Chapter 5: Progress reducing transport emissions

Introduction and key messages

Domestic transport emissions were 117 $MtCO_2$ in 2011, accounting for 26% of UK CO_2 emissions. Emissions from international aviation and shipping were 42.5 $MtCO_2$ but are not currently formally included in carbon budgets.

The focus of this chapter is on domestic transport emissions covering emissions from surface transport and domestic aviation and shipping.

Our analysis is based on final emissions and other data for 2011 and preliminary data on emission drivers for 2012 which enables us to make an estimate of emissions last year. Our focus is on trends in new car and van emissions, HGV emissions, the use of biofuels, recent developments in the market for electric vehicles and progress towards sustainable transport choices.

Our key messages are:

- Domestic transport CO_2 emissions fell 1.2% in 2011, having been unchanged the previous year. An initial assessment suggests that surface transport emissions may have fallen slightly in 2012, with reduced emissions from cars and HGVs outweighing an increase from vans.
  - Surface transport emissions fell 1.3% in 2011, largely due to falls among cars and buses. Improved vehicle efficiency for car and vans and lower kms travelled for HGVs offset lower penetration of biofuels and a rise in distance travelled for cars and vans.
  - Our initial assessment for 2012 suggests that emissions may have decreased again, with continued improvement in vehicle efficiency driven by EU regulations, and lower distance travelled by cars and HGVs, offsetting reduced biofuels and the continuing rise in kms travelled by vans.
  - Domestic aviation emissions fell by 4.5% in 2011, to 1.7 $MtCO_2$, while domestic shipping emissions fell by 3.2%, to 2.5 $MtCO_2$.

- Carbon intensity of vehicles. There has been continued good progress in reducing new car and van emissions, leading to improvements in the overall fleet intensity. Monitoring of emissions intensity for HGVs is problematic as new HGV emissions are not currently measured, and monitoring of trends in the overall fleet is affected by the methodology adopted by the National Atmospheric Emissions Inventory (NAEI). While emissions are currently on track to meet our indicators, progress will need to be maintained to meet future carbon budgets.
  - CO_2 intensity of new cars fell from 138.1 gCO_2/km in 2011 to 133.1 gCO_2/km in 2012, a 3.6% reduction. While there was a reduction in CO_2 intensity of new cars across all car classes, the purchase of cars in different classes was more polarised than in 2011, with a move towards both smaller and larger models at the expense of the medium car segment. Continued growth in higher-emitting vehicles suggests a need to reinforce EU standards with incentives for best-in-class purchase as well as switching between classes. On the supply side, the Government should push for agreement of an ambitious EU target for 2025 in order to drive continued technological progress.
  - Average CO_2 intensity of new vans is estimated to have fallen by between 4.1 and 4.9% in 2012, to between 187 and 189 gCO_2/km, as industry responds to the target of 175g/km in 2014-17. However, the market shift to larger, higher emitting vehicles may limit progress in reducing emissions. The Government should push for a challenging EU target for 2025, with a possible need to reinforce EU standards with incentives around purchase behaviour.
  - Uptake of electric cars doubled in 2012 as Plug-in Hybrid Electric Vehicles (PHEVs) became available. A number of new Battery Electric Vehicles (BEVs) and PHEV models are expected in 2013/14. There was also progress in developing charging infrastructure with around 9,000 chargepoints installed to date, and the launch of a new national funding offer in February 2013. However, levels of uptake are still low and the market remains in its infancy. It is important that a stable framework of support remains in place to boost consumer and producer confidence, including continuation of current grants, as well as incentives for leasing firms who have the potential to play a key role in driving uptake.
  - Biofuels penetration decreased from 3.5% in 2011 to 3.1% (by volume) in 2012, as the Renewable Transport Fuel Obligation (RTFO) was amended to allow biofuels produced from wastes, non-agricultural residues and second generation biofuels to be counted twice in meeting the biofuels target. This level of biofuels is 1.4% short of our indicator. It is important that a robust framework for taking account of Indirect Land Use Change (ILUC) impacts is agreed as soon as possible to guard against an investment hiatus in this sector, or to allow additional action to meet carbon budgets to be put in place if required.
- Progress on changing behaviour. There has been some progress towards roll-out of Smarter Choices, with limited progress on eco-driving training and speed limiting, and some uncertainty in land use planning:

- Funding for the Local Sustainable Transport Fund (LSTF) was increased from £560 million to £600 million in 2012. The Fund is now fully committed, supporting 96 projects in 77 Local Authorities across England between 2011/12 and 2014/15 – almost all of which included Smarter Choices measures in their bids. As the projects progress, monitoring and evaluation of outcomes should be encouraged, to ensure emission reductions are achieved. If successful, the Government should make a commitment to further funding post-2015 and develop a plan for nationwide roll-out of Smarter Choices over the next decade.
- The level of eco-driving training remained low in 2012, with much greater use reported for truck drivers than for other vehicles. Given the benefits to both cost reductions and carbon savings, we recommend the Government should actively promote the uptake of eco-training, through a combination of inclusion as a key element in the practical driving test, driver training, awareness raising and in-car information on fuel efficiency.
- Speed limits are exceeded by a high proportion of drivers on motorways (49%) and dual carriageways (41%). Given the significant decline in fuel efficiency as car speed increases from 70 to 80 mph, enforcing current speed limits presents an opportunity for reducing emissions. In-car information from fuel consumption meters would also encourage driving within the speed limit by emphasising the excessive fuel consumption associated with driving at 80 rather than 70 mph.
- Government has set out proposals for changes in the way local authorities take account of transport issues in local plans. Given the potential for these to increase car use and emissions, it is important that transport emissions are factored into planning decisions alongside other costs and benefits. An Impact Assessment setting out the potential effect on travel demand and emissions should be published as soon as possible

The analysis that underpins these messages is set out in the following sections:

1. Transport emission trends
2. Opportunities for reducing emissions – the indicator framework
3. Progress in reducing car emissions
4. Progress in reducing van emissions
5. Progress in reducing HGV emissions
6. Progress in developing electric vehicle markets
7. Progress on biofuels in surface transport
8. Progress in changing travel behaviour
9. Other policy developments

1. Transport emission trends

In 2011, domestic transport emissions were around 117 $MtCO_2$. These are dominated by surface transport (96%), with domestic aviation and shipping accounting for the remaining 4% of emissions. Provisional data suggest domestic transport emissions fell 1.2% in 2012, to 116 $MtCO_2$. A breakdown by mode is not yet available.

Since the financial crisis in 2008, surface transport emissions as well as those from aviation and shipping have been falling. The key drivers have been reduced economic activity, high fuel prices and EU emissions standards for new cars and vans, as well as tax and other incentives for the purchase of cleaner vehicles.

In this section we assess 2011 emissions data (the latest year for which final data by mode are available) and data on emission drivers for 2012. We consider in turn:

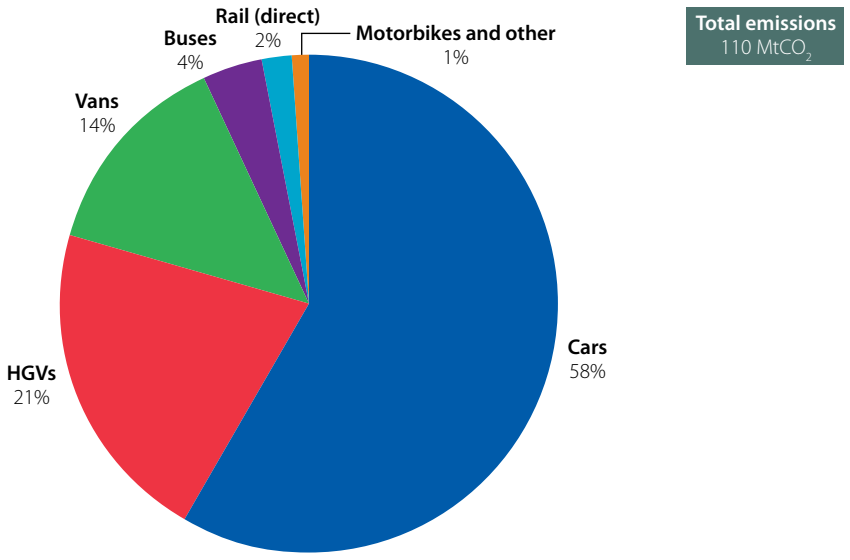
(i) Emissions from surface transport

(ii) Emissions from aviation and shipping

(i) Emissions from surface transport

Official estimates from the National Atmospheric Emissions Inventory (NAEI) suggest that surface transport (road and rail) CO_2 emissions in 2011 were dominated by cars (accounting for 59% of emissions), followed by HGVs (21%), vans (14%), buses (4%), mopeds and motorcycles (1%); rail accounted for the remaining 2% of surface transport emissions (Figure 5.1).

Figure 5.1: Breakdown of surface transport CO_2 emissions by mode (2011)



Source: NAEI (2013).
Notes: 'Other' includes motorcycles and mopeds, liquefied petroleum gas emissions (all vehicles), and other road vehicle engines.

According to these estimates, surface transport emissions fell by 1.3% in 2011, to 110 $MtCO_2$, with a 1.4% fall in road transport, which was partly offset by a 4.6% increase in rail emissions. Within road transport, emissions from vans increased, while those from other modes fell. The biggest falls were in emissions from cars and buses.

While road transport emissions data for 2012 are not yet available, petrol and diesel sales in 2012 suggest that emissions may have fallen by 0.3%

- Petrol and diesel currently account for the vast majority of road transport emissions (99.7% in 2011).
- Petrol sales fell by 4.8% in 2012, while diesel sales rose by 2.6%.
- Given the carbon intensity of petrol and diesel, this suggests road transport emissions may have fallen by 0.3%.
- For comparison, in 2011, petrol sales fell by 4.8% and diesel sales rose by 1.2%, suggesting a 1.3% fall in emissions, compared to the 1.4% fall based on NAEI estimates.

Overall road transport emissions have fallen by 10% since 2007, in line with our indicator trajectory (Figure 5.2). Most of this fall has been among passenger cars, driven by EU limits on new car CO_2, together with subdued economic activity and high fuel prices which have affected travel demand (Box 5.1). As economic conditions improve, policies will become increasingly important in driving emissions reductions in order to meet carbon budgets.

Box 5.1: Drivers of travel demand

While emissions from surface transport fell in 2011, this was against the background of subdued economic activity and high fuel prices. Going forward, it is important to monitor these drivers and their implications for travel demand. The key economic drivers we consider are prices, incomes, population and car efficiency. Figure B5.1 shows recent trends in the transport components of the RPI, and key income measures: GDP, manufacturing output as well as population changes.

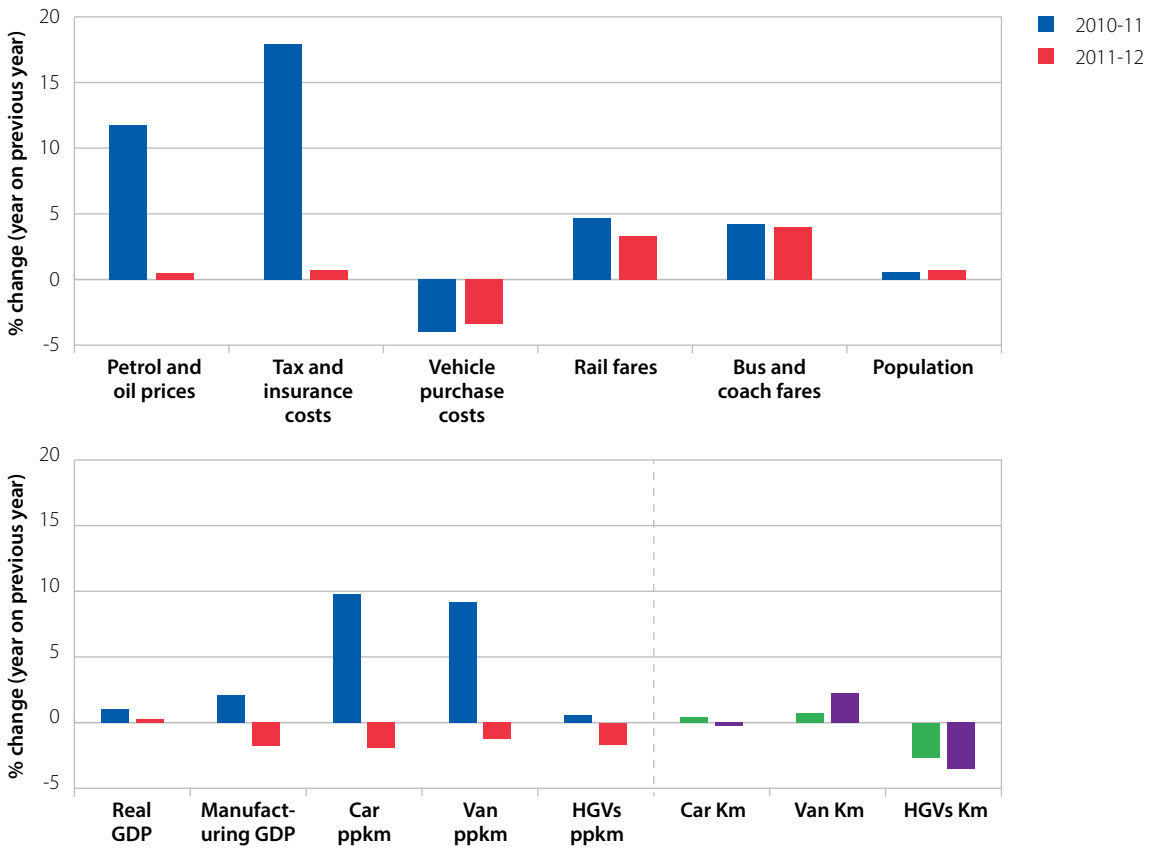
In the passenger car market, real GDP and population grew slightly in 2012. Last year also saw a rise in motoring costs, particularly running costs – petrol and tax and insurance. However improvements in car efficiency meant that the overall cost of driving per km fell. The balance of these factors resulted in a slight fall in car-km. This goes against evidence on elasticities which suggest that the net effect of these factors would be to increase demand over the last year. However, year-on-year changes are subject to other fluctuations (e.g. depending on weather) and over a longer period these remain useful indicators. Going forward, we would expect demand to be less responsive to prices as improvements in efficiency and rises in incomes reduce the importance of prices in determining demand.

In 2012, van-km rose much faster than would have been expected given indicators on prices and incomes. The rise in population and fall in cost of van travel per distance would have broadly been expected to offset the fall in GDP per capita, but in fact travel demand by vans grew by 2.3%. This reflects a continuation of longer term trends, where over the last decade van travel has risen by nearly 10 times as fast as would have been predicted by historical indicators. This may reflect a stronger relationship of van travel to income indicators such as GDP and retail sales than has previously been estimated. We will return to this in future reports.

HGV-kms fell by 3.5% in 2012, broadly in line with expectations given the fall in manufacturing output was larger than the fall in motoring costs. Over the last decade or so the fall in distance travelled by HGVs has been faster than would have been expected given the fall in manufacturing output and rise in travel costs. As with van travel, this may be because demand to transport goods and services rather than the cost of motoring are more important considerations for companies servicing that demand.

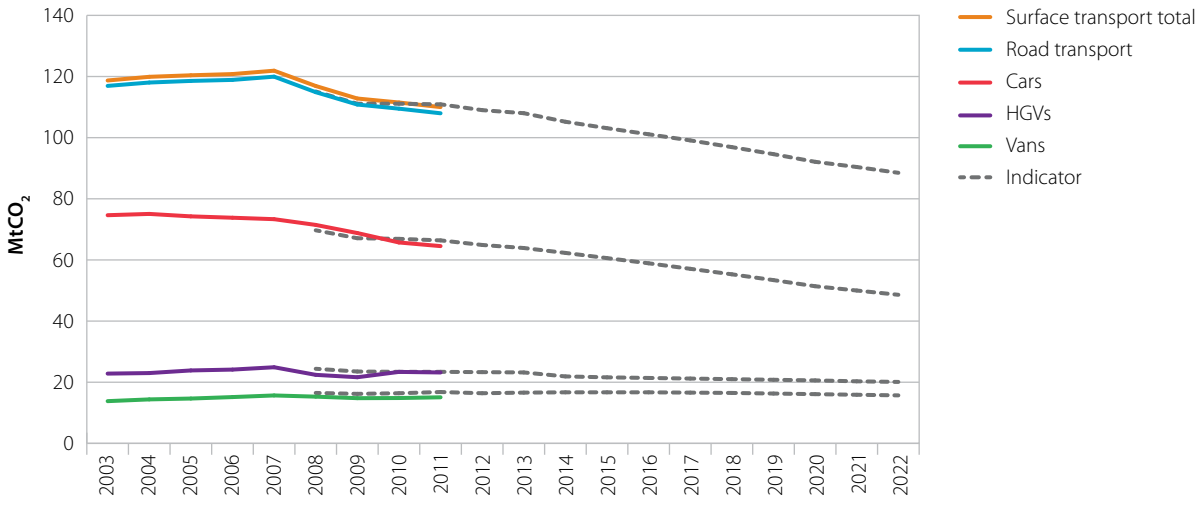
Box 5.1: Drivers of travel demand

Figure B5.1: Drivers of travel demand (2010-2012)



Source: CCC calculations based on Office of National Statistics and Department of Transport data.
Notes: ppkm refers to pence per kilometre

Figure 5.2: Surface transport emissions: historic and indicator trajectory (2003-2022)



Source: NAEI (2013), CCC modelling.

Uncertainty around emissions estimates

In our 2012 progress report, we highlighted issues with the methodology used in the NAEI to estimate emissions by mode. We demonstrated that, given data on distance travelled and penetration of biofuels, these estimates implied implausible changes in the fuel efficiency of vehicle fleets, particularly HGVs. Our recommendation was that the NAEI move to a more rigorous estimation methodology based on bottom-up modelling of the vehicle fleet.

In this chapter we continue to report NAEI estimates of emissions by mode. While we still have concerns over these estimates, more recent data have helped to explain some of the changes seen historically (Box 5.2). However, it remains the case that improvements in the methodology and data used to estimate emissions are needed to allow an accurate assessment of trends by mode. It is likely this will entail additional resources; the Government should consider what steps could be taken to provide better estimates at reasonable cost.

Box 5.2: Estimating emissions by mode

The National Atmospheric Emissions Inventory (NAEI) includes estimates of road transport CO_2 emissions by mode. CO_2 emissions from each mode are estimated with the following steps:

- Fuel consumption factors are defined for petrol and diesel vehicles, for each type of road.
- Total petrol and diesel consumption is estimated based on fuel consumption factors and vehicle km travelled on each type of road.
- Estimated petrol and diesel consumption is adjusted so that total consumption matches official statistics on total petrol and diesel sales in the UK.

In our 2012 progress report, we highlighted two problems with this methodology:

- While bus and HGV fuel consumption factors reflect real-world survey data, car and van factors are assumptions based on speed-emissions curves which do not reflect reductions in gCO_2/km arising from the latest EU new car and van CO_2 regulations. Car and van emissions are therefore likely to be overestimated.
- For petrol, any discrepancy between estimated consumption and total sales is allocated proportionally across petrol consuming modes, but for diesel it is allocated entirely to HGVs. This can lead to large year-on-year changes in implied HGV fleet efficiency, raising questions over the robustness of the estimates.

We highlighted last year that the scaled estimates imply HGV fleet intensity (gCO_2/v-km) worsened by over 10% between 2009 and 2010. However, recently available road freight statistics suggest that loads lifted in 2009 were particularly light, with a significant fall in goods moved by the heaviest HGVs. In 2010, there was a bounce back, with tonne km undertaken by the heaviest HGVs increasing by 14%. Given heavier vehicles tend to have higher tailpipe emissions, this is likely to have led to the apparent worsening of emissions on a vehicle km basis. On a tonne km basis however, emissions fell by 2.6%.

A number of actions could be taken to improve emissions estimates by mode, including:

- Speed emissions curves for cars and vans could be updated to reflect improvements in new vehicle CO_2 intensity arising from the latest EU legislation.
- Updating of HGV fuel consumption factors to reflect real-world survey data could be done on a regular basis to reflect the most up-to-date information available and better capture variations in loads lifted over time.
- Estimates of fuel used in the UK but purchased elsewhere (and vice versa) could be improved (e.g. using HGV Road User Levy data, following its introduction in April 2014), to reduce the discrepancy between estimated consumption and total sales data (which must then be allocated to particular modes)[1].

These actions would require additional resources. However, accurate monitoring of emissions by mode is important to allow the appropriate action to meet carbon budgets to be put in place if required.

1 Not all fuel used in the UK is sold in the UK and vice versa, as vehicles (especially HGVs) may enter or leave the country with full tanks.

Car emissions

Car emissions in 2011

The NAEI estimate of car emissions in 2011 is 64.5 $MtCO_2$, a 1.8% decrease on the estimate for 2010 of 65.7 $MtCO_2$. The change in emissions can be accounted for by changes in total car travel, penetration of biofuels, and the fuel efficiency of the car fleet:

- Total car travel in 2011 was 403.2 billion vehicle km, a 0.4% increase on 2010 levels of 401.6 billion vehicle km.
- Combined bioethanol and biodiesel penetration for cars fell from 2.7% (by energy) in 2010 to 2.6% in 2011.
- The implication of data on car emissions, total car travel and biofuels penetration is that the fuel efficiency of the fleet may have improved by 2.2% between 2010 and 2011.

The age profile of the fleet and historical time series of the CO_2 intensity of new cars (which fell by 4.2% in 2011) also suggests that the fuel efficiency of the fleet may have improved by 2.2% between 2010 and 2011.

Car emissions in 2012

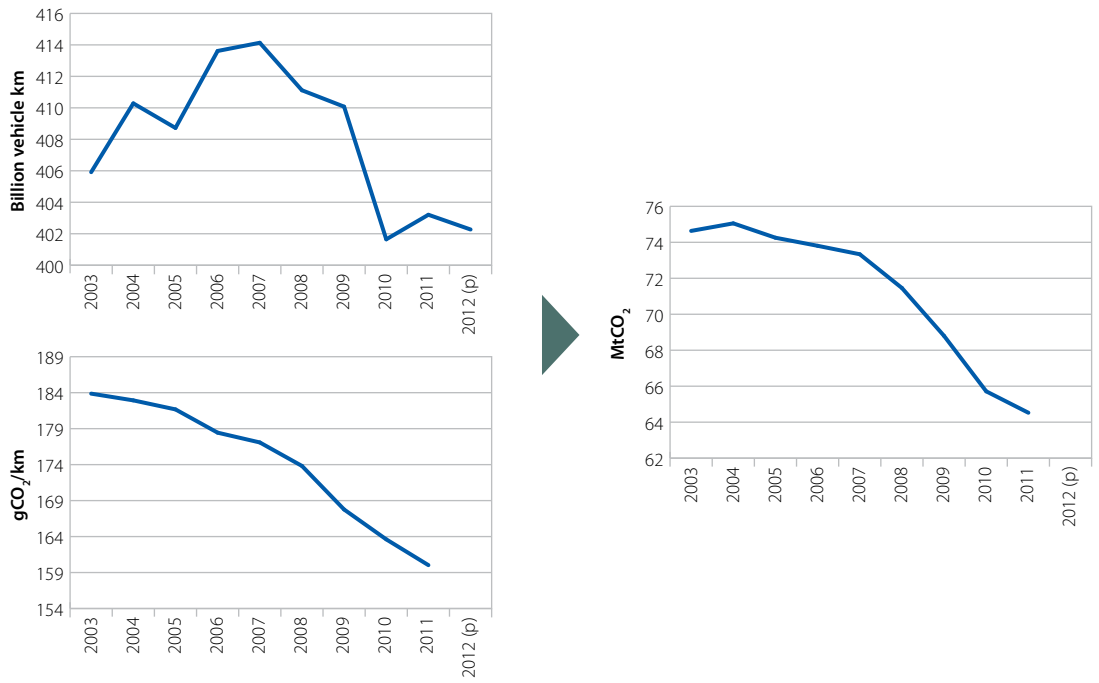
We do not have estimates of car CO_2 emissions in 2012. However, there are provisional data on total car travel, biofuels penetration and new car CO_2:

- Total car travel in 2012 was 402.3 billion vehicle km, a 0.2% decrease on 2011 levels of 403.2 billion vehicle km.
- Combined bioethanol and biodiesel penetration for cars remained constant at 2.6% (by energy) in 2012.
- The CO_2 intensity of new cars fell by 3.6% in 2012 (see section 3 below). The age profile of the fleet and historical time series of new car CO_2 intensity suggests that the fuel efficiency of the fleet may have improved by 2.4% between 2011 and 2012.

The implication is that car CO_2 emissions in 2012 are likely to have fallen between 2011 and 2012, though this should be treated with caution given uncertainties in the data.

With this caveat in mind, Figure 5.3 sets out the historical data on total car travel, CO_2 emissions and the resulting CO_2 intensity of the fleet.

Figure 5.3: Historical trends of vehicle km, $MtCO_2$ and gCO_2/km for cars (2003-2012)



Source: NAEI (2013), DfT (2013) Transport Statistics Great Britain 2012.

Van emissions

Van emissions in 2011

The NAEI estimate of van emissions in 2011 is 15.1 $MtCO_2$, a 1.6% increase on the 2011 estimate of 14.8 $MtCO_2$. The change in emissions can be accounted for by changes in total van travel, penetration of biofuels, and the fuel efficiency of the van fleet:

- Total van travel in 2011 was 69.3 billion vehicle km, a 0.8% increase on 2010 levels of 68.8 billion vehicle km.
- Combined bioethanol and biodiesel penetration for vans decreased from 3.8% (by energy) in 2010 to 3.4% in 2011.
- The implication of data on van emissions, total van travel and biofuels penetration is that the fuel efficiency of the fleet may have worsened by 0.4% between 2010 and 2011.

Looking at the age profile of the fleet and historical time series of the CO_2 intensity of new vans suggests that the fuel efficiency of the fleet should have improved by around 0.3 – 0.5% between 2010 and 2011. Given the level of accuracy of the figures, this is consistent with the change in fuel efficiency implied by the NAEI estimate of van emissions.

Van emissions in 2012

We do not have estimates of van CO_2 emissions in 2012. However, there are provisional data on total van travel, biofuels penetration and CO_2 intensity of new vans:

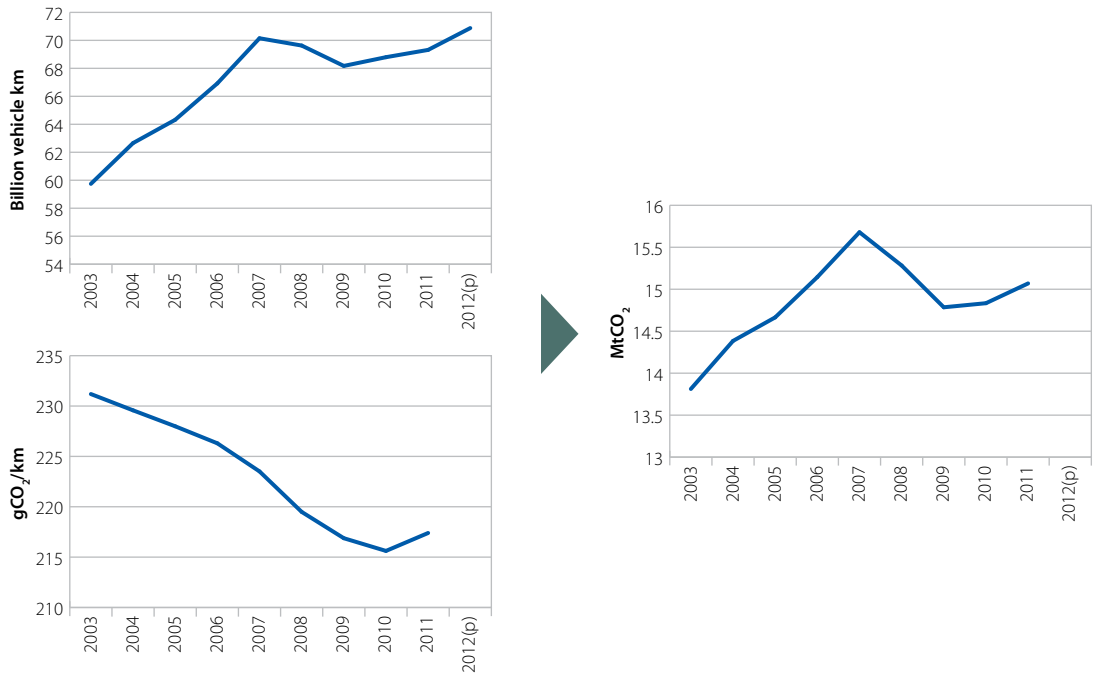
- Total van travel in 2012 was 70.9 billion vehicle km, a 2.3% increase on 2011 levels of 69.3 billion vehicle km.
- Combined bioethanol and biodiesel penetration for vans decreased from 3.4% (by energy) in 2011 to 2.3% in 2012.
- Estimates from the Driver and Vehicle Licensing Agency (DVLA) and Society of Motor Manufacturers and Traders (SMMT) suggest that the CO_2 intensity of new vans improved by 4.1 – 4.9% in 2012 (see section 4 below). The age profile of the fleet and limited historical time series of CO_2 intensity of new vans suggests that the fuel efficiency of the fleet is likely to have improved by at least 0.8% between 2011 and 2012.

Together, these factors imply that van emissions may have increased between 2011 and 2012.

Figure 5.4 sets out the historical data on total van travel, CO_2 emissions and the CO_2 intensity of the fleet.

In order to ensure that van emissions are reduced in future, the key driver will be lower CO_2 intensity of new vans; we consider approaches to reducing new van emissions in Section 4 below.

Figure 5.4: Historical trends of vehicle km, $MtCO_2$ and gCO_2/km for vans (2003-2012)



Source: NAEI (2013), DfT (2013) Transport Statistics Great Britain 2012.

HGV emissions

HGV emissions in 2011

The NAEI estimate of HGV emissions in 2011 is 23.2MtCO_2, a 0.8% decrease on the 2011 estimate of 23.4 MtCO_2. The change in emissions can be accounted for by changes in total HGV travel, penetration of biofuels, and the fuel efficiency of the HGV fleet:

- Total HGV travel in 2011 was 26.6 billion vehicle km, a 2.7% fall on 2010 levels of 27.4 billion vehicle km.
- Biodiesel penetration for HGVs increased from 2.0% (by energy) in 2010 to 3.4% in 2011.
- The implication of data on HGV emissions, total HGV travel and biofuels penetration is that the fuel efficiency of the fleet (gCO_2/v-km) may have worsened by 3.4% between 2010 and 2011.
  - This apparent worsening may be due to data issues related to how NAEI allocates emissions to HGVs (see Box 5.2 for a discussion of the methodology).
  - It may also reflect increased activity by larger vehicles: the share of vehicle km travelled by articulated HGVs with 6 or more axles increased from 23% to 27% in 2012. This would be expected to increase emissions per vehicle km.

Data on the fuel efficiency of the fleet in 2011 (collected via the survey of haulage companies reported in Department for Transport (DfT) Road Freight Statistics) is not yet available.

HGV emissions in 2012

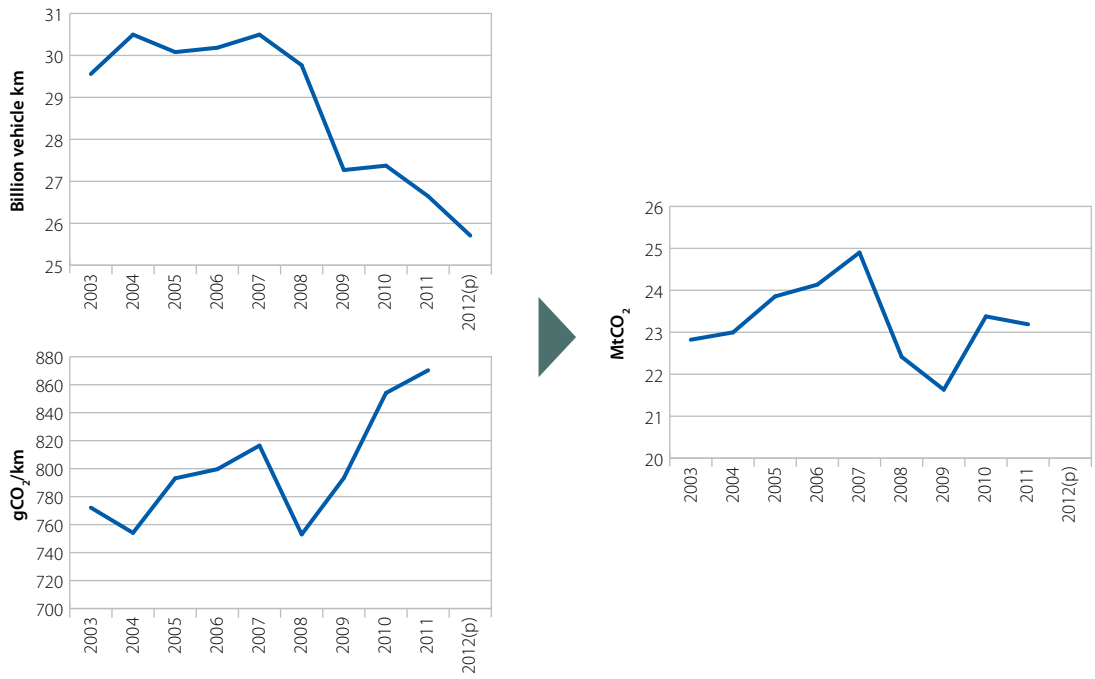
We do not have estimates of HGV CO_2 emissions in 2012. However, there are provisional data on total HGV travel and biofuels penetration:

- Total HGV travel in 2012 was 25.7 billion vehicle km, a 3.5% fall on 2011 levels of 26.6 billion vehicle km, and coincides with a 2% drop in manufacturing output.
- Biodiesel penetration for HGVs decreased from 3.4% (by energy) in 2011 to 2.3% in 2012.
- We do not have data on the CO_2 intensity of the HGV fleet in 2012.

If there was no change in CO_2 intensity between 2011 and 2012, a small reduction in HGV emissions between 2011 and 2012 seems likely.

Figure 5.5 sets out the historical data on total HGV travel, CO_2 emissions and the implied CO_2 intensity of the fleet.

Figure 5.5: Historical trends of vehicle km, $MtCO_2$ and gCO_2/km for HGVs (2003-2012)



Source: NAEI (2013), DfT (2013) Transport Statistics Great Britain 2012.

Motorcycle emissions

In 2011 motorcycle emissions comprised around 0.5% of all surface transport emissions.

The NAEI estimate of motorcycle CO_2 emissions is 0.5 $MtCO_2$ in 2011, a 0.2% increase on the 2010 level.

Motorcycle CO_2 emissions increased by over 20% between 2000 and 2007, but have decreased by around 18% between 2007 and 2011, with motorcycle distance travelled also decreasing by 16% over the same period.

Public transport emissions

Public transport emissions as a whole decreased in 2011, as the fall in bus emissions more than offset the increase in rail (direct) emissions.

- The NAEI estimate of bus emissions in 2011 is 4.2 $MtCO_2$, a 7.1% decrease on the 2010 estimate of 4.6 $MtCO_2$.
- Direct emissions from rail increased by around 4.6% in 2011, from 2.0 $MtCO_2$ in 2010 to 2.1 $MtCO_2$ in 2011, driven largely by an increase in passenger demand (passenger km increased by 5.3%). Indirect emissions from electricity generation used in transport (currently mainly rail) are accounted for in Chapter 2, however indirect emissions from rail increased by 5%, with the increase in demand only partly offset by a 3% fall in the carbon intensity of electricity.

(ii) Emissions from aviation and shipping

Aviation emissions

UK aviation CO_2 emissions grew by 3.8% in 2011. Domestic emissions fell while international emissions grew (Figure 5.6):

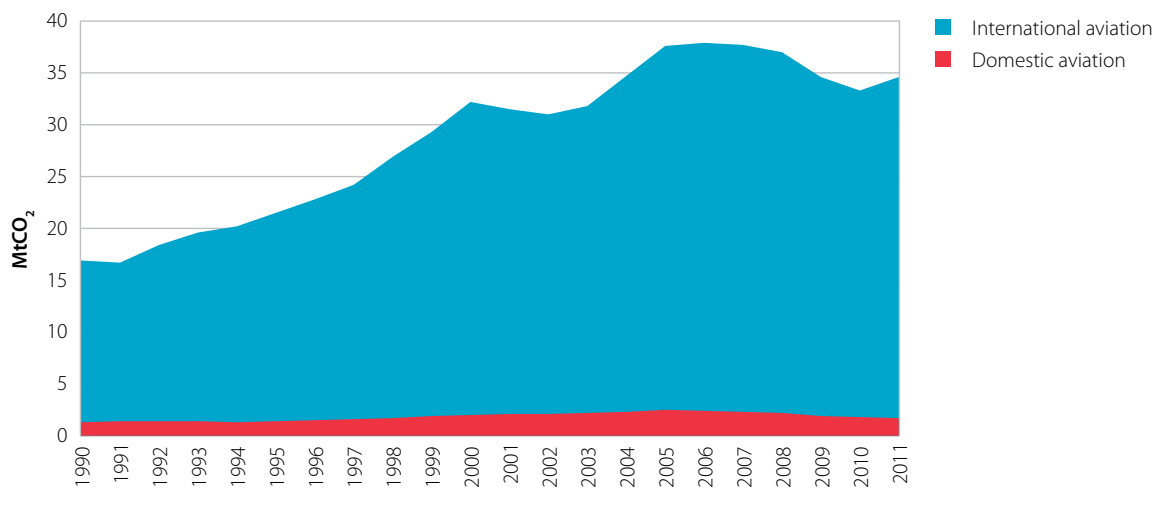
- Domestic aviation CO_2 emissions fell by 4.5%, from 1.8 $MtCO_2$ to 1.7 $MtCO_2$
- International aviation CO_2 emissions[2] grew by 4.3%, from 31.5 $MtCO_2$ to 32.9 $MtCO_2$.

The increase in aviation emissions reflects a 4.1% rise in passenger numbers in 2011. Growth in international passengers (5.1%) outweighed a fall in domestic trips (0.5%).

In 2012 passenger numbers rose by 0.6%, suggesting that aviation emissions may also have risen.

In future, emissions are projected to continue rising but can be reduced through a combination of improvements in fuel efficiency, use of biofuels, and moderations to demand growth. In our 2012 advice on the inclusion of international aviation and shipping in carbon budgets[3], we suggested an appropriate planning assumption was for UK aviation emissions in 2050 to be around 2005 levels. Our analysis, and that of government and industry, suggests this is feasible and broadly cost-effective. In January 2013 DfT updated their forecast of aviation emissions to provide a baseline for discussion in relation to the new Airports Commission (Box 5.3). Given weaker forecast demand growth due to the recession, these suggest emissions in 2050 could be around 4% lower than previously forecast. We will assess the implications of this in our review of the fourth carbon budget later this year.

Figure 5.6: UK aviation CO_2 emissions (1990-2011)



Source: NAEI (2013).

2 Based on bunker fuel sales. International emissions occur on journeys where one of the departure/destination points is outside the UK.
3 http://www.theccc.org.uk/publication/international-aviation-shipping-review/

Shipping emissions

UK shipping CO_2 emissions grew by 8.7% in 2011. Domestic emissions fell while international emissions grew (Figure 5.7):

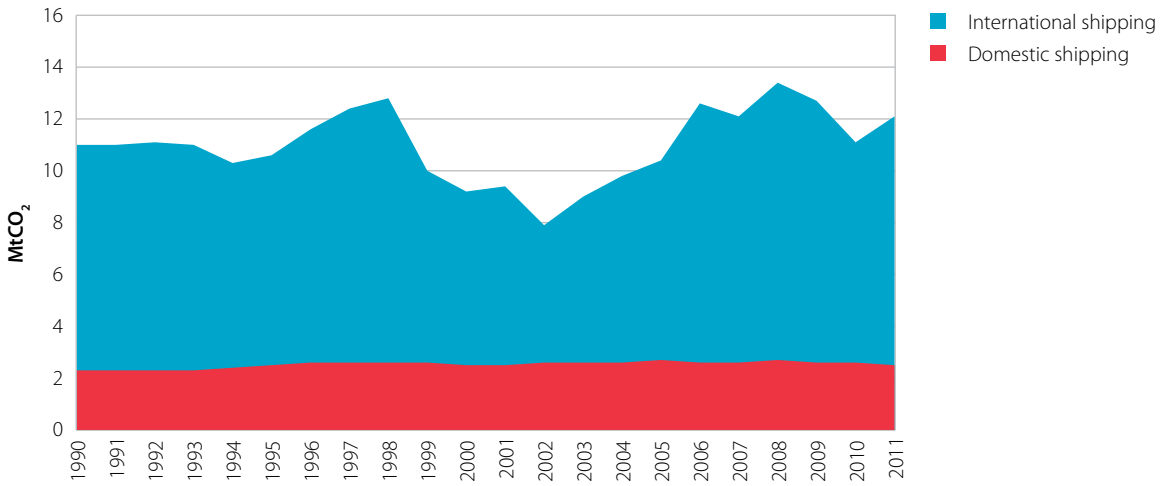
- Domestic shipping CO_2 emissions fell by 3.2%, from 2.6 $MtCO_2$ to 2.5 $MtCO_2$
- International shipping CO_2 emissions[4] grew by 12.2%, from 8.5 $MtCO_2$ to 9.6 $MtCO_2$.

The increase in shipping emissions is likely to reflect a 5% increase in UK cargo demand in 2011.

In 2012 UK cargo demand fell by 2.7%, suggesting that emissions may have fallen in 2012.

In future, there is scope to significantly reduce UK shipping emissions (e.g. by up to around 65% below current levels by 2050). More ambitious international policies beyond those already agreed (i.e. the IMO's Energy Efficiency Design Index, Box 5.3) will be needed to unlock the full range of abatement potential.

Figure 5.7: UK shipping CO_2 emissions (1990-2011)



Source: NAEI (2013).

4 Based on bunker fuel sales. International emissions occur on journeys where one of the departure/destination points is outside the UK.

Box 5.3: Recent climate change policy developments in aviation and shipping

International policy

- **Aviation.** In November 2012 the International Civil Aviation Organisation (ICAO) agreed to form a High-level Group on environmental policy. This will provide recommendations on global market based measures to the ICAO Assembly in late 2013.
- **Shipping.** In January 2013 the International Maritime Organisation's regulation to improve energy efficiency of new ships – by up to 30% by 2025 – came into force (the Energy Efficiency Design Index). The IMO has also agreed to undertake a study to update its 2009 estimate of greenhouse gas emissions from international shipping.

EU policy

- **Aviation.** In November 2012 the European Commission (EC) decided to suspend inclusion of non-EU aviation emissions in the EU ETS for one year. This is designed to allow space for ICAO to develop a proposal for global market based measures by its Assembly in late 2013. If ICAO is not able to agree, then aviation will revert back to inclusion in the EU ETS.
- **Shipping.** In October 2012 the EC announced their intention to introduce a system for monitoring, reporting and verification of EU shipping emissions in 2013. This will help provide more accurate data on shipping emissions.

UK policy

- **Carbon budgets.** In December 2012, following the EC's decision to suspend inclusion of non-EU aviation emissions in the EU ETS, the Government decided to postpone formal inclusion of international aviation and shipping (IAS) emissions in carbon budgets. However, it confirmed the status quo that IAS emissions are included in the 2050 target and that carbon budgets are set on this basis.
- **Airport capacity.** In September 2012 the Government established the Airports Commission to advise on future need for airport capacity. The Commission will release interim advice by the end of 2013, and final advice by Summer 2015. The Commission membership includes Julia King who is a member of the Committee on Climate Change.
- **Aviation strategy.** In March 2013 the Government published a new policy framework for aviation. This set out the Government's policy objectives for aviation, including their climate change strategy. It emphasised the importance of international and EU action on aviation emissions, together with the national actions which could support this.

2. Opportunities for reducing emissions – the indicator framework

We now recap our transport indicator framework before considering progress against indicators. The framework reflects measures that are either cost-effective now, or are required on the path to deeper decarbonisation in the 2020s, and includes the following indicators:

Surface transport emissions

- By 2020, emissions from road transport fall by 23% relative to 2007 levels, with reductions of 30% in car emissions, and 15% in HGV emissions, while a rise in van emissions is limited to 1%.
- The CO_2 intensity of the fleet falls to 121 gCO_2/km for cars, 176 gCO_2/km for vans and 648 gCO_2/km for HGVs

Fuel/carbon efficiency of vehicles

- New vehicle CO_2 intensity falls in line with EU regulations, reaching an average of 95 gCO_2/km in 2020 for new cars, and 147 gCO_2/km for new vans. We envisage that electric vehicles contribute to meeting these targets. Excluding electric vehicles, CO_2 intensity of conventional new cars falls to 110 gCO_2/km by 2020, while CO_2 intensity of conventional new vans falls to 169 gCO_2/km.
- The market share of electric (battery and plug-in hybrid) vehicles reaches 16% of new sales for both cars and vans. This translates to a fleet penetration of 5% (1.7 million vehicles) for cars and 4% (135,000 vehicles) for vans.
- CO_2 intensity of new HGVs decreases by 6-9% between 2008 and 2020.
- Sustainable biofuels penetration increases to 8% by energy (10% by volume) by 2020, in line with recommendations in the Gallagher Review.

Behaviour change

- Implementation of Smarter Choices initiatives nationwide results in a 5% reduction in car travel by 2020 relative to a business as usual scenario.
- There is wide-scale uptake of eco-driving through training, with 3.8 million drivers trained by 2020 (10% of car and van drivers and 100% of HGV drivers).
- Speed limits on motorways are enforced at current levels, cutting the additional emissions generated at higher speeds.

If all indicators were to be achieved in practice, this would result in a 20% reduction in transport emissions in 2020 relative to a business as usual scenario. Whether we are on track to deliver this emissions reduction depends on progress relative to indicators, which we now consider.

3. Progress in reducing car emissions

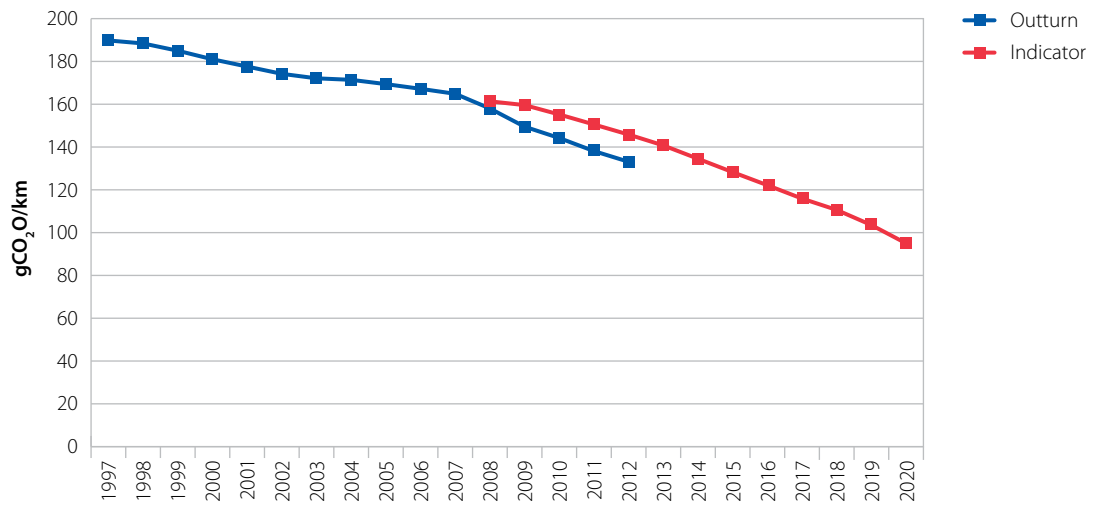
A reduction in car emissions is primarily achieved through the renewal in the car fleet; our analysis suggests that replacement of old inefficient cars with increasingly efficient new cars offers scope for a 2.5% annual improvement in the carbon intensity of the car fleet between 2010 and 2020.

Strong progress in recent years on new car efficiency improvement continued in 2012 (Figure 5.8):

- CO_2 intensity of new cars fell from 144.2 gCO_2/km in 2010 to 138.1 gCO_2/km in 2011 (a 4.2% reduction), and to 133.1 gCO_2/km in 2012 (a further 3.6% reduction).
- Our indicator for 2012 – consistent with progress towards a 95 gCO_2/km target in 2020 – is 145.8 gCO_2/km.
- Therefore CO_2 intensity of new cars is currently out-performing our indicator, by around 9% in 2012.

There is, however, evidence that efficiencies under real world driving conditions can be significantly lower than measured under the current test cycle. Our indicator trajectories account for this difference to the extent that historic data suggests; however if the gap were to widen in future, for example the difference between the test cycle data and real driving were to be proportionately greater for highly efficient, low emissions vehicles, this could pose a risk to meeting carbon budgets. The European Commission's proposed move to an alternative test cycle – part of a wider set of proposals relating to the EU new vehicle CO_2 regulations (Box 5.4) – could help to mitigate this risk.

Figure 5.8: New car CO_2 – indicator trajectory and outturn (1997-2020)



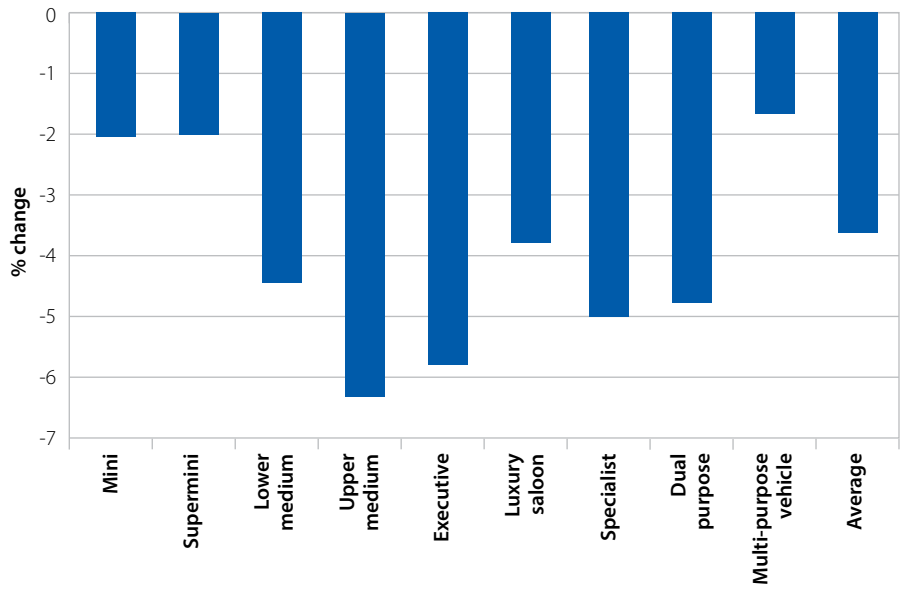
Source: Society of Motor Manufacturers and Traders (SMMT) (2013) *New Car CO_2 Report 2013*, CCC modelling.

There was a reduction in CO_2 intensity of new cars across all car classes, while purchase of cars in different classes was more polarised than in 2011, with a smaller share of medium cars sold, but higher shares of both small and large cars:

- CO_2 intensity of new cars fell across all car classes in 2012, with the reduction ranging from 1.7% for multi-purpose vehicles to 6.3% for upper medium saloons (Figure 5.9). The significant improvement in executive saloon efficiency was influenced by an increase in the share of diesel vehicles in this market segment.
- There was a slightly lower share of medium-sized new cars in 2012, with increases in the shares of both smaller, lower-emitting and larger, higher-emitting cars:
  - There was a small decrease (1.9 percentage points) in the market share of cars in the lower medium and upper medium segments (despite an increase in the number of models available). Meanwhile, the share of cars in the mini and supermini segments rose by around 1%, returning to almost their 2009 shares (Figure 5.10). However, the share of higher-emitting 'dual-purpose' vehicles also rose by 1.2 percentage points, reaching their highest level (almost 10%) since 2008, and corresponding to a 25% increase in models available.
  - Overall, the impacts of these changes were broadly offsetting: had the share of car sales in each class remained at their 2011 levels, average new car CO_2 intensity would have been 133.0 gCO_2/km, rather than the actual value of 133.1 gCO_2/km).

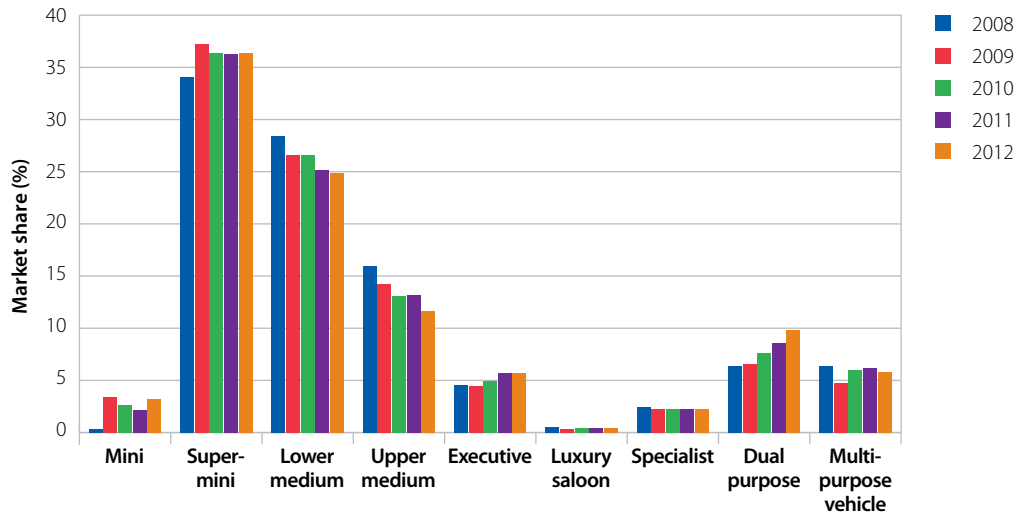
The changes in car purchase behaviour in 2012 appear to form part of a longer term trend, with a high and stable share of mini and supermini segments (following a sharp increase in 2009), declining shares of medium sized cars and increasing shares of executive and dual-purpose vehicles.

Figure 5.9: Change in gCO_2/km for each car segment (2011-2012)



Source: SMMT.

Figure 5.10: Market share of new car segments (2012)



Source: SMMT.

Going forward, there remains scope for CO_2 intensity of new cars to be reduced both due to within-class efficiency improvements and switching between classes. There are signs that the market share of mini and supermini segments may continue to grow at the expense of medium sized cars, even as the economy recovers. However, the continued growth in the share of higher-emitting dual purpose vehicles suggests a need to reinforce EU standards with incentives for best-in-class purchase as well as switching between classes. If progress in reducing car emissions is to be sustained in future, increased and further differentiated Vehicle Excise Duty may be required, with lower rates for more fuel efficient cars and without discontinuities such that there is a large change in VED for a small change in efficiency.

We will continue to track the CO_2 intensity of new cars and highlight appropriate actions to support continued progress by encouraging demand for more efficient vehicles, thereby encouraging suppliers to bring more efficient models to market. This is especially relevant in light of the recent draft agreement on use of "supercredits" for meeting the 2020 target (Box 5.4). While encouraging manufacturers to produce higher volumes of ultra-low emissions vehicles, supercredits also mean that actual g/km (even on a test-cycle basis) may be higher than 95 g/km.

Notwithstanding this, it is clear that the EU new car CO_2 regulations have been very effective in driving emissions reductions. In order to provide certainty for vehicle manufacturers and sustain progress, there is a need for longer-term targets to be set. The European Commission recognises this, and has proposed an indicative target range for 2025 of 68-78 gCO_2/km (Box 5.4). However, evidence suggests there may be scope to go further than these proposals:

- Our scenario for meeting the fourth carbon budget envisaged 75 g/km in 2025 given a 30% share of plug-in electric vehicles (95 g/km excluding plug-in EVs)[5]. New analysis of road transport technologies we commissioned last year[6] suggests g/km could be lower still, for example with combined hybridisation and strong engine downsizing.
- Others[7] have suggested a target of 60 g/km in 2025 would be achievable with an EV share of around 50% (of which half are BEVs) – and indeed required to accelerate the introduction of ultra-low emission vehicles.

To ensure continued progress, particularly given current outperformance, and to further encourage the availability of ultra-low emission vehicles, the Government should push for agreement of ambitious longer term targets as soon as possible (e.g. after the Commission's proposed review in 2014). These should be sufficiently challenging to have a strong effect on pulling new technology through to market.

Box 5.4: Update on EU new vehicle CO_2 regulations

In April 2013, the European Parliament's Environment Committee approved a draft law setting out the rules for meeting the 95 gCO_2/km new car CO_2 target for 2020. They also added an indicative target for post-2020 CO_2 emissions. Key features of the draft law include:

- Use of supercredits to provide an incentive to manufacturers to bring forward ultra-low emission vehicles. When calculating manufacturers' fleet-average emissions, each car emitting less than 50 gCO_2/km would count as 3.5 cars in 2013 (falling to 1.3 from 2020 to 2023 and 1 from 2024 for cars emitting less than 35 gCO_2/km), making their target easier to meet. However, the draft law states that any effective increase in manufacturers' emissions targets deriving from the "super-credits" calculation would be capped at 2.5 gCO_2/km. It also states that it should not be possible to transfer any unused super-credits from one year to another.
- An indicative 2025 target range from 68 – 78 gCO_2/km, to further incentivise manufacturers to maintain investment in ultra-low carbon vehicles. A review and impact assessment should be carried out by the end of 2014 at the latest.
- A move to the new UN-defined World Light Duty Test Procedure (WLTP) "as a matter of urgency", and if possible by 2017. Currently new car CO_2 is measured using the New European Driving Cycle (NEDC). However, a number of studies suggest significant discrepancy between test-cycle fuel consumption and emission figures and those achieved in everyday driving conditions. The WLTP has been designed with the aim to better reflect real-world driving conditions.

The draft is due to be considered by the full European Parliament in July 2013, and will also need to be approved by the European Council before it can enter into force.

In May 2013, the Environment Committee also approved a draft law setting out rules for meeting the new van CO_2 target of 147 gCO_2/km by 2020, and proposed an indicative target range of 105 – 120 gCO_2/km from 2025. However, they rejected tightening the 2020 target.

5 Around 50 g/km in 2030 with a 60% share of EVs (80 g/km excluding EVs).
6 AEA (2012) *A review of the efficiency and cost assumptions for road transport vehicles to 2050.*
7 RAC Foundation (2013) *Powering Ahead: The future of low-carbon cars and fuels*, Greenpeace and Transport & Environment (2013) *The case for 2025 targets for CO_2 emissions from cars and vans.*

4. Progress in reducing van emissions

There is scope, under our indicators, to reduce total van[8] emissions in 2020 by around 2% from 2010 levels (in the context of an expected 28% increase in van km), mainly due to fleet efficiency improvement as old inefficient vans are replaced with increasingly efficient new vans.

The context for new van emissions reductions is the EU new van CO_2 target: in May 2011, the EU agreed a target to reduce the average CO_2 intensity of new vans to 175 gCO_2/km by 2017, and to 147 gCO_2/km by 2020.

We have previously reported estimates of new van CO_2 intensity from the Driver and Vehicle Licensing Agency (DVLA). DVLA estimate that the new van CO_2 intensity fell 4.1% to 187 gCO_2/ km in 2012, having fallen by 0.6% the previous year. An alternative estimate is available from the Society of Motor Manufacturers and Traders (SMMT), who recently established a database for light commercial vehicles. SMMT estimate that new van CO_2 intensity fell 4.9% to 188.7 gCO_2/km in 2012. Our indicator value for 2012 is 195.4 gCO_2/km.

According to SMMT data, the reduction in average gCO_2/km comes despite a continued shift in van sales towards heavier, higher-emitting vans, which offer greater flexibility of use and increased payload efficiency. The market share of vans[9] weighing 3.5 tonnes grew from 28% to 30% in 2012, with reductions across all lower van weight classes[10].

This implies that the shift towards heavier vehicles was outweighed by improvements in average CO_2 intensity within-class, driven by a shift in purchase behaviour towards best-in-class vehicles and/or technology-driven improvements in CO_2 intensity within each class.

In future, if the trend towards heavier vans continues, it will be important that purchasers choose the least carbon-intense options within-class. Further levers to encourage uptake of more efficient vans, and the emissions reductions that these offer, may be needed.

It will also be important that technology improvements continue to be delivered and to this end, MEPs recently proposed an indicative target range for van emissions in 2025 of 105 –120 gCO_2/km (Box 5.4). However evidence suggests there may be scope to go further than the Commission's proposals:

- Our scenario for meeting the fourth carbon budget envisaged 112 g/km in 2025 given a 29% share of electric vehicles (137 g/km excluding EVs)[11]. With lower emissions from non-plug in vehicles (e.g. with combined hybridisation and strong engine downsizing), these values could be lower.
- Others have suggested that a target of 85 – 100 g/km in 2025 would be with an EV share of 50%, depending on the mix of pure battery and plug-in hybrid vehicles[12].

As for cars, the Government should push for rapid agreement of challenging longer term targets that will have strong effect on pulling new technology through into the market.

8 Including 4x4s and pick-up vehicles.
9 Excluding 4x4s and pick-up vehicles.
10 The share of 4x4 and pick-up vehicles remained broadly constant.
11 around 80 g/km in 2030 with a 60% share of EVs (120 g/km excluding EVs).
12 Greenpeace and Transport & Environment (2013) *The case for 2025 targets for CO_2 emissions from cars and vans.*

5. Progress in reducing HGV emissions

As for cars and vans, there is scope to reduce total HGV emissions, notwithstanding an increase in HGV km, mainly through fleet efficiency improvement as old inefficient HGVs are replaced with increasingly efficient new ones.

However, there is no official test cycle for measuring new HGV CO_2 intensity and no regulatory framework for reducing new HGV emissions. This is more challenging than for cars and vans given the heterogeneity of the HGV fleet and the impact of loads on emissions.

Nevertheless, the European Commission recognises the need to address this issue and has been conducting work on measurement of new HGV CO_2 intensity, together with abatement opportunities and costs.

- Working with industry and academia, the Commission is developing a simulation methodology and tool (VECTO) for measuring whole-vehicle tailpipe emissions. The tool is expected to be available in 2014.
- Research for the Commission[13] suggested a range of cost-effective technology measures, with emissions savings of around 30% available at zero or negative cost over the vehicle lifetime.

It is anticipated that the Commission will publish a strategy for HGV emissions in summer 2013, which is expected to consider regulating whole emissions over the vehicle lifetime after 2020. This is expected to be accompanied by an Impact Assessment considering the likely costs and benefits of introducing limits for HGV CO_2 emissions (akin to the new car and van CO_2 legislation).

In April 2013, the Commission also proposed updates to existing rules on HGV weights and dimensions, to permit manufacturers to develop more aerodynamic HGVs with rounded cabins and aerodynamic flaps at the back of the trailer. This is expected to lead to a cut of up to 15% in GHG emissions per year as well as reducing fatal accidents with vulnerable road users (pedestrians or cyclists)[14].

There have also been a number of initiatives aimed at reducing HGV emissions within the UK (Box 5.5). While these initiatives are welcome, given the effectiveness of the EU new car and van CO_2 targets, the Government should push for an EU framework for HGVs as quickly as possible.

13 CE Delft (2012) *Marginal abatement cost curves for Heavy Duty Vehicles.*

14 See http://ec.europa.eu/commission_2010-2014/kallas/headlines/news/2013/04/doc/com(2013)195-impact-assessment.pdf

Box 5.5: UK action on reducing emissions from HGVs

- Research commissioned by the UK Task Force on Fuel Efficient, Low Emission HGV Technologies, a joint industry/government initiative[15], suggested three key areas for emissions reduction: substituting diesel with natural gas, improving aerodynamic efficiency, and supporting uptake of electric vehicles for urban and municipal delivery. It also identified uncertainty over the business case as a key barrier to uptake, with a need for government-led demonstration programmes to provide evidence for operators.
- The Low Carbon Truck Demonstration Trial will run for two years and supports delivery of low-emission HGV fleets and supporting infrastructure. Since the competition closed in June 2012, 13 awards have been made to a range of partners including fleet operators, vehicle convertors, gas hub providers and universities. For example, the John Lewis Partnership is seeking to reduce carbon emissions by 70% across its articulated vehicles, through a range of interventions including improved aerodynamics and use of biomethane.
- The Logistics Carbon Reduction Scheme (LCRS) is a voluntary, industry-led scheme, covering around 9% of all licensed HGVs. Members reported a 2.8% reduction in the carbon intensity of their operations in 2011, on track to the scheme's target reduction of 8% between 2010 and 2015, through a combination of behavioural and technology measures (most commonly fuel performance monitoring, use of automated transmission vehicles, eco-driving, and reduced engine idling).
- In May 2013, DfT published the Freight Carbon Review of industry-led efforts, including results of an online survey which allowed operators who are not part of the LCRS to provide information on uptake of carbon saving interventions. The Review concluded that efforts by some operators to reduce HGV fuel consumption (mainly through eco-driving training) are evident, but that evidence on the sector as a whole is limited. It also concluded that no regulatory action should be pursued at this stage, letting industry lead the way in adopting low-carbon measures more widely, while keeping the issue under review.

6. Progress in developing electric vehicle markets

In previous reports we have identified deployment of ultra-low emission vehicle (ULEV) technologies (battery electric, plug-in hybrid electric or hydrogen fuel cell vehicles) as key to achieving the deep emission cuts required to meet the 2050 emissions reduction target.

We have presented analysis suggesting that it is technically feasible and economically desirable for all light duty vehicles to be ULEVs by 2050, and have recommended this as the current planning assumption. Achieving a fully ULEV fleet by 2050 requires that 100% of new cars and vans purchased will need to be ULEVs by the mid 2030s, and that progress in developing ULEV markets must be made now in order to prepare for this. The relative technical maturity of battery electric and plug-in hybrid electric vehicles implies that support for an early-stage electric vehicle market is now critical.

The Government has accepted this advice, and is supporting electric vehicle market development both through providing subsidy for purchase of electric vehicles, and through funding investment in recharging networks:

15 Ricardo-AEA (2012) *Opportunities to overcome the barriers to uptake of low emission technologies for each commercial vehicle duty cycle.*

- **Price support.** The Plug-in Car Grant (PiCG) came into effect in January 2011 and provides consumers and businesses with up to £5,000 towards the purchase of an eligible electric car. It was extended in January 2012 to vans, providing up to £8,000 for each eligible electric van. In 2012, 2,129 claims were made through the plug-in car grant (up from 892 in 2011) and 215 through the Plug-in Van Grant. However, this funding is only committed for the remainder of the current parliament. Given the low sales of EVs, and high costs relative to conventional alternatives (see below), the Government should extend availability of the grants beyond 2015.
- **Infrastructure investment. The Government is providing a range of support:**
  - **Plugged-In Places.** Through the PiP scheme, designed to kick-start a national recharging infrastructure, the Government offered match-funding to private and public sector consortia for the installation of EV charging points in eight regional schemes (East of England, Greater Manchester, London, the Midlands, Milton Keynes, the North East, Northern Ireland and Scotland). Data gathered through the PiP scheme will be used to help inform business models for future investment.
  - **National Offer.** In February 2013, the Government announced a further £37 million funding package, including £13.5 million available to homeowners, £11 million to local authorities (for rapid or on-street residential chargepoints), £9 million to train companies (for chargepoints at stations) and £3 million to public sector bodies (for chargepoints on their estate). Funding will cover 75% of the cost of installation and be available until April 2015. Meanwhile, in February 2013, the Scottish Government announced a new policy for charging infrastructure, including a £2.6 million scheme for free installation of home chargepoints, plus chargepoints at leisure facilities, local authority public carparks and (in contrast to the UK offer) private workplaces.
  - **Infrastructure strategy.** *Making the Connection* (June 2011) set out the Government's vision for recharging infrastructure and identified actions being taken to "remove barriers for those wishing to invest in, provide or benefit from" it. An updated strategy is expected in the summer this year. It is important that consistency is provided between this and a number of other Government strategies expected this year (roads, industrial, automotive and transport), in order to provide clear signals to investors.

Sales of electric cars were around 2,250 vehicles in 2012, more than double the volume in 2011 but still only 0.1% of total new car sales. Despite their higher up-front costs, the increase largely corresponds to the appearance on the market of plug-in hybrid and range-extended models in the medium car segments:

- Of the electric cars sold in 2012, around 1,260 were pure EVs, while around 520 were range extended EVs, and 470 were PHEVs. This compares with sales of around 1,100 in 2011, which were almost all pure EVs.
- The price of a PHEV is currently around £30,000 (including grant) compared to around £18,000 for the best-selling conventional car in the same segment. The price of 2012's best-selling BEV is around £23,000 (including grant), compared to around £17,000 for the best-selling conventional car in the same segment.

While full penetration of BEVs (or other zero-emission vehicles) is likely to be needed in the longer term to meet the UK's emissions reduction targets, our indicator trajectories to 2020 assume a higher share of PHEV sales, reflecting the likely range constraints of BEVs over this period. The relatively high uptake of PHEVs in 2012 is therefore not a matter of concern, provided it drives development in battery technology, allowing increased electric range and paving the way for a high penetration of BEVs later on. PHEVs are currently eligible for the PiCG provided they have an electric range of just 10 miles. Ideally, however, the electric range of PHEVs should be consistent with typical driving patterns. Our indicator trajectories assume PHEVs with an electric range of 40 miles (65 km), which given trip patterns, have the potential to cover over 70% of total car km in electric mode, so that miles travelled in non-electric mode are limited to occasional long trips. In future, the Government should take account of this in incentives offered for PHEVs.

We will return to pathways for high electric vehicle uptake in our review of the fourth carbon budget.

We noted in our last progress report that low sales of EVs in 2011 relative to volumes required over the next decade (e.g. a total of around 1.7 million electric vehicles by 2020), could be explained by the higher up-front cost of the vehicles (notwithstanding the PiCG), the limited range of models on the market, limited investment in public charging infrastructure, and initial consumer caution towards what may be perceived as a new and radically different technology.

There has been good progress in the development of new electric vehicle models, including, as noted above, availability of plug-in hybrid and range-extended models, although the cost of electric vehicles remains higher relative to conventional alternatives (Box 5.6):

- As of June 2013, there are ten electric car models available on the UK market, including one plug-in hybrid and two range-extended models in the medium car segment. Moreover, a considerable range of models is currently under development and due to come to market in the near future, with all of the current top-ten best-selling vehicle brands represented.
- In addition, a number of electric van models reached the UK market in 2012, with seven models currently eligible for the plug-in van grant available and further models expected soon.
- It is important to set a sufficiently challenging 2025 target to encourage further availability of models on the market (see section 5).

There has also been progress in development of public charging infrastructure:

- Plugged-In Places delivered a total of around 4,000 chargepoints in the period to the end of March 2012. This period has also seen significant investment in privately delivered chargepoints, with a total of around 5,000 delivered to the end of March 2013. It is likely that the Plugged-In Places programme has facilitated investment in privately delivered chargepoints by providing the private sector with confidence in the existence of a market for electric vehicles and the viability of battery-charging business models.
- However, interoperability of chargepoints is an issue, with access to some available on a pay-as-you-go (PAYG) basis and others through subscription to a membership schemes. The requirement that chargepoints funded through the new National Offer have PAYG functionality is a step towards improved access.

In terms of consumer awareness, a joint Government and industry communications campaign is planned for autumn this year. Meanwhile the Government is supporting the Plugged-In Fleets Initiatives (PIFIs).

- PIFI (2012–13) was funded by DfT and Transport for London, and delivered by the Energy Saving Trust (EST) in partnership with EDF Energy and Route Monkey. Twenty companies received free guidance and a strategic plan for the introduction of plug-in vehicles into their fleets. Findings and case studies from the initiative were published in a report to offer wider practical advice for all business fleets.
- Through PIFI 100, EST – with funding from the Office for Low Emissions Vehicles– is offering 100 further organisations free analysis and a tailored review of where and how plug-in vehicles could work in their business. In return, live fleet lists, vehicle usage and fuel data will be shared with EST to help inform policy development.

Box 5.6: Current and near-term electric vehicle releases

As of June 2013, the following electric car models are currently available on the UK market (Table B5.6.1):

Table B5.6.1: Electric car models currently available on the UK market

BEV	PHEV	PHEV (RE)
Citroen Czero (2011)	Toyota Prius Plug-in (2012)	Chevrolet Volt (2012)
Mitsubishi i-MiEV (2011)		Vauxhall Ampera (2012)
Nissan Leaf (2011)		
Peugeot iOn (2011)		
smart Electric Drive (2011)		
Renault Fluence ZE (2012)		
Renault Zoe (2013)		

Notes: BEV = Battery Electric Vehicle; PHEV = Plug-in Hybrid Electric Vehicle. RE refers to "Range Extended", a type of plug-in hybrid that is powered exclusively by the electric motor, with a petrol or diesel internal combustion engine and on-board generator to generate additional electricity when battery has been depleted.

In addition to these, options to purchase electric cars include a number of small cars formally classed as quadricycles, and third party electric conversions.

Furthermore, a considerable range of new electric car models are currently under development and due to come to market in the near future (Table B5.6.2):

Table B5.6.2: Electric car models expected on the UK market

BEV	PHEV	PHEV (RE)
Mercedes-Benz SLS AMG E-Cell (2013)	Misubishi Outlander PHEV (Q2 2013)	BMW i3 EREV (2013)
Tesla Model S (2013)	Porsche 918 Spyder (Q4 2013)	Fisker Karma (2013)
Ford Focus Electric (2013)	Volvo V60 PHEV (Q3/Q4 2013)	Fisker Surf (2013)
BMW i3 (2013)	Ford Mondeo Energi (2013)	
VW Golf (2013)	Ford C-Max Energi (2013)	
VW e-Up (2013)	VW Golf PHEV (2013)	
Audi E-Tron (2014)	BMW i8 (2013/14)	
Lightning GT (tbc)	Land Rover Range Rover PHEV (2014)	
Westfield Sport-E (tbc)	Honda Accord PHEV (2014)	
Ginetta G50 electric (tbc)	Porsche Cayenne E-hybrid (2014)	
	Porsche Panamera E-hybrid (tbc)	

Notes: BEV = Battery Electric Vehicle; PHEV = Plug-in Hybrid Electric Vehicle. RE refers to "Range Extended".

As of June 2013, there are a number of electric van models available on the UK market. DfT's list of vans eligible for the Plug-in Van Grant comprises the BD Otomotiv Veicoli eTrafic, Daimler Mercedes-Benz Vito E-Cell, Faam ECOMILE, Faam JOLLY 2000, Mia U, Renault Kangoo and Smith Edison electric vans.

As with cars, options to purchase electric vans include a number of small electric vans formally classed as quadricycles, and third party electric conversions.

Source: Manufacturer websites.

Budget 2012 announced that from 2015/16 ultra-low emission cars will no longer be exempt from Company Car Tax (CCT), or attract 100% first year capital allowances (FYA) for leasing firms. We noted in our progress report last year that this could have a significant impact on purchases (e.g. removal of the CCT exemption could add around £2,000 to the cost of a BEV compared to conventional alternatives). Given the promise of this sector, the need for early take-up of electric vehicles, and the very limited revenue generated by the proposed changes, we strongly recommended that the Government should reverse this decision.

In the 2013 Budget, the Chancellor announced two new company car tax bands to be introduced from April 2015:

- Cars emitting 0-50 g/km will be taxed at 5% in 2015/16, rising to 7% in 2016/17
- Cars emitting 51-75 g/km will be taxed at 9% in 2015/16, rising to 11% in 2016/17

The 4% differential between bands will fall to 3% in 2017/18 and to 2% in 2018/19 and 2019/20. The Government will review this in light of market developments at Budget 2016, to inform decisions on CCT from 2020-21 onwards.

The reinstatement of preferential rates for ULEVs is welcome, but compared to the existing zero rate, the 5% rate for zero-emission vehicles will still add around £500 to the cost of a BEV. We recommend that the zero rate for zero-emission vehicles is reinstated.

On FYA, it was announced that 100% FYA for non-leasing businesses purchasing low-emission vehicles will be extended to 31st March 2018; the qualifying threshold will be reduced from 110 g/km to 95 g/km in April 2013 and to 75 g/km in April 2015. These changes could be positive in encouraging uptake of BEVs and PHEVs, as it is unlikely that a wide range of internal combustion engine cars with similarly low emission levels will be available by 2015.

However, the removal of 100% FYA for leasing firms was confirmed in Budget 2013. A recent report by the Institute of Public Policy Research[16] suggested this could add 3-5% to the cost of car lease. Given the potentially key role for leased business cars in driving EV uptake (reflecting both their share in total sales and the opportunity they present in allowing the public to gain experience of ULEVs), we recommend that this decision be reversed.

In addition to support for plug-in vehicles, the Government is working with industry on the H2Mobility project, which was established to evaluate the benefits of fuel cell electric vehicles (FCEVs) to the UK and to develop a roadmap for the introduction of vehicles and hydrogen refuelling infrastructure.

- Phase 1 of the project reported in February 2013. The findings suggest around 10% of new car buyers could be potential early adopters of FCEVs, with vehicle costs and access to refuelling infrastructure being the key barriers to uptake. Annual sales of around 10,000 could be achievable by 2020, rising to around 300,000 by 2030, as vehicle costs become more competitive and the refuelling infrastructure develops from around 65 stations initially (in major population centres and connecting roads) to full national coverage.

16 IPPR (2013) *Leading the charge: Can Britain develop a global advantage in ultra-low emission vehicles?*

- Phase 2 of the project will build on these findings to develop a detailed business case for deployment. Measures will be identified for overcoming the barriers identified, including the commercial model for the initial network of refuelling stations as well as the early consumer proposition. Phase 3 will then commit partners to specific actions to accelerate roll-out.

Progress on hydrogen fuel cell vehicles and infrastructure is important to provide a long-term alternative to plug-in electric vehicles, especially where the latter may not be suitable (e.g. for larger, high-mileage vehicles including HGVs). Availability of hydrogen produced via low-carbon routes (steam methane reforming with carbon capture and storage or electrolysis using low-carbon electricity) will be critical in order that FCEVs deliver emissions reductions. This reinforces the need for demonstration of carbon capture and storage and decarbonisation of electricity supply (see Chapter 2). Without hydrogen from low-carbon sources, FCEVs can have significantly higher emissions than conventional vehicles.

7. Progress on biofuels in surface transport

The use of biofuels in the transport sector is important in meeting our carbon budgets in the medium term. Our indicator for road transport biofuels penetration is for 8% (by volume) to be supplied by 2020. In 2012 the volume of biofuels supplied to the transport sector was 3.1%, down from 3.5% in 2011. This was due to amendments to the Renewable Transport Fuel Obligation (RTFO) from April 2012, allowing biofuels produced from wastes, non-agricultural residues and second generation biofuels to be counted twice in meeting the 10% biofuels target, in line with the EU directive. This led to a reduction in the volume of biodiesel supplied in the UK due to the high proportion of used cooking oil and tallow used in this sector. The proportion of bioethanol supplied continued to rise, from 3.3% in 2011 to 4.1% in 2012 (by volume).

While incentivising biofuels with high carbon savings is to be encouraged, the current penetration of biofuels in this sector falls short of our indicator trajectory by around 1.4% by volume (1% by energy).

A key issue on biofuels is to ensure that this supply is sustainable. Mandatory sustainability criteria for direct GHG impacts of using biofuels are already in place, and are due to become more stringent over time. Biofuels supplied currently are exceeding the minimum standards of at least 35% GHG savings. Of biofuels supplied in 2012/13, 80% had direct GHG savings of at least 50% relative to the fossil fuel comparator, and almost 70% achieved savings of 60% or above. These savings are net of emissions from direct land use change associated with biofuel production, but exclude emissions from indirect land use change (ILUC).

The framework for ILUC impacts is still under discussion at the EU level. The EU published its proposals in Autumn 2012 (Box 5.7), but these are unlikely to be resolved in the near term.

Until this issue is resolved, there remains uncertainty as to the direction of government policy in this area. The RTFO target is flat-lined from 2013/14 onwards and there are as yet no plans for how to deliver the Fuel Quality Directive (FQD) beyond 2014. The FQD requires the suppliers of fuel for use in road vehicles and non-road mobile machinery (NRMM) to reduce the life-cycle GHG emissions per unit of energy ('GHG intensity') of the fuel they supply by 6% in 2020 relative to an EU-wide 2010 fossil fuel baseline.

While it is important that robust sustainability criteria that take account of ILUC impacts are implemented, the Government should push for these to be agreed as soon as possible to provide certainty to investors and to allow additional action to meet carbon budgets to be put in place if required.

Box 5.7: Biofuel sustainability standards

Mandatory sustainability standards for the direct impacts of using biofuels in the transport sector were introduced in the Renewable Energy Directive in December 2010. These were transposed into the RTFO in December 2011. The Directive requires a GHG saving of 35% (rising to 50% in January 2017, and 60% in January 2018 for installations in which production started from 2017 onwards). It contains a methodology for calculating this saving as well as default values that can be used in certain cases to show compliance with the requirement. The criteria also ensure that biofuels are not produced from areas of high carbon stock or high biodiversity.

DfT are responsible for administering compliance with the sustainability criteria, which includes chain of custody evidence and independent verification of supplier evidence. It is important that this procedure is clear and transparent in order to retain confidence in ensuring GHG emissions reductions are being achieved.

In October 2012 the EC published proposals to take account of indirect land use change when calculating GHG savings. They suggested the inclusion of ILUC factors in reporting by fuel suppliers and Member States of savings from biofuels and bioliquids counted under the RED and the FQD.

The ILUC factors represent the estimated land use change emissions that are taking place globally as a result of the crops being used for biofuels in the EU, rather than for food. Feedstocks that do not require agricultural land for their production (e.g. wastes, residues, algae), and those that cause direct land use change (in which case operators need to calculate their actual emissions) are exempt from the factors.

The EC proposals also:

- Increase the minimum GHG savings requirements for new installations to 60% compared with fossil fuels, in order to improve the efficiency of biofuel production processes and discourage those with low GHG performance.
- Limit the amount of food and crop-based biofuels and bioliquids that can be counted towards the EU's 10% target for renewable energy in the transport sector by 2020, to 5% (around the current level). This means the remainder will have to come from mainly second generation biofuels.

For the new rules to take effect, the European Parliament and the Council must first adopt the proposals in a co-decision procedure (after which Member States must transpose the provisions into national law within one year); the timescale for a decision is uncertain.

8. Progress in changing travel behaviour

Smarter Choices

Smarter Choices corresponds to a set of measures addressing psychological motivation for travel choice with the objective of reducing levels of car use (in contrast to alternative measures such as development of transport infrastructure or services, enforcement of travel behaviour or changes to economic incentives).

Smarter choices measures include:

- Travel plans (e.g. workplace, school, residential, and station travel plans)
- Personalised travel planning
- Public transport information and marketing
- Travel awareness campaigns
- Car clubs
- Car sharing schemes
- Teleworking, teleconferencing, and home shopping
- Cycling and walking information, marketing, training and events.

The Local Sustainable Travel Fund (LSTF) was created by DfT in 2011 with the dual objective of supporting the local economy and reducing carbon emissions. The initial fund of £560 million (£350 million resource plus £320 million capital funding) was topped up to £600 million in 2012 to accommodate approval for a greater number of bids.

The LSTF bidding rounds are now closed and the fund is fully committed. In total, the fund is supporting 96 projects in 77 Local Authorities across England between 2011/12 and 2014/15. Along with local contributions provided by funded project teams, over £1 billion is now being invested in local sustainable travel.

As part of the bidding process, Local Authorities (LAs) were asked to provide evidence for the carbon benefits of proposed schemes, and show that the benefits identified clearly relate to the package proposals. However, under the monitoring and evaluation framework published by DfT, measurement of carbon benefits is not required for all LAs:

- All projects are required to report annually on outputs (e.g. delivery of cycle training), but only larger schemes are required to report on outcomes metrics (e.g. increased number of cycle trips).
- Some projects (both large and small) are asked to submit case studies for a few key priority questions, where evidence is weakest. There will be a case study looking at carbon impacts, which is expected to carry out in-depth research to understand the carbon savings from a select number of LSTF projects. The intention is that this case study will serve as a proxy for all projects.

- The first LSTF annual report was published in May 2013, covering progress to date in the 39 projects allocated funding in Tranche 1. Every project team reported providing community engagement activities during 2011/12, mainly consisting of travel planning for workplaces, schools, residents and/or visitors and tourists. However, as the Tranche 1 projects are all small schemes, the impact of these activities is not reported.

Going forward, monitoring of impacts on travel behaviour should be encouraged across all projects where possible, to allow estimates of emissions reductions to be made. Monitoring will also be important in the context of DfT's Door to Door Strategy, published in March 2013 (Box 5.8).

Almost all successful projects receiving LSTF funding include Smarter Choices measures – most commonly workplace engagement initiatives to promote sustainable travel choices.

It is important that progress continues. If monitoring and evaluation confirms success in achieving emission reductions, the Government should make a commitment to further funding post-2015 and develop a plan for nationwide roll-out of Smarter Choices over the next decade.

Box 5.8: DfT's Door to Door Strategy

The Door to Door Strategy establishes what the Government wants from transport providers and what DfT is doing to support door-to-door journeys using sustainable modes. It addresses four core areas that influence people in choosing sustainable transport:

- Access to reliable information on transport options
- Providing convenient and affordable tickets, for an entire journey
- Making sure there are regular and straightforward connections at all stages of the journey and between different modes of transport
- Ensuring safe, comfortable transport facilities

The LSTF is cited as one of the existing programmes supporting this agenda, though the focus is mainly on infrastructure investments rather than softer measures. DfT has established a cross-industry group, the Door to Door Roundtable, to act as a delivery mechanism for taking forward the initiatives outlined in the strategy, and will publish an action plan later this year. Going forward, it will be important to monitor progress against actions and evaluate the resulting impacts, particularly in terms of modal shift and emissions reductions.

Eco-driving

Eco-driving (i.e. adoption of more efficient driving techniques such as smooth acceleration and braking, driving at optimal speeds, use of cruise control, engine braking) could make an important contribution to reducing the CO_2 intensity of vehicles.

Progress on eco-driving appears to be mixed, with the freight sector embracing it as an effective cost and emissions reduction measure, but uptake among car drivers has been limited:

- Evidence from the LCRS and Freight Carbon Review suggest that eco-driving is the most common emissions reduction measure employed by freight operators (see section 5 above), although we do not have data on actual numbers of drivers trained. Our indicator framework assumes 100% of HGV drivers are trained in eco-driving, delivering emissions reductions of 0.9 $MtCO_2$ in 2020.
- Only 6,962 drivers (around 75% of which are car drivers, and 25% van drivers) were trained under the Energy Saving Trust's Smarter Driving Programme in 2012[17], down from 7,892 in 2011. The Energy Saving Trust's target is 8,500 per year. The pace of roll-out is therefore still very low relative to the 300,000 car and van drivers to be trained annually if an emissions reduction of 0.3 $MtCO_2$ for eco-driving is to be achieved by 2020

In our 2012 progress report we recommended that eco-driving become a formal part of the driving test. This recommendation was not accepted by the Driving Standards Agency (DSA), although some action has been taken:

- In April 2013 DSA revised the National Driving Standards for categories B, C and D[18], extending the content of the sections on "driving in an ecologically responsible way" and "choosing a suitable mode of transport". They now include a requirement to turn off the engine when one is likely to be stationary for some time, and to understand the environmental implications of tyre choice.
- DSA also commissioned research[19] looking at how eco-driving training can be provided and promoted in a more engaging way, how take-up can be increased amongst existing car drivers, and how the use of the techniques can be sustained over time (Box 5.9).

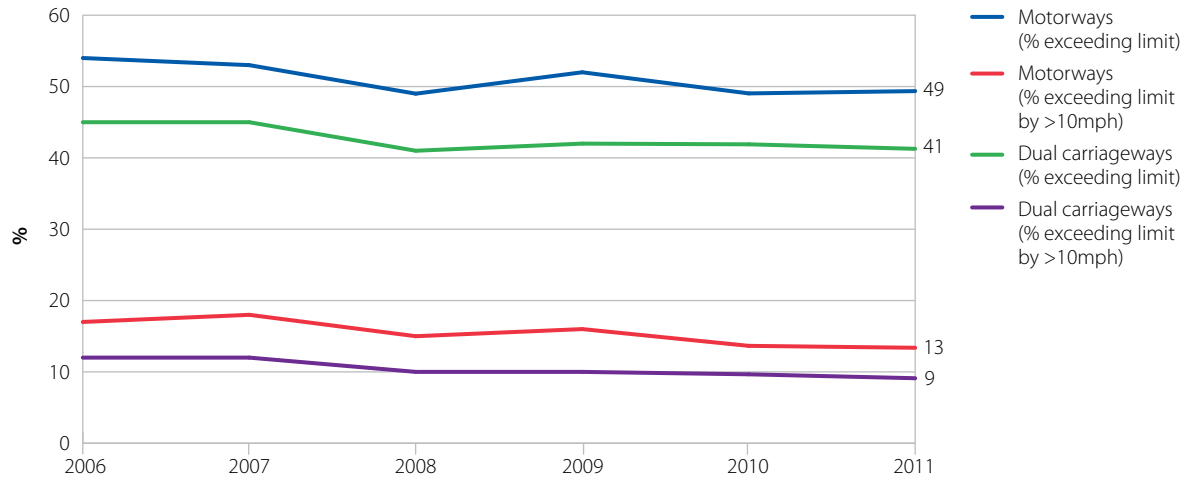
In future, drivers will be assisted in driving more efficiently by technology solutions within the vehicle:

- Gear shift indicators (GSI) inform the driver when to change gear to minimise fuel consumption. Under EU regulations, GSI are mandatory, as of 1 November 2012, for all new passenger vehicles which undergo type approval, and mandatory for all new vehicles sold in the EU from 2014.
- Fuel consumption meters (FCM) can provide information on fuel consumption in real-time or as an average over a specified period. Many new cars are already fitted with an FCM, although display is often optional. Following a consultation in 2011, the European Commission is expected to include mandatory fitting of FCM to new cars and vans in a package of proposals due in summer 2013.

We continue to believe that eco-driving is an effective emissions reduction measure for both private drivers and employers, as well as helping to save fuel costs. The Government should actively promote uptake of eco-driving, through a combination of inclusion as a key element in the practical driving test, driver training, awareness raising and in-car information on fuel efficiency.

17 Please note that the Smarter Driving Programme is only open to organisations.
18 B: cars, C: lorries, and D: buses and coaches.
19 TNS-BMRB (2011) *Eco-driving: Factors that determine take-up of post-test training research.*

Figure 5.11: Speeding on motorways and dual carriageways (2006-2011)



Source: DfT (2012) Free flow vehicle speeds in Great Britain 2011.

Box 5.9: Promoting eco-driving

A recent report for the DSA looked at how eco-driving training can be provided and promoted in a more engaging way, how take-up can be increased amongst existing car drivers, and how the use of the techniques can be sustained over time. The report included a number of recommendations:

- Emphasising wider benefits
  - Cost savings from lower fuel consumption and reduced maintenance costs need to be made explicit to employers and ordinary drivers through carbon calculators, websites, and information campaigns (e.g. changing the term to "fuel efficient driving").
  - Providing tangible financial incentives through a reduction in insurance or road tax could also help increase take up in the current climate
  - Stressing the full range of savings (e.g. lower maintenance costs) and other benefits such as increased road safety, and – for employers – corporate image, is crucial
- Promoting eco-driving as a social norm
  - Policies targeting behaviour change in this area should be easy to adopt, stressing the "fun" element of in-vehicle training (e.g. where colleagues/friends could compete with each other on their eco performance).
  - Behaviour change policies should also aim at presenting driving in an ecologically friendly way as a characteristic of skilled drivers.
  - Initiatives to increase take-up should target appropriately the "messengers" within a community or a workplace.
- Timing
  - To increase specifically post-test interventions, eco-driving training should be offered in conjunction with popular course such as Pass Plus and Advanced Driver Skills trainings.
- The report also recommends trying to provide information on eco-driving at different stages of driving/buying a car (e.g. when hiring a car, when purchasing a vehicle, and when renewing car tax).

DSA have stated that they "expect the lessons identified in the report will be taken forward by training providers".

Speed limits and their enforcement

DfT statistics indicate that speed limits are exceeded by a high proportion of car drivers on motorways (49%) and dual carriageways (41%) (Figure 5.11). This offers an opportunity for reducing emissions through enforcing the current speed limit, given the significant decline in fuel efficiency as car speed increases from 70 to 80 mph. Our indicator framework includes full enforcement of the speed limit from 2012.

Conversely, if the speed limit were to be increased, fuel efficiency would further decline, increasing emissions. The Government recently consulted on increasing the speed limit for HGVs on single carriageway roads (Box 5.10). It is important that emissions impacts are properly reflected in the final decision, alongside other costs and benefits. Any increase in the speed limit leading to an increase in emissions (other things equal) will reinforce the need for progress in reducing the emissions intensity of HGVs, and agreement of an EU framework to drive this as soon as possible (see section 5).

In future, car drivers may be encouraged to observe the speed limit by in-vehicle technology. Fuel consumption meters, which are expected to become mandatory for new cars and vans under European regulations (see above), could allow drivers to observe the impact of speed on fuel economy.

Box 5.10: Government consultation on the speed limit for HGVs on single carriageway roads

Currently the maximum speed limit for HGVs over 7.5t on single carriageway roads is 40 mph and 50 mph for smaller HGVs (between 3.5t and 7.5t).

Stakeholders have voiced concerns that the 40 mph speed limit leads to additional costs to vehicle operators, congestion, overtaking accidents, and an uneven playing field given 70% of observed vehicles currently exceed this speed limit.

Consequently, DfT consulted on increasing the speed limit for HGVs over 7.5t on single carriageway roads to 45 mph or 50 mph.

The preliminary impact assessment published alongside the consultation[20] suggested that benefits from time savings and non-fuel operating cost savings, would outweigh fuel, carbon and local environmental costs associated with a speed limit increase. Carbon emissions were estimated to increase by 12 – 31 $ktCO_2$ per year over the years modelled (2013-2030).

The consultation closed on 1 February 2013, and Ministers are currently considering the responses.

Transport and land-use planning

In our last report we highlighted the need to ensure that the new National Planning Policy Framework (NPPF), published in March 2012, encourages appropriate land-use planning decision making and ensure that the impact for transport emissions are taken into account.

Since then the Government has issued a consultation[21] on revising policy on the way the Highways Agency engages with the new planning system.

20 See https://www.gov.uk/government/consultations/examining-the-speed-limit-for-heavy-goods-vehicles-over-7-5-tonnes-on-single-carriageway-roads
21 See https://www.gov.uk/government/consultations/consultation-on-the-strategic-road-network-and-the-delivery-of-sustainable-development

- The consultation document sets out the role of the Strategic Road Network (SRN) and the support function that the Highways Agency can provide in delivering a reliable road network, supporting productivity and growth.
- The proposals reflect the changes brought about by the NPPF, removing regulation and devolving decisions to local authorities, while placing more emphasis on the Highways Agency's role as a delivery partner and enabler. A key plank of the proposals is for planning authorities to deliver Local Plans setting out the scale and pattern of local development. It is envisaged that the Highways Agency will work with local authorities to provide information and expertise in helping to understand the transport implications of new developments.
- However elements of the proposals such as easing of restrictions of access to motorways and removal of restriction on retail space at motorway service areas could increase car trips and mileage.

Going forward it is important that transport emissions are factored into planning decisions alongside other costs and benefits. An Impact Assessment setting out the potential effect on travel demand and emissions of the current proposals should be published as soon as possible. To the extent that travel demand is projected to increase beyond levels incorporated in our indicator framework, this could pose a risk to meeting carbon budgets.

9. Other policy developments

In November 2011, Alan Cook published a report[22], commissioned by the Government, which set out the challenges in managing the SRN and outlined a package of reforms to the current operating model for the network. In response to this report, the Government has committed to delivering a long term roads strategy, and has taken several measures to achieve this:

- The first performance specification for the SRN was published in April 2013, setting out five outcomes and key performance indicators for the network up to 2015, including economic growth, safety on roads, an efficient network and one that minimises negative impacts on the environment.
- A programme of route-based strategies which set out investment and delivery plans for the network on key routes, with the aim of informing decisions on policy and funding requirements. Three routes were published earlier this year.
- Government plans to publish a consultation paper on a roads reform feasibility study looking at new ownership and financing models for the national roads system later this year. The study will explore a number of options for running and financing roads, including how investment in roads can be paid for and the interaction with existing motoring taxation.

It is important that, in considering alternative financing models for roads, government places due weight on the environmental damage of car use, and on incentives to move towards cleaner forms of travel consistent with meeting carbon budgets.

22 Alan Cook (2011) *A Fresh Start for the Strategic Road Network.*

Key findings

- Surface transport **emissions fell in 2011** after staying flat the previous year…
- … car and HGV emissions fell but van emissions increased
- Road transport emissions **likely to have fallen slightly in 2012**
- EU **new car and van CO_2** regulations continue to drive improvements in efficiency, which **outperformed** our indicators…
- … important that **challenging targets** agreed for 2025 and introduced for HGVs as soon as possible
- The market for new electric vehicle models is expanding, with **plug-in hybrid models available** for the first time in 2012…
- … however take-up remains limited and purchase **incentives need to continue**, including reinstatement of tax incentives for company cars
- **Progress on behaviour change was mixed**. Some progress towards roll-out of Smarter Choices, limited uptake of eco-driving and uncertainty over land-use planning.

Table 5.1 The Committee's transport indicators

ROAD TRANSPORT		Budget 1	Budget 2	Budget 3	2012 trajectory	2012 outturn
Headline indicators						
Emissions (% change on 2007)	Road Transport	-9%	-17%	-26%	-8% (2011)	-10% (2011)
	Car	-11%	-22%	-34%	-9% (2011)	-12% (2011)
	Van	5%	8%	4%	+7% (2011)	-4% (2011)
	HGV	-6%	-15%	-19%	-6% (2011)	-7% (2011)
gCO_2/km (carbon intensity of a vehicle kilometre)	Car	158	136	113	162 (2011)	160 (2011)
	Van	217	196	171	227 (2011)	217 (2011)
	HGV	761	678	635	768 (2011)	870 (2011)
Vehicle kilometres with impact of Smarter Choices	Car	412	419	431	412	402 (2012p)
Supporting indicators						
Vehicle technology						
New car gCO_2/km	Car	146	116	95 (by 2020)	146	133
New electric cars registered each year (at end of Budget period)		12,000	240,000	600,000	12,000	2,254
Stock of battery electric and plug-in hybrid cars in vehicle fleet		24,000	650,000 (240,000 delivered through pilot projects in 2015)	2.7 million	24,000	3,566
Biofuels						
Penetration of biofuels (by volume)		4.5%	7.7%	10.0%	4.5%	3.1%
Decision on whether RTFO target can be met sustainably		2011/12			n/a	n/a

Table 5.1 The Committee's transport indicators

ROAD TRANSPORT	Budget 1	Budget 2	Budget 3	2012 trajectory	2012 outturn
Demand side measures					
Proportion of drivers exceeding 70mph		0%*	0%*	n/a	49% (2011)
Car drivers who have undergone eco driving training	1.2 million	2.8 million	4.5 million	1.2 million	30,000
Smarter Choices – demonstration in a city and development plan for roll out if successful, demonstration in rural areas and demonstration targeting longer journeys	2010			n/a	n/a
Smarter Choices – phased roll out to towns	2010		Complete	n/a	LSTF funding Smarter Choices projects in 77 Local Authorities
Development of integrated planning and transport strategy	2011			n/a	n/a
Other drivers					
Fuel pump prices, fuel duty, proportion of small/medium/large cars, Van and HGV kms (vehicle/tonne), Petrol/diesel consumption, surface transport modal split, average speed of car drivers exceeding 70mph.					
Agreement of modalities for reaching an EU target of 95 gCO_2/km target and strong enough penalties to deliver the target, new car CO_2 in EU, New Van and HGV gCO_2/km**, Number of EV car models on market, developments in battery and hydrogen fuel cell technology, battery costs.					
Successful conclusion of EU work on Indirect Land Use Change/development of accounting system for ILUC and sustainability.					
Number of households and Car ownership by household, cost of car travel vs cost of public transport, funding allocated to and percentage of population covered by Smarter Choices initiatives*, Proportion of new retail floorspace in town centre/edge of centre locations, proportion of new dwellings in settlements >100,000 (% within boundary, on edge), ratio of parking spaces to new dwellings on annual basis.					

Note: Numbers indicate amount in last year of budget period i.e. 2012, 2017, 2022.

* CCC recognise that in practice it is impossible to achieve zero speeding. However, as close to zero as practicable is required to achieve the greatest carbon savings.
** We aim to include new van and HGV gCO_2/km in our indicator set as the available monitoring data improves.

Key: Headline indicators Implementation indicators Milestones Other drivers