CO_2 emissions of 98g/km, 24.3% below the average for the range. Econetic models accounted for 2.4% of total Fiesta volumes, up from 0.1% in 2008.

Trends by sales type

- Strong reduction in average private car CO_2 emissions widened the gap to the company car average. Scrappage scheme influenced private buyer performance.
- All sales type categories report improved average new car CO_2 emissions.
- Changes to company car tax (CCT) to encourage electric vehicle take up.

Table 10 - New car CO_2 emissions by sales type, g/km

Year	Fleet	Business	All company	Private
2001	175.4	195.0	178.8	176.4
2008	158.2	159.3	158.4	157.6
2009	150.8	154.2	151.1	147.9
% ch '09 vs				
2008	-4.7%	-3.2%	-4.6%	-6.2%
2001	-14.0%	-20.9%	-15.5%	-16.2%

98. SMMT classifies registrations into three distinct sales type group: 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 the remainder are private buyers.

99. Average CO_2 emissions from all three buyer groups have fallen since 2001, by 14-21%, as shown in Table 10. In 2009 the private buyer's average CO_2 emissions fell at a faster rate than all company car buyers, reflecting the positive impact of the Scrappage Incentive Scheme. As earlier indicated, cars bought under the Scrappage Incentive Scheme tend to have lower than average CO_2 emissions. Over 98% of cars registered through the Scrappage Incentive Scheme were made by private buyers in 2009.

100. The impact of the recession and need to reduce running costs would have focused the buying patterns of both private buyers and company car users. The reduced number of registrations shows how consumers have withheld from replacing their car as frequently as they had previously. It remains to be seen if the replacement cycle returns to pre-recession levels, or if those buyers have been lost to the market place forever, eg through loss of job or shift into secondhand cars (the latter is predominantly only done by private buyers).

101. While all drivers face the same fuel and vehicle excise duty charges, company car drivers also pay tax on the private use of a company car, known as company car tax (CCT).

102. Since 1 April 2002 an individual's CCT liability has been based on their vehicle's CO_2 emissions. HM Revenue & Customs (HMRC) estimates that there were around 1.1 million company cars in use in 2007.

Over time the CCT has been adjusted to encourage the take-up of ever lower emitting vehicles. In the November 2009 Pre-Budget Report further measures to encourage this shift were announced, including electric vehicles to face a 0% rate for five years. Further details on CCT are presented on page 29.

Chapter 3 - Outlook for new car CO_2 emissions

Overview

103. This section shows total new car CO_2 emissions in the context of overall UK emissions and of road transport in particular. It shows how government has set legally binding targets for CO_2 emissions reductions and adopted regulations specifically for vehicles to achieve to help meet those targets. It then explores what industry is doing to achieve lower CO_2 emissions and what opportunities and constraints there are to realise the move to a lower carbon transport system.

Car CO_2 emissions in context

- Cars accounted for 12.5% of total UK CO_2 emissions in 2008.
- Emissions from cars fell at a faster rate than overall UK emissions in 2008.
- Total road transport accounts for a fifth of CO_2 emissions.

Table 11 - CO_2 emissions: cars, road transport and total UK, million tonnes CO_2 ($MtCO_2$) (Source:DECC)

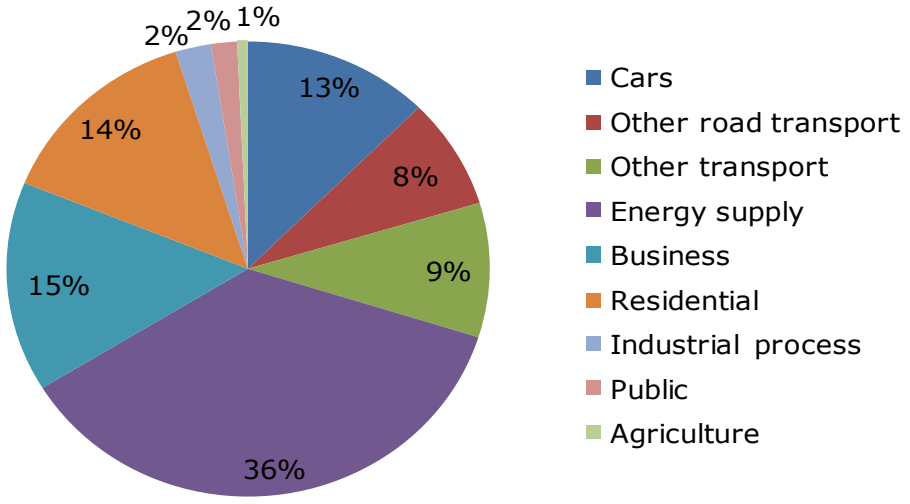
Year	Total UK	Road transport	Cars	% total	% road transport
1997	582.4	116.6	75.4	12.9%	64.7%
2000	587.1	116.0	76.2	13.0%	64.6%
2007	585.8	121.4	74.4	12.7%	65.4%
2008	574.4	117.2	72.1	12.5%	65.7%

104. Transport has a significant role to play in emissions reductions. UK total CO_2 emissions in 2008 were 572.4$MtCO_2$ in 2008 (source www.decc.gov.uk). This includes international aviation and shipping bunkers, which are not included in the IPCC definition of total emissions, and add 41.6$MtCO_2$ to the total. Total UK emissions in 2008 were 1.9% down on the 2007 figure and 1.4% below the 1997 level.

105. Road transport emissions, at 117.2$MtCO_2$, represented 20.4% of total emissions. This was down from the 20.7% in 2007, but above the 20.0% share recorded in 1997.

106. CO_2 emissions from cars, at 72.1$MtCO_2$, represented 12.5% of total emissions and 65.7% of road transport emissions in 2008. Car CO_2 emissions were down 4.4% on the 1997 level, having fallen by 3.1% between 2007 and 2008. The declines come despite strong growth in the number of vehicles in use and the total distance travelled (see page 10).

Chart 15 UK CO_2 emissions by source, 2008 (DECC: includes bunkers)



UK targets and milestones

- Global push towards legally binding targets on CO_2 emission reductions.
- UK has target of 34% reduction in emissions by 2020 and 80% by 2050.
- Transport will have to contribute its share towards those reductions.

Global consensus on action

107. The outcome of the Copenhagen Climate Change Conference was disappointing, with no legally binding commitments or clear timetable for such a treaty being set. However, participants representing 80% of global emissions (including the UK) did agree to the Copenhagen Accord, which endorses the limit of two degrees warming as the benchmark for action on climate change and to undertake comprehensive measurement, reporting and verification of progress. The EU27 (including the UK) reiterated its commitment to a 20% reduction in emissions by 2020 (from a 1990 base), and to move to 30% if others made comparable commitments.

UK ambition

108. The UK government has set itself a legally binding target to reduce greenhouse gas emissions by 34% by 2020 from a 1990 base. The UK government has appointed the Committee on Climate Change (CCC) to set out policy recommendations for government to adopt to achieve within five-yearly carbon budgets. The carbon budgets are set three budgets at a time to give a pathway towards a longer term objective. Government is looking to reduce emissions by 80% by 2050, so giving a long term target as well.

109. The CCC believes for road transport to contribute towards its share, the UK new car average CO_2 emissions should be on par with the EU targets of 130g/km by 2015 and 95g/km by 2020. The latter target is subject to impact assessment. Currently the UK position is slightly above the EU average (see page 12), so a better than EU-average improvement would need to be made to achieve the CCC target.

110. The CCC believes that after 2020 'deep emissions cuts in transport' can be developed through supply side measures and changes in customer choice. The CCC put its weight behind take-up of electric cars, but realises that hurdles must be overcome in battery costs, vehicle prices and battery-charging infrastructure. Consumer choice and behaviour, CCC suggests, can be influenced by the introduction of road pricing, the Smarter Choices programme and more effective land use planning and transport policy. Smarter Choices is a programme to support better journey planning, more use of public transport, etc.

111. Government's response to the CCC's first report is generally supportive, especially in terms of promotion of electric vehicles - although government recognises that other technologies could contribute to carbon reduction from road transport too. Measures the government is to introduce to tackle emissions from cars are set out on page 24.

EU new car CO_2 regulation

- Regulation is the cornerstone of EU plan to reduce emissions from new cars.
- Targets require increased rate of improvement, or significant fines will be levied.

112. The new car CO_2 emissions regulation (EC) No 443/2009 will be a driver in delivering lower CO_2 emissions. The regulation covers new passenger cars and sets a sales-weighted CO_2 target of 130g/km, with an additional 10g/km from complementary measures. A longer term target of 95g/km was set for 2020, subject to impact assessment.

113. To achieve the 2015 target, EU15 data suggests an annual improvement of around 2.3% is required. In the past five years the EU15 reduced emissions by 1.5% per annum, however, in 2008 the improvement was 3.3%. Although the target is set at EU rather than UK level, for comparison purposes, UK improved by 1.7% per annum in the past five years and by 4.0% in 2008. To move from 130g/km in 2015 to 95g/km by 2020 would require approximately a 6% improvement per annum.

114. An individual manufacturer will face a pan-European sales-weighted specific emission target as a function of their cars' mass. The target will be phased in with 65% of each manufacturer's new registrations having to comply with their target in 2012, rising each year, to 100% by 2015. Manufacturers will also be able to use super-credits for <50g/km and 'eco-innovations' to achieve their targets. Low volume and niche manufacturers can apply for a derogation, whereby they will get targets reflecting their technical and economic potential to reduce emissions.

115. Manufacturers will face major fines if they miss their targets. These fines will be multiplied by the number of registrations; €1 for the first gram over target, €15 for the second gram, €25 for the third gram and €95 for four grams and above. From 2019 the premium will be €95 for every gram over target.

The integrated approach (IA)

- The IA is about ensuring all stakeholders work together for a common goal.
- IA remains a key part of the ongoing solution to reducing emissions.

116. The integrated approach (IA) remains a cornerstone of the pathway to achieving the desired reductions in CO_2 emission and the move to a lower carbon transport system at least cost to society. The IA supports a sharing of responsibility between stakeholders to achieve these goals. The key stakeholders are the automotive industry, fuel supply industry, policy makers (eg government) and consumers.

117. The automotive industry alone cannot deliver all the CO_2 savings. It does have a vital role to play in developing, delivering and promoting the use of lower CO_2 emitting vehicles. However, it needs the fuel suppliers - traditional oil companies, electricity suppliers or other alternative fuel suppliers - to ensure the necessary infrastructure is in place. Consumers need to understand and accept change in the type of vehicles they buy and use, and government can help facilitate this to happen.

118. Already there are a number of ways the IA is being used to shape the move to a lower carbon transport system. The Automotive Council (see page 25) is another step along this route, which also aims to ensure UK companies play a key role in the process.

119. An important factor in the expected success of an integrated approach is to ensure the cost of moving to a low carbon economy is equitably shared and kept as low as possible. Set against the backdrop of a global recession, the importance of value for money and competitiveness is stronger than ever.

120. Despite the recession the automotive industry has continued to develop new technologies. It understands that to survive it must compete on a low CO_2 footing. Studies suggest that meeting the new car CO_2 regulations through technology alone would be very expensive, two to three times higher than through the IA says ACEA (the European vehicle manufacturers association).

Government measures and plans to tackle car CO_2 emissions

- Myriad measures being deployed to develop transition to low carbon vehicles.
- Office for Low Emission Vehicles set up within government to oversee approach.
- Automotive Council set up to work with industry to support transition.

121. UK government is tackling emissions reductions from transport with both hard and soft measures aimed at users and suppliers. Soft measures include information, advice and moral suasion. Hard measures are taxes, incentives and regulations.

Measures for users

122. Soft measures for users include consumer information to enable travellers to make more informed choices about the best mode or route to take, or the most efficient route, with tools like route planners and green travel plans. Promotion of eco-driving techniques also enable the existing vehicle fleet to be used more efficiently. Safe and fuel efficient driving techniques are now part of the driver training syllabus and the driving test itself. Energy Saving Trust (EST) is promoting eco-driving to existing drivers through the Smarter Driving programme. Eco-driving is thought to be one of the most effective ways of reducing emissions.

123. Government also uses hard measures, notably fiscal and charging instruments to shape vehicle demand and use. These include traditional measures like fuel duty, vehicle excise duty and company car tax, but also could include a national road pricing system or an emissions trading type scheme. These latter two options have been set aside for the time being while further evaluation is undertaken. Fiscal measures are studied in more detail on page 27.

Measures for suppliers

124. Enforcement of the European new car CO_2 regulation is the key measure on vehicle manufacturers. Government is also putting in place a number of measures to support research and development, as well as to stimulate supply of infrastructure and promote demand for products vehicle manufacturers will deliver to the market.

Infrastructure

125. There is investment in public transport to encourage consumers out of their cars. In addition to measures to reduce congestion and improve the flow of traffic, thus ensuring the existing networks work more effectively.

Delivery mechanisms
126. Government is to produce a Carbon Reduction Delivery Plan in 2010, which will set out more detail on how it intends to achieve its objectives.
A cornerstone of the move to ultra-low carbon vehicles is the promotion of electric vehicles.

127. The Office for Low Emission Vehicles (OLEV) was formed in 2009 to co-ordinate the efforts to deliver these ultra-low carbon vehicles. OLEV is a cross-Whitehall team aiming to position the UK as a world leader in the volume ultra-low carbon vehicle arena. OLEV will oversee the £230 million scheme to help incentivise car buyers to make the shift to low carbon products by offering 25% off the list price of a car up to a maximum of £5,000 for people buying an electric car from January 2011 to March 2014.

128. In the 2009 Pre-Budget Report the chancellor announced that electric cars would be exempt from company car tax for five years.

129. The CCC's first report (see www.theccc.org.uk) suggests that 1.7 million electric cars could be on the UK's road by 2020, with electric cars taking around 16% of the new car market in 2020. Government acknowledges this is a 'very optimistic' scenario, dependent upon major improvements in battery technology, reduced costs and widespread consumer acceptance. Other independent forecasts believe total hybrid electric vehicle penetration will be much lower, 2-5% of the new car market by 2015, with Renault-Nissan suggesting it could reach 10% by 2020. The CCC said a £9 billion price support package (initially £6,000-£20,000 per car) would be needed to support their ambitious scenario.

130. A £30 million electric vehicle infrastructure programme, called the Plugged-In Places Infrastructure Framework, was launched in November 2009 and aims to offer match-funding to a select number of locations in the UK to support an electric charging network from 2010. CCC suggested monies in the region of £230 million should be invested in pilot projects to support charging infrastructure. Government is also investing in projects that are not confined to electric vehicles. The Technology Strategy Board (TSB) has £140 million to promote technology-based innovation. On 9 December 2009 a further £30 million funding was announced for a low carbon vehicle competition.

131. The TSB also jointly runs with Department for Transport's (DfT) Low Carbon Vehicles Innovation Platform. This is a £20 million programme to support low carbon vehicle research, development and demonstration projects.

132. Government also put in place the Automotive Assistance Project in 2009. This £2.3 billion programme is part of the government's economic support package to help offset the impacts of the recession. The scheme was established to give loans and loan guarantees to low carbon investment projects. Unfortunately the scheme has failed to deliver any money, so far.

133. Government is clearly investing a lot of money in projects to develop lower carbon vehicles, notably electric vehicles. This is a very welcome move, although the funds are perhaps not as great as industry believes are necessary, nor of the order of magnitude seen in other EU Member States, USA and China. Significant long-term investment needs to be maintained and funds targeted. Ensuring there is joined up thinking on all these different work-streams will be a key aim for OLEV and the Automotive Council.

The Automotive Council

- The Automotive Council was formed in 2009, to pursue the NAIGT agenda.
- Council to address strategic aims of developing a low carbon transport system.
- Council has no funds to manage directly.

134. The launch of the Automotive Council by government in November 2009 will help address the long-term strategic challenges of developing a low carbon transport system in the UK. The Council is also tasked with helping UK companies develop and manufacture the necessary products to meet the needs of a lower carbon economy.

135. The Automotive Council will build on the work of the New Automotive Innovation and Growth Team (NAIGT). The NAIGT was established to create a forum for government and industry to work together to identify and agree a strategic view of the innovation and growth challenges the automotive industry would face over the next 15 years. From this, the Automotive Council has emerged to aid the development, demonstration, manufacture and use of ultra-low carbon vehicles.

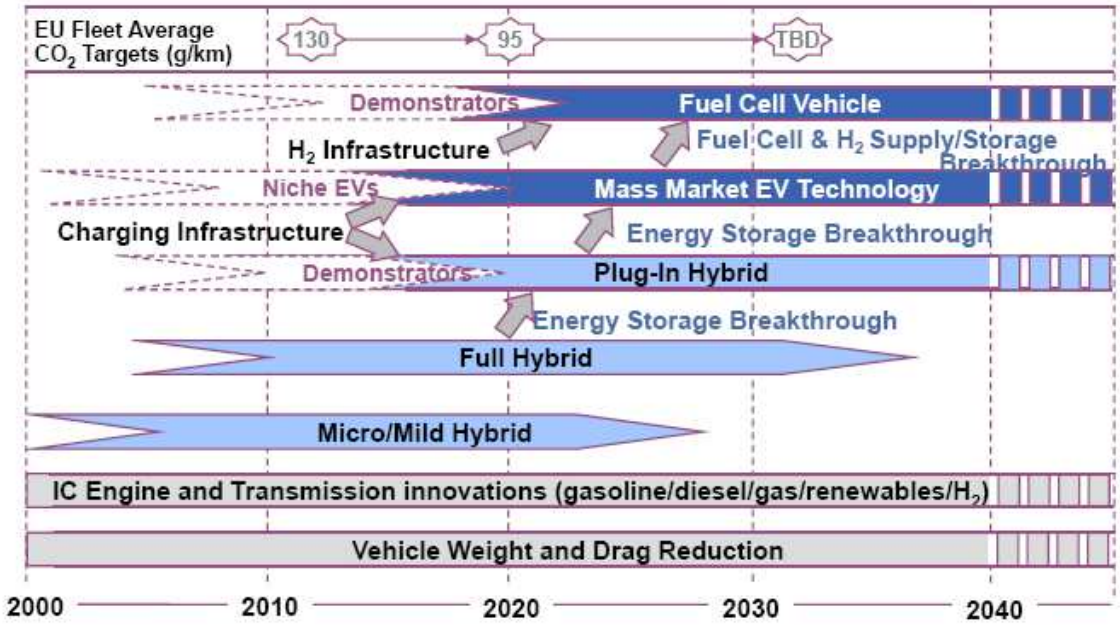
136. A key output from the NAIGT was the technology road map, shown in Chart 16. This shows, over time, a consensus industry view of the differing technologies that will help reduce carbon emissions in the sector. It suggests that internal combustion engines (ICEs) will continue to play a role in meeting society's motoring needs throughout the period. ICEs are likely to contribute the largest CO_2 reductions over the immediate future until the transition to EVs or a different AFV is made.

137. Measures to reduce weight and drag are common across all technologies. The road map then charts the movement from micro-mild hybrid, through full hybrid to plug-in hybrid and then on to electric vehicle and fuel cell vehicles. It is important to note that by 2020 all different types of technology are expected to be in the marketplace or in the demonstration phase. To achieve this does, however, rely upon development of several breakthrough technologies to be made.

138. The Automotive Council has set up a Technology Council and a Supply Chain Council. A key aim of the Councils is to help UK vehicle manufacturers and suppliers work together to succeed in the emerging low carbon vehicle markets, to promote UK industry in R&D and manufacturer of new technologies, and also ensure that resources are available to support the development of the right skill sets needed to deliver those solutions.

139. The NAIGT builds on the work of the Automotive Innovation and Growth Team (AIGT) and the road maps are a continuation of work undertaken under the Foresight Vehicle programme.

Chart 16 NAIGT Technology Road Map (Source: NAIGT)



Definitions

140. The road map uses a number of abbreviations and technical terms, some are explained here. Hybrid vehicles use two power sources. Sometimes cars with a conventional internal combustion (IC) engine with stop-start technology are termed hybrids. Micro hybrids use stop-start technology and regenerative braking. Mild hybrids use an electric motor to assist a conventional engine. Full hybrids can use the electric motor to drive the wheels for short periods. Plug-in hybrids can charge the batteries directly from the national grid, in addition to the charge supplied under use conditions. The Honda Insight is a mild parallel-hybrid, where the IC engine works with the electric motor to deliver combined petrol and electric power. The Toyota Prius is a full series-parallel hybrid, where either the electric motor or the petrol engine can provide power. A series hybrid system uses the IC engine to turn a generator for the electric motor or to re-charge the battery as the car runs.

141. EV is an electric vehicle, which uses only power from a battery to power the motor. Fuel cell vehicles mostly use hydrogen (H2 is hydrogen gas) mixed with oxygen to produce electricity.

Fiscal and charging instruments

- Fiscal and charging measures can shape demand via carrot-and-stick approaches.
- Policy should ideally be harmonised to give suppliers and consumers consistency.
- Linear CO_2 based taxes would encourage change at all levels.

142. Fiscal and charging instruments, such as taxes, are used by government to raise money for public finances. They can also help shape consumer demand.

143. Motorists in the UK paid almost £25 billion in fuel duty and over £5.5 billion in vehicle duty in 2008. This represented 90% of the total taxes the government claimed to be environmental. Chart 17, below, shows revenues have increased significantly over time.

144. SMMT supports a taxation system that is technology neutral. Fuel duty is the same for petrol and diesel and VED rates of these two fuels were also aligned on 22 March 2007. The increased use of CO_2 emissions for VED and company car tax is aligned to the 'polluter pays' principle.

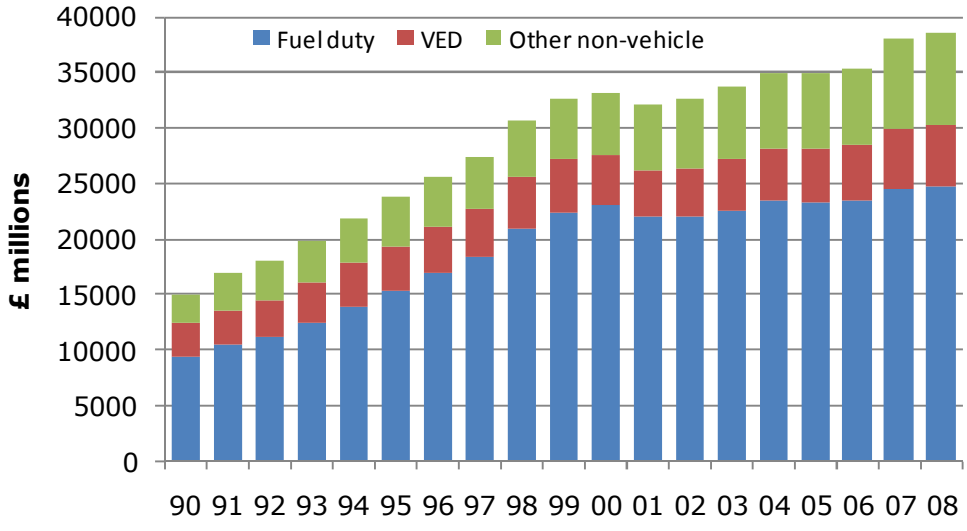
145. The 'polluter pays' principle is also focused on the use of the vehicle, rather than ownership. If the vehicle is not used then it emits nothing. Fiscal regimes should therefore follow and focus upon the use, not ownership, of the vehicle. Fiscal measures should also strive to balance being simple, effective and efficient to police and enforce and provide longer term pathways to delivering stated (eg environmental) goals, but adjust to trends and influences to consumer demand.

146. Fiscal and charging instruments should be as harmonised as possible. Cars are largely global products and common standards would allow manufacturers to deliver vehicles for as wide a marketplace as possible, at least cost. Similarly, local taxes and the like designed to shape consumer behaviour will create localised market conditions, which might require costs and time consuming engineering solutions, which could detract from general efforts to improve vehicle efficiency levels.

147. Localised fiscal or charging measures, such as congestion or parking regimes based on differing vehicle technical specifications can also create disparity and confusion for the motorist. SMMT would support the development of national guidelines or recommendations on how such schemes could operate.

148. A national road pricing scheme could be developed which balances needs of congestion charging and adopts an emissions fee element. The scheme is likely to be complex, difficult and costly to administer and enforce and needs to address concerns over invasion of privacy. SMMT is supportive of trials until a robust and fair mechanism can be introduced. Whether the scheme is additional or complementary to other existing tax regimes also needs to be reviewed to ensure motorists understand why any new scheme would be installed. The Government has ruled out proceeding with a national scheme during the next Parliament.

Chart 17 UK government revenue from environmental taxes (source: ONS)



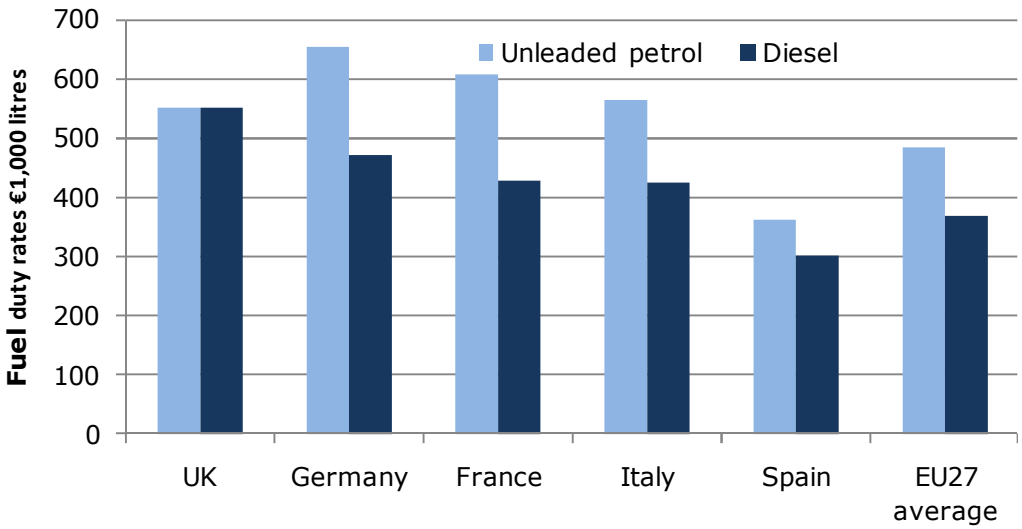
Fuel duty

149. Fuel duty directly taxes the use of the vehicle and therefore follows the 'polluter pays' principle, which is supported by SMMT. In the UK the fuel duty rates for petrol and diesel are the same and among the highest in Europe - see chart 18 (note these rates do not include VAT). Duty in most other member states is lower on diesel than petrol, on average by 22.5% in the EU27. This in turn has implications for diesel penetration levels, which are relatively low in the UK compared with other member states. As noted earlier, diesel cars tend to have lower CO_2 emissions than their petrol counterparts and this is a contributory factor in the UK having slightly above average CO_2 emissions compared with the EU15.

150. The UK government has already set out in previous Budgets that fuel duty will increase by 1% above inflation over the next few years. Higher fuel duty is used to curb demand for car (and CV) travel.

151. Fuel duty is a key source of revenue for the government. Over the longer term, as vehicle fuel efficiency falls, this will erode government revenues unless the duty rates rise accordingly. As fuel use shifts to alternative fuels, government revenues could be further eroded. Understanding and planning how fuel taxation will be dealt with in future will be an important part on determining which fuels succeed and how society in a wider context deals with a move to a lower carbon economy.

Chart 18 Fuel duty rates in selected countries - January 2009 (Source: EC)



Vehicle excise duty

152. Vehicle excise duty (VED) is an annual tax on the ownership of a vehicle. It does not therefore strictly adhere to the 'polluter pays' principle, but since March 2001 it has been based on a vehicle's CO_2 emissions for all cars newly registered from that time (cars registered before then pay VED based on a engine size, with a differential rate over and under 1549 cc). Originally diesel and petrol cars paid different rates (diesel the higher), but the rates were aligned in March 2007. The CO_2 levels are in bands, originally four, with additional bands being added over time. In April 2009 the system moved from seven to 13 bands. The rates are shown in Table 12. SMMT was supportive of the move to a more linear framework.

153. In April 2010 a new first year rate of VED is set to be introduced, sometimes referred to as a showroom tax. For cars below 150g/km the first year rate is zero or below the standard rate. For cars over 165g/km a higher rate will be charged in the first year, with cars over 255g/km paying £950, £515 above the standard annual rate.

154. SMMT is concerned the new system will add an extra layer of complexity, as well as undermine the competitiveness of some products. It could turn some buyers away from the new car market and increase demand for used cars which may have higher emissions and influence residual values for certain products quite noticeably. As prices are typically displayed as on-the-road pricing the consumer might not be aware of the duty payable, and instead the industry will have to bear the charge.

Table 12 - VED rates for cars registered from March 2001

Pre 04/09		From 01/05/09					First year
Band	CO_2 g/km	**New band**	CO_2 g/km	**Standard rate***			**rate**
				2008-09	2009-10	2010-11	2010-11
A	Up to 100	A	Up to 100	£0	£0	£0	£0
B	101-120	B	101-110	£35	£35	£20	£0
		C	111-120	£35	£35	£30	£0
C	121-150	D	121-130	£120	£120	£90	£0
		E	131-140	£120	£120	£110	£110
		F	141-150	£120	£125	£125	£125
D	151-165	G	151-165	£145	£150	£155	£155
E	166-185	H	166-175	£170	£175	£180	£250
		I	176-185	£170	£175	£200	£300
F	186-225	J	186-200	£210	£215	£235	£425
G	Over 225	K**	201-225	£210	£215	£245	£550
		L	226-255	£400	£405	£425	£750
		M	Over 255	£400	£405	£435	£950

**AFV discount: 2008-09 A-E £20, F-G £15, 2009-10 A-I £20, J-M £15, 2010-11 onwards £10 all cars*
*** All cars over 225g/km registered 1 March 2001 - 23 March 2006 in K band*

Company car tax (CCT)
155. CCT is paid by those using a company car for private use. Since April 2002 it has been based on the vehicle's CO_2 emissions, with a user taxed at their income tax rate on a percentage of the vehicle's list price. The percentage figure used is between 15-35% cross-referenced to the vehicle's CO_2 emissions, with each 5g/km CO_2 band equating to a 1% rate rise. Since April 2008 the starting rate has been 135g/km. This is due to fall to 130g/km in 2010. Cars below 120g/km (known a QUALECs—qualifying low emissions car) face a 10% rate. There are also discounts for alternative fuelled vehicles, while diesel cars pay a 3% surcharge (although the rate cannot go above the 35% maximum ceiling).

156. In the Pre-Budget Report in November 2009 it was announced that from April 2010 cars powered solely by electricity would pay a 0% rate for five years. From April 2011 further changes were announced to simplify the scheme, including treatment of alternatively fuelled vehicles and the £80,000 limit for the price of a car for benefit is to be removed. In 2012-13 the lowest appropriate percentage will still be 10%, but will apply to cars with CO_2 emissions up to 99g/km, with the rate for emissions of 100g/km set at 11% and increasing by 1% for every 5g/km to the maximum of 35% (see www.hmrc.gov.uk/cars/rule-changes.htm).

157. CCT should provide a further stimulus for electric vehicles, again showing government's strong support for this particular vehicle type.

158. In the past air quality was often cited as a reason not to promote diesel use, as diesels emit higher levels of particulates. However, given improvements in technology which allow diesels to comply with strict Euro emission standards, the continuation of the 3% surcharge on diesels in CCT is at odds with promotion of low CO_2 emitting vehicles.

Other fiscal measures
159. A first year capital allowance of 100% is provided for the purchase of electric cars. From April 2010 electric vans receive a 100% first year allowance and be exempt from the van benefit charge, which is currently £3,000 per annum.

160. It had been proposed that road transport be included in the European Union Emissions Trading Scheme (EU ETS). It was proposed that this would allow transport emissions to be treated alongside other emitters and under the auctioning element of the scheme polluters have to buy the right to emit. However, greater analysis is to be undertaken before a proposal is made. At present transport is not expected to join the EU ETS in phase 3, ie until 2017 at the earliest. Areas to be resolved with such a proposal are who is the polluter - the millions of individual motorists or a larger body such as the fuel suppliers? The impact of including transport in the wider workings of the scheme must also be assessed, as to whether inclusion in EU ETS will be in addition to or replace many of the existing taxes on the motorist.

Technological developments

- Continuous improvement sought by industry to lower environment impact.
- Existing and developing technologies being developed at the same time.
- Growing focus on electric vehicles, as hybrids or pure electrics.

161. The NAIGT road map (Chart 16, page 26) sets out the main technologies being viewed to achieve the shift to a lower carbon transport system. At present all are being explored and whilst no single technology has emerged as the dominant solution, the focus by some stakeholders is predominantly on electric vehicles.

162. There have been a number of false dawns for technological solutions to reducing emissions. It is important to ensure a balanced and long-term solution is, or solutions are, developed. The current focus is very much on vehicle efficiency, but this might be best broadened to focus on the wider life-cycle emissions. These would involve the emissions taken to produce, use and dispose (including recycle) of the vehicle. These measures would go beyond just vehicle efficiency. Most efficient approaches for overall life-cycle emissions reductions have to be established with the lowest cost per CO_2 reduction. From this perspective the importance of effort by all stakeholders, the integrated approach, is important. Developing a life-cycle approach is difficult, time-consuming, potentially costly and subject to change over time and to being influenced by a number of outside variables (eg where does the electricity to power electric vehicles come from?). The full life-cycle costs of traditional internal combustion-engined vehicles would also need to be examined, including impacts of the fuel supply chain to ensure like-for-like comparisons are made between different fuel types.

163. The use of light-weight materials has often been to increase outright performance of a vehicle, but the improved efficiency can be used in conjunction with the downsized engine to achieve better fuel economy and lower emissions. As many of these light-weight materials can be expensive to produce and use, eg carbon fibre or aluminium, this could mean striking a balance between ensuring a vehicle is still cost-effective for the consumer and more efficient.

164. Downsizing engines and vehicle components can lead to the development of smaller vehicles. In 2009 there were a number of additional models launched in the mini-segment, such as the Toyota iQ, Nissan Pixo and Suzuki Alto. The mini-segment is for vehicles of a smaller size to the supermini-segment. Use of different materials and better packaging could mean a smaller floorplan is used for the same overall space occupied by occupants. Alternatively space for occupants or luggage could be compromised to enable lower CO_2 emissions.

165. Aerodynamics have also come back to the fore as a measure to lower CO_2 emissions, notably with measures underneath the car helping reduce drag. Reduced drag enables a vehicle to slip through the air more efficiently and so require less energy use. Use of thinner wheels also gives small improvements in drag. The use of low-rolling resistance tyres can further help reduce drag.

166. The internal combustion engine (ICE), powered by petrol, diesel or gas, still has plenty of scope for development and improvement in it. ICEs also benefit from having a strong infrastructure in place, for refuelling as well as maintenance/repair.

167. Already several diesel-engined cars are producing below 100g/km and are on par with emissions from hybrid vehicles. The lowest CO_2 emitting diesel registered in 2009 emitted 88g/km, the lowest petrol was at 106g/km.

168. Manufacturers have been able to downsize the capacity of engines, so the unit weighs less and requires smaller ancillaries (eg oil and cooling systems). Thus weight is saved and efficiency gained. Use of better engine management, better injection systems, super-charging and or turbo-charging has allowed power levels to be maintained.

169. Reducing the capacity of the engine may also allow a reduction in the number of cylinders, which can in turn give efficiency savings.

170. Increasingly manufacturers have also been using automatic stop-start systems to reduce emissions. By switching off the engine when not in use impressive CO_2 reductions can be achieved, especially within urban motoring.

171. Direct shift gearboxes (DSG) have also been used to lower energy consumption, when compared with a conventional manual gearbox. Use of automated or pre-programmed gear-changes can also be electronically configured to optimise fuel use. More gears also allow the engine to rev at the optimal level.

172. Alternatively fuelled vehicles (eg biofuels, biogas to liquid) and advanced propulsion technology vehicles (eg electric and hybrid) are in this report abbreviated to AFV.

173. Toyota and Honda have been instrumental in bringing hybrids to the marketplace in significant volumes.

174. Several other manufacturers are set to introduce hybrids and electric cars to the marketplace over the next year or so. Tesla launched its electric sports car in January. Renault plans to bring four pure electric cars to the marketplace in 2011 - the Twizy, Kangoo, Zoe and Fluence. The Nissan Leaf will begin production in Japan this year and it is hoped that the model will also be built in the UK plant in Sunderland. Mitsubishi is set to introduce the iMiev, and the Peugeot iON and Citroën C-Zero are models based on the same platform. Ford is testing the Focus BEV and will begin mass production of a battery-electric vehicle in 2011. 40 MINI e models are already on trial through the TSB programme and a 'megacity' model may be launched commercially in the future. Tata plans to build the Vista electric car in the UK and electric Jaguar and Land Rover models could follow using this technology know-how. The Toyota plug-in hybrid is also expected to enter the marketplace shortly with a CO_2 rating of 75g/km.

175. A number of low volume UK producers are also building electric vehicles, including Axon, Lightning Car Company, Westfield, Radical, and Ginetta.

176. The Vauxhall/Opel Ampera is due late 2010/early 2011. This is a 'range extender' vehicle, or a series hybrid, meaning it is the electric motor that drives the wheels and the 'other' engine is used to drive the motor. In the Ampera the other engine is a petrol motor, and various other power-trains have been developed.

177. Fuel cell vehicles are also being developed. These use hydrogen and oxygen to produce electricity to power a motor. Honda is currently trialling the FCX range in the US.

178. In the last CO_2 report, SMMT highlighted a number of other different technologies, such as biofuels and hydrogen powered vehicles, which are also under development. These alternatives are still being developed and assessed.

Selection of electric, hybrid and range-extender vehicles

Opportunities and constraints on move to low carbon vehicles

- Need for technological breakthroughs, at a competitive cost.
- Infrastructure needed to support new technologies.
- Consumer sentiment needs to adjust; government can help shape this change.

Technological breakthrough, at a competitive cost
179. Developing any new product costs money and involves a commercial risk. The need to meet future regulation dictates that progress must be made in developing lower emitting vehicles. It then moves to a commercial decision how best to achieve that aim. The impact of the economic crisis could limit the ability of all stakeholders to invest in the transition to a lower carbon vehicle transport system.

180. Setting the long-term goals allow for better planning and development, but judging the balance between political desire and commercial realism is complex. Technology could allow a break-through, or alternatively it could be an expensive failure, making any political targets look too easy or too onerous.

181. Industry, at present, needs the ability to explore different pathways to achieve the emissions reductions. The alternative is a regulatory car, one that is virtually dictated to the producer. This would also mean consumers had to compromise on the type of car they could use, whereas today they have a vast array of choice. By moving towards company specific targets for emissions reductions, this allows companies to plan their own strategic model development programme and to develop cars which they feel they will be able to sell competitively.

182. Standardisation of technology is likely to be required and this is work-in-progress. A balancing act will need to be made between allowing the market leaders to develop the technology systems and what is good for society now and in the longer term. Otherwise, a patchwork of different vehicle types might be created, similar perhaps to the betamax/ VHS video recording systems (which were ultimately replaced by more advanced technologies anyway).

Consumer acceptance required
183. Consumers will also need to be willing to accept these different vehicles and powertrains. There could well be a higher cost to bear for the new technology. It will take time before AFVs move from aspirational to functional products. Consumers are used to vehicles that can be refuelled quickly and relatively conveniently, and can go hundreds of miles between refuelling. For some AFVs, such as hybrids and range-extenders, there will be little change to the consumer's traditional motoring habits. For others, such as electric vehicles the switch will require a bigger step for the consumer to take. Electric vehicles typically take several hours to charge and can often do less than 100 miles before needing to be recharged. With consumer acceptance should also come stability in residual values. Residual values are a very important factor in determining the success of products in the existing marketplace, ensuring new technologies find favour amongst new and used buyers throughout the vehicle's life. This will be determined by a number of factors that are embodied in a vehicle's residual value. Getting all these factors right will enable a new technology to enter and be sustainable in the market.

Infrastructure necessary in tandem
184. Developing commercially new technologies expected to gain a greater share of the marketplace, eg hybrids, electric, CNG, biogas and hydrogen-powered cars, has the added risk of there being scattered infrastructure and uncertain demand of consumer uptake of these technologies.

185. The technology breakthroughs are also not just in the vehicle, but from the infrastructure too. There is already a strong network of petrol stations and service and repair centres in place for conventionally fuelled vehicles. For alternative fuels this infrastructure is either not in place or not convenient. For electric vehicles there are plenty of sockets for plugs in homes and offices, but few available in the street or car parks at present. This could be viewed as a large commercial opportunity for change. Fast-charge points could also be developed to allow for rapid charging of batteries.

186. Standardisation of infrastructure is also desirable, so for example any electric car could be re-fuelled at any charging point. It is unclear yet whether industry can develop in accord a workable solution or government intervention would be best.

187. Battery exchanges are cited as a way of getting over the issue of long charging times for electric vehicles. These exchanges would likely need trained technicians or robots to change-over the batteries. This will require an entirely new infrastructure (even if existing petrol retailing sites were to be used). Battery exchanges would also require large stocks of expensive batteries to be maintained, ideally for vehicles to have standardised battery systems and potentially some checking procedure to ensure poor quality batteries are not being exchanged for good quality ones (eg over time batteries may lose their recharging qualities).

188. Changes to alternative fuels might also require wider changes to the infrastructure, such as the energy supply chain industry. If there was mass electrification of the fleet then this would push up need for recharging points to be installed. It might also mean increased demand for electricity in total, which might necessitate more supply. What fuel the suppliers use to generate the electricity, eg coal, gas, nuclear, wind, etc, would also greatly influence the overall emissions from vehicles. This mass electrification of the fleet is likely to take a number of decades. Development of smart meters would allow better interaction between the charging post and the grid, to ensure the grid was not being over-loaded at peak times and the consumer was getting the lowest rate for recharging their vehicle.

Political drive

189. Government already appears firmly committed to moving to a lower carbon transport system. Funds have already been set aside to promote consumer change, develop product and infrastructure. More funds would help. Government could look to promote private investment in UK industry to develop products, eg through raising awareness or tax incentives.

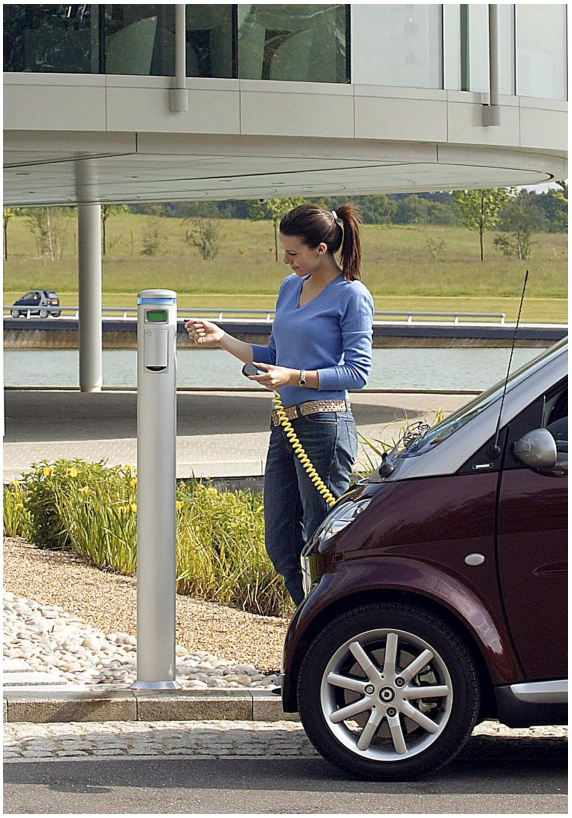
190. Government influence on the development of lower carbon vehicles and the supporting infrastructure needs to be mindful that solutions should be developed to be effective at a wider European or global level. Vehicles are global products and to be internationally competitive requires vehicles that can be used both nationally and internationally.

191. This report has already looked at the sizeable resource to the public finances that comes from fuel duty revenues. Government, and wider society, will also need to be realistic that any switch to alternative fuel sources would impact on the public purse.

Summary

192. Clearly there are a number of complex and interlinked issues to resolve. Industry, through sector associations, has set up workgroups to look at and ensure collective thought is developed. Similarly, government-industry collaboration on the issues and developing projects in unison should help ensure a successful route to a lower carbon economy can be achieved, with a cost which all sides can bear.

193. A common target for all technology is not just lowering emissions, but also delivering safe and commercially viable products. Those products need to have a widely available and economically viable infrastructure coverage. The products and the infrastructure need to be effectively, efficiently and economically maintained, with a suitable repair and end of life infrastructure. For this to happen most effectively, a suitable degree of standardisation is also required. This will take time to be developed, but can be delivered through the integrated approach.



Chapter 4 - Van CO_2 emissions

194. While this report is primarily focused on new car CO_2 emissions, the commercial vehicle market is also an important part of the automotive industry in terms of jobs, technological input, impact on society and CO_2 emissions. This chapter highlights some key differences between cars and CVs and notes how complex CV emissions are to measure. In October 2009, the European Commission proposed CO_2 targets for van manufacturers. Vans are also termed light commercial vehicles (LCVs).

Total van CO_2 emissions

- Total van CO_2 emissions showed steady growth since 1997, but fell in 2008.
- Reduction in distance travelled as recession impacts lowers emissions and fuel use.

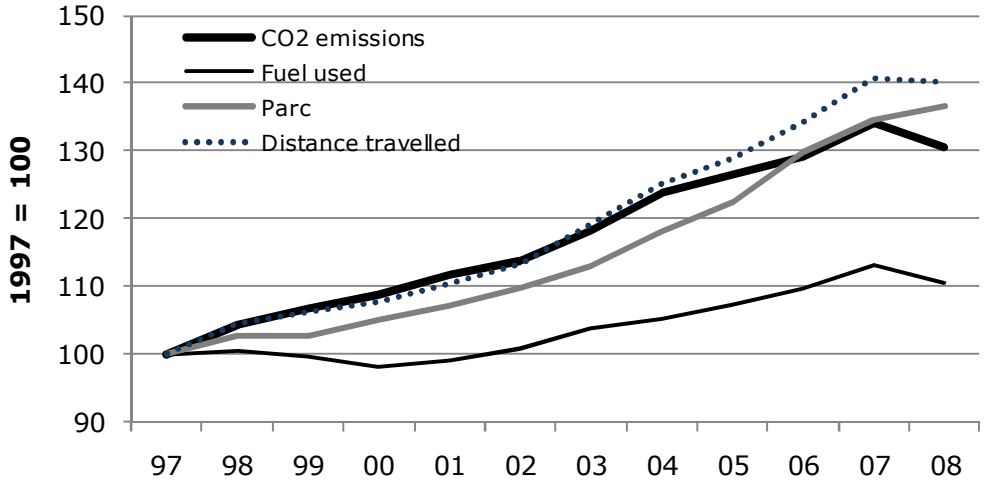
Table 13 - Total van CO_2 emissions, fuel consumption, distance travelled and parc size, GB (Source: DECC (CO_2), DfT (Fuel and distance), and SMMT(parc)

Year	Total CO_2 (tCO_2)	Fuel consumption (Mt)	Distance travelled (bn kms)	Parc size (mn)
1997	12.0	11.4	48.6	2.64
2007	16.1	12.9	68.4	3.54
2008	15.7	12.6	68.1	3.60
% ch '08				
vs '07	-2.5%	-2.3%	-0.4%	1.5%
vs '97	30.6%	10.6%	40.1%	36.5%

195. Over the past decade total CO_2 emissions from vans have risen sharply, as the number of vehicles in use and distance travelled has increased. However, emissions fell for the first time in 2008, as the recession impacted. Chart 19 shows trends over time and a similar pattern in total CO_2 emissions to fuel used and distance travelled is evident. Van fuel efficiency, as opposed to total emissions, is thought to have been stable or improving slightly.

196. Vans are very different from cars in terms of who buys them, why and how they are used. They are primarily used by businesses and their use is directly related to economic activity. Van buyers also have different requirements for their vehicles than car buyers, eg they cover much larger average mileages, have increased need for reliability, and are very aware of running costs and residual values. Fuel economy and running costs are already a very significant factor in CV buyers' purchasing decisions.

Chart 19 Growth in van CO_2 emissions, fuel use, parc and distance travelled



European van CO_2 regulation

- EC proposes 14% reduction in average van CO_2 by 2016 and 50% cut by 2020.
- Industry committed to continuously improving CVs' environmental performance.
- Industry seeks appropriate targets and realistic lead time.
- Diversity of market needs to be protected and innovation should be encouraged.

EU van CO_2 proposal

197. In October 2009 the European Commission made a Proposal for a Regulation on van CO_2. This covers light commercial vehicles (LCVs) and proposes targets of 175gCO_2/km phased-in between 2014-16 - down 14% on 2007 performance, and a long-term target of 135g/km in 2020, subject to impact assessment - down 23% on 175g/km and down 50% on 2007 performance.

198. As with the new car CO_2 regulation published in April 2009, the Commission Proposal includes an important flexibility to recognise the limited technical and economic potential for small volume producers, registering less than 22,000 vehicles per year, to reduce emissions and incentives for eco-innovations and super-credits for ultra-low carbon vans.

199. The Commission suggests that the EU fleet average for vans in 2007 was 203g/km. The UK performance, as for cars, may be slightly above this level reflecting the composition of the market in the UK. Work is in progress to develop better data on the average emissions of CVs, although it is a complex dataset to construct accurately.

200. Measuring CO_2 levels from new vehicles is done during the type approval process (to ensure the vehicle meets all requirements to be allowed on the road). Emissions tests are carried out over a drive-cycle (NEDC in Europe), which is typically done at a model derivative level for cars, so using different engine and gearbox configurations. For CVs to determine individual CO_2 values is more complex than cars as base vehicles can be fitted with a number of different body styles - short/long-wheelbase, high roof, panel van, flat-bed and so on. In addition, the payload can have an impact on emission levels.

Industry position

201. The proposal needs to set achievable targets within a realistic timeframe, to ensure that industry can achieve the environmental benefits, and also remain competitive. The proposal should also protect the diversity of the market, understanding the variety of different sectors the CV market caters for.

202. As with the new car regulation, industry seeks a four year phase-in from 2015-2018 (65% compliance in 2015, 75% in 2016, 80% in 2017 and 100% in 2018). A comprehensive impact assessment should be undertaken before long-term targets are introduced. This assessment should consider potential technological progress as well as competitiveness implications for any EU specific target.

203. The proposal should also recognise the recent impacts of the recession on the sector. CV volumes have fallen sharply in 2009, down 36% in the UK (and much more than that from the peak of the market). Customers are unlikely to return until the economic setting and business confidence improve to make capital investments in new products. Tougher regulation that increases the cost of new vans may curtail the wider economic recovery, given their intrinsic link to economic activity. Similarly, industry's ability to undertake investment will be weakened by the economic setting and a period of further restructuring may well evolve.

Measures to help purchase of more environmentally friendly CVs and to use them more efficiently

204. A van CO_2 database, the most comprehensive in Europe, was created jointly between SMMT, the Vehicle Certification Agency (VCA) and the Department for Transport (DfT) in June 2009. The database can be accessed at www.businesslink.gov.uk/vanfueldata. The database allows consumers to search for new van models on the UK market and compare CO_2 emissions and fuel consumption.

205. SMMT, along with the DfT and VCA, published a van buyers guide "Right Van Man" on 26 February 2009 which informs users how to make the right choice when buying and maintaining a van and how driving style can also play an important role in CO_2 emissions, fuel consumption and running costs (see http://www.smmt.co.uk/publications).

206. The industry believes that these consumer information initiatives will help buyers select the best van for their business and improve CO_2 emissions at the same time.

207. The DfT is administering the Low Carbon Vehicle Procurement Programme which has a £20 million fund to incentivise trials for low carbon vans in public fleets. The programme began in 2009 and a further £30 million could be invested if the scheme is a success. The November 2009 Pre-Budget Report announced that electric vans would be exempt from the van benefit charge (currently £3,000 per annum) for five years from April 2010 and a 100% first-year allowances will also be provided for the purchase of electric vans (subject to state aid approval).

Annexes

1. UK Scrappage Incentive Scheme (SIS)

Following significant declines in new car demand and the successful application of schemes in other countries, notably Germany, the UK government announced a Scrappage Incentive Scheme (SIS) would be introduced in the UK. The scheme went live on 18 May 2009 and has been far more influential than most imagined, delivering a major increase in vehicle demand. It has also helped reduce CO_2 emissions.

Initially the scheme had a £300 million Government budget, with each motorist receiving a £2,000 discount if they scrapped an old car or LCV (below 3.5 tonnes) and bought a new vehicle. Unlike other schemes the funding was half contributed by government and half by industry. The scheme was extended on 28 September with an extra £100 million, to take the total government funding to a maximum of £400 million, thus £800 million in total with the match funding from industry.

The scheme was set to close on 28 February 2010 or before if the money ran out, but in February the closing date was extended to 31 March 2010 (or earlier if the funds run out). Note this is the date for orders to be placed, manufacturers have a four month period to deliver the vehicle and a further one month to make the claim, so claims could still be being processed into the summer.

The criteria for the old vehicle is that it must be a car or small van not exceeding 3.5 tonnes that was registered in United Kingdom on or before 29 February 2000 if a car or 28 February 2002 if a van (note this changed on 28 September 2009, previously had been for cars or vans registered before 31 August 1999). The vehicle also needs to have been registered to the consumer for at least 12 consecutive calendar months before the order date of the new vehicle. Further, it must have a current MOT test certificate and tax disc on date of order (or one that has expired no earlier than 14 days before the time of order) and be insured. The new car or LCV registered to the same keeper as the old vehicle and must be a UK specification vehicle.

Determining if registrations are additional or would have happened anyway is a key and difficult question. A survey of consumers is needed and the government department for Business Innovation and Skills (BIS), which administers the scheme, plans to carry out such a survey during an audit after the scheme has finished.

In the absence of a survey it could be taken as a planning assumption that 70% of SIS volumes are additional, although the range could be 50-90%. These are sales that would not have happened in 2009 and are new, rather than used, vehicle purchases.

A study on the German scheme by EurotaxSchwacke suggested that of the additional sales 60% were new incremental sales and 40% were pulled forward from 2010-12.

For the new car market in 2009 and 2010 collectively, SMMT's April and October forecasts (pre scrappage announcement and latest view before the year end) differed by almost 330,000 units, with an estimated 390,000 cars expected to go through the SIS in total, and 281,000 in 2009. In 2009 SMMT reported some 285,000 cars had been registered through the SIS, very close to the October estimate.

Several manufacturers have reported additional shifts or extra staff taken on to meet increased demand from the UK, and from other SIS in place in Europe. The scheme has helped sustain jobs in the retail, distribution, production and supply chain industries. Dealers have reported a rise in footfall through their showrooms and finance companies reported an uplift in take-up for their services. As the scheme encourages consumers to spend this should provide a positive effect for the economy at large.

2. SMMT MVRIS segmentation

(MVRIS = motor vehicle registration information system)

A	=	Mini	(eg smart)
B	=	Supermini	(eg Nissan Micra)
C	=	Lower medium	(eg Renault Megané)
D	=	Upper medium	(eg Ford Mondeo)
E	=	Executive	(eg BMW 5 Series)
F	=	Luxury saloon	(eg Rolls-Royce)
G	=	Specialist sports	(eg Porsche 911)
H	=	Dual purpose	(eg Range Rover)
I	=	Multi purpose vehicle (MPV)	(eg Vauxhall Zafira)

Segment A - Mini
Normally less than 1.0 cc.
Body style 'miniature'.
Normally two doors.
Length normally not exceeding 3,050 mm (10 feet).

Segment B - Supermini
Normally between 1.0 - 1.4 cc.
Body style bigger than mini.
Length normally not exceeding 3,745 mm (12.5 feet).
Performance greater than mini.
More variety of trims per range.

Segment C - Lower medium
Normally between 1.3 - 2.0 cc.
Length of saloon not exceeding 4,230 mm (14 feet).

Segment D - Upper medium
Normally between 1.6 - 2.8 cc.
Length of saloon normally not exceeding 4,470 mm (14.9 feet).

Segment E - Executive
Normally between 2.0 - 3.5 cc.
Body style generally bigger than upper medium.
Normally four doors.
Length of saloon normally not exceeding 4,800 mm (16 feet).
More luxuriously appointed.

Segment F - Luxury saloon
Normally above 3.5 cc.
Most luxurious available.

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

Segment H - Dual purpose
4x4 off-road.

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

3. Other emissions

- Euro emissions standards introduced to reduce other pollutants.
- Lead to significant improvements in noxious emissions from passenger cars.

Table A - 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%)

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

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 before all cars).

Table A shows that NOx and PM levels have typically improved by 82% - 92% between Euro 0 and Euro 4. Euro 4 standards are also a quarter to a third of the Euro 2 levels (pre-2000).

The introduction of these standards has helped air quality from all cars in use, as shown in Table B, sourced from the DfT's Transport Statistics GB 2009. This shows that passenger cars have made significant reductions in the presented emissions, better than the average gains for overall road transport. All transport includes emissions from international bunkers (aviation and navigation).

Table B - Trends in other selected pollutants (Source: DfT)

'000 tonnes	**1997**	**2000**	**2006**	**2007**	'07 vs '06	'07 vs '97
Carbon monoxide (CO)						
Passenger cars	3,106	2,084	760	639	-15.9%	-79.4%
Road transport	3,706	2,480	918	786	-14.4%	-78.8%
All transport	5,833	4,296	2,305	2,149	-6.8%	-63.2%
Nitrogen oxides (NOx)						
Passenger cars	479	357	158	137	-13.3%	-71.4%
Road transport	891	749	478	441	-7.7%	-50.5%
All transport	2,362	2,134	1,910	1,798	-5.9%	-23.9%
Particulates (PM10)						
Passenger cars	9.4	7.1	6.1	5.9	-3.3%	-37.2%
Road transport	41.4	32.3	25.5	24.7	-3.1%	-40.3%
All transport	228.3	182.5	152.7	151.6	-0.7%	-33.6%

Data appendix

1. Size of the new car market - and share covered by CO_2 data

	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%

SMMT has published an annual CO_2 data report since 2002 and has new car CO_2 data from 1997 onwards. This data is sourced from manufacturers' own CO_2 figures (supplied on the car's first registration document) and checked with type approval data from the Vehicle Certification Agency 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 the database it has compiled 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 Vehicle Registration Information Service (MVRIS). It links vehicles' CO_2 levels to the MVRIS new car registration database.

2. Average new car CO_2 emissions, 1997-2009

	All registrations	With CO_2 data	% total	volume difference
1997	2,170,725	1,742,251	80.3%	428,474
1998	2,247,402	1,993,301	88.7%	254,101
1999	2,197,615	2,125,465	96.7%	72,150
2000	2,221,647	2,212,786	99.6%	8,861
2001	2,458,769	2,457,368	99.9%	1,401
2002	2,563,631	2,562,764	100.0%	867
2003	2,579,050	2,579,050	100.0%	0
2004	2,567,269	2,567,269	100.0%	0
2005	2,439,717	2,439,717	100.0%	0
2006	2,344,864	2,344,864	100.0%	0
2007	2,404,007	2,404,007	100.0%	0
2008	2,131,795	2,131,795	100.0%	0
2009	1,994,999	1,994,999	100.0%	0

Quick Facts

- Average new car CO_2 fell by 5.4% in 2009, on 2008, to 149.5g/km.
- Rate of reduction best on record, three times rate averaged since 1997.
- Average new car CO_2 in 2009 down 21.2% on 1997 level.
- Almost half of all cars in 2009 were below 140g/km, was 3.9% in 1997.
- Total CO_2 emissions from all cars in use fell by 3.1% in 2008 on 2007*.

	2009	2008	1997
Average new car CO_2 emissions	**149.5g/km**	**158.0g/km**	**189.8g/km**
% reduction vs 1997	-21.2%	-16.8%	
Share of cars under:			
120g/km	20.4%	11.0%	0.0%
130g/km	27.6%	16.4%	0.1%
140g/km	47.3%	34.8%	3.9%
Total new car market	**1,994,999**	**2,131,795**	**2,170,725**
Diesel penetration	41.7%	43.6%	16.2%
Supermini segment share	37.2%	34.1%	26.5%

	2008	2007	1997
Total CO_2 emissions cars*	**72.1MtCO_2**	**74.4MtCO_2**	**75.4MtCO_2**
Fuel consumed by cars**	23.4Mt	24.4Mt	24.5Mt
Total GB car parc	30.3mn	30.2mn	25.6mn
Total distance travelled by cars**	401.7bn kms	404.1bn kms	365.8bn kms

SOURCES

All data sourced from SMMT unless otherwise stated

* DECC, **DfT Transport Statistics Great Britain, 2009 edition

$MtCO_2$ = Million tonnes carbon dioxide.

Mt = Million tonnes. Mn = Million. Bn kms = billion kilometres

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