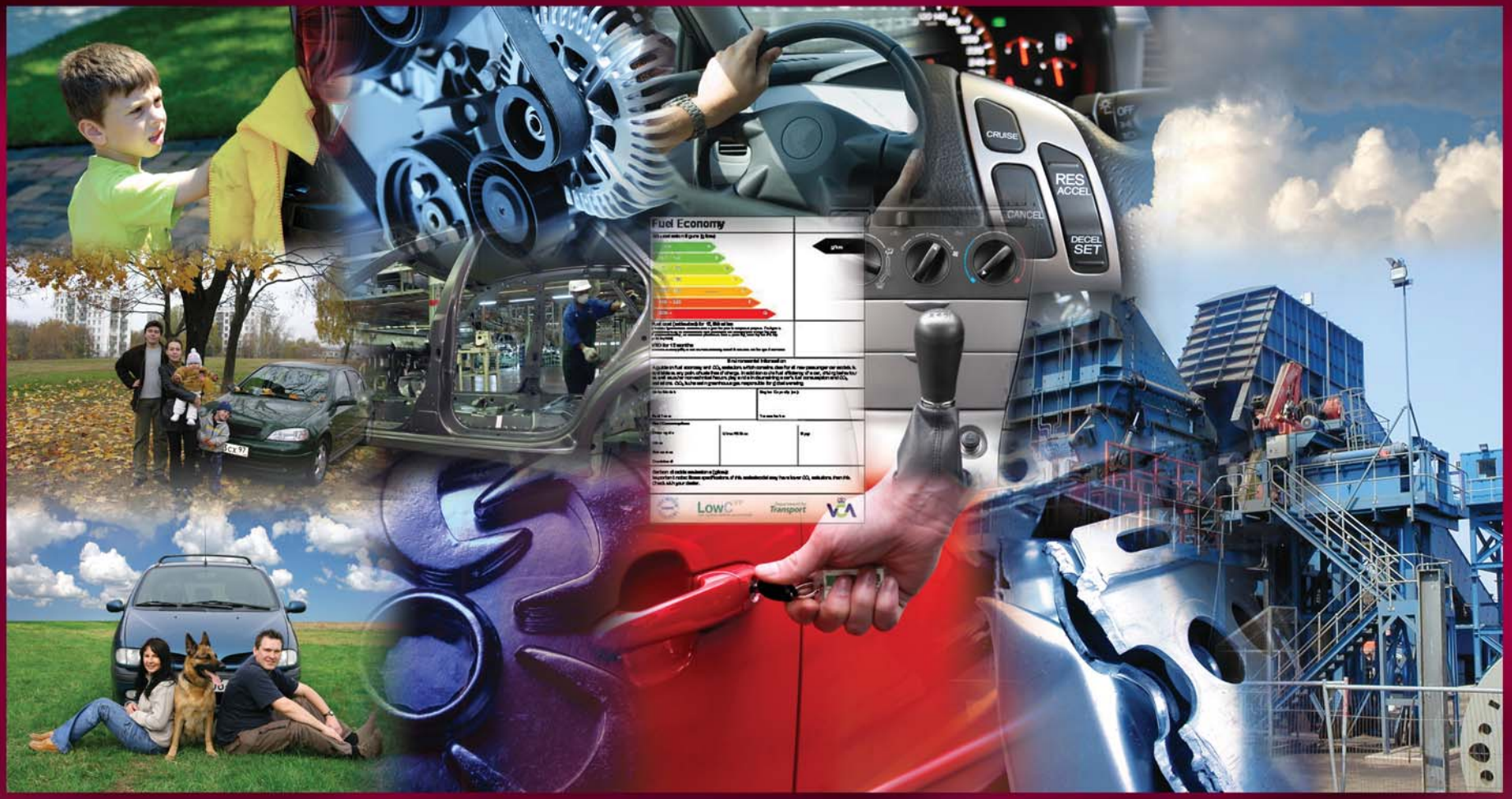
THE UK AUTOMOTIVE SECTOR TOWARDS SUSTAINABILITY



PRODUCTION CONSUMPTION AND DISPOSAL SEVENTH INDUSTRY REPORT

THE MOTOR INDUSTRY SMMT

www.smmt.co.uk

Contents

Production and distribution

Vehicle use

Vehicle disposal

1.0 Signatories and the reporting year

This is the seventh report produced by the SMMT on the Sustainability of the sector. Environmental, social and economic progress has again been evident during 2005. Our business and responsibilities are changing, as a result we have looked at our commitments and updated them in two main ways; firstly to reflect the changing nature of our business and secondly to address the life cycle of vehicles from production to disposal. The report now follows the life of the vehicle and comments on the major sustainability issues at each point of the life cycle.

In section 10.0 we highlight the work of SMMT in developing the integrated approach to road transport CO_2 reduction, outlining how total CO_2 is generated and strategies for control of this important issue.

I hope you enjoy the new report and we look forward to SMMT coverage of these issues in future years.

Christopher Macgowan,

Chief Executive, SMMT

Data for this report is taken from the 2005 calendar year.

Signatories to this report now represent over 98 percent of car and CV assembly in the UK. This represents the largest proportion in our reporting process and makes the data a comprehensive review of sustainability of the sector.

We are pleased to add IBC Vehicles, Luton to the companies inputting data into this year's report. IBC manufacture a range of light vans on behalf of the General Motors Group.

Perkins of Peterborough did not submit data for 2005.

It is not possible to divulge data from individual companies. However, if you have any questions on the data in the report, please contact:

sustainability@smmt.co.uk

Signatories to this report are:

Audi
Bentley Motors
BMW Group
Ford Motor Company Limited
GKN Driveline Limited
Honda of the UK Manufacturing Limited
IBC Vehicles Ltd.
Jaguar Cars Limited
Land Rover
LDV Limited
Nissan Motor Manufacturing (UK) Limited and Nissan Technology Centre Europe
PSA Peugeot Citroën Automobiles UK Limited
Rolls-Royce Motor Cars Limited
SEAT
Skoda Auto
Toyota (GB) plc and Toyota Motor Manufacturing UK Limited
Vauxhall Motors Limited
Volvo Cars UK Limited
Volkswagen Group (UK) Limited
Volkswagen Commercial Vehicles

2.0 Executive Summary

Commitment 1: Improve and enhance sustainability reporting, respond to stakeholder feedback.

Table 2.0 Key Performance Indicators		2003	2004	2005	CHANGE 2005 ON 2004 - REPRESENTATION
Number of signatories	(AS)	22	20	20	No change
6.0 Vehicle production and distribution					
6.1 Production inputs					
Total combined energy use	(gwh) (AS)	6,126	5,337	5,103	-234
Energy used per vehicle produced	*(MW/h/unit) (VMS)*	*2.8*	*2.5*	*2.3*	-0.2
Total combined water use	(000m3)(AS)	8,404	7,037	7,127	+90
Water use per vehicle produced	*(M3/unit)(VMS)*	*3.4*	*3.4*	*3.2*	-0.2
6.2 Material outputs					
Total combined CO_2 equivalents	(tonnes)(AS)	1,679,832	1,447,900	1,417,129	-30,771
CO_2 equivalents per vehicle produced	*(tonnes/unit)(VMS)*	*0.7*	*0.7*	*0.6*	-0.1
Total combined emissions of VOCs	(tonnes)(AS)	7,337	5,480	6,478	+998
VOC emissions per vehicle produced	*(kg/unit)(VMS)*	*4.1*	*3.5*	*3.5*	0
Total combined waste to landfill	(tonnes)(AS)	56,743	52,842	44,910	-7,932
Waste to landfill per vehicle produced	*(kg/unit)(VMS)*	*17.9*	*19.8*	*14.5*	-5.3
6.3 Economics and investment					
Automotive manufacturing sector turnover	(£ billion)	46.0	49.0	48.8	-0.2
Total number of cars and CVs produced	(UK) (WI) (million)	1.84	1.86	1.80	-0.06
Total new car registrations	(UK) (AC) (million)	2.58	2.57	2.44	-0.13
Signatories' combined turnover	(£ billion) (AS)	39.16	34.64	39.38	+4.74
Total number of vehicles produced by signatories	(AS) (million)	1.73	1.61	1.77	+0.16
6.4 Employment and employees					
Signatories' combined number of employees	(AS)	87,625	76,327	72,337	-3,990
Signatories' lost-time incidents	(AS)	710	491	410	-80
Signatories' average number of training days	(AS)	3.8	2.9	3.2	+0.3
Signatories' average staff turnover	(AS)	6.10	8.65	5.80	-2.85
7.0 Vehicle use					
7.2 New car CO_2 emissions					
Average new car CO_2 emimissions	(g/km) (AC)	172.1	171.4	169.4	-2

Whole industry data	(WI)	SMMT members data	(SMMT)
All car sales in the United Kingdom	(AC)	All signatories	(AS)
		Vehicle manufacturing signatories	(VMS)

2.0 Executive Summary

Table 2.1 Sector Fact Sheet		1999	2000	2001	2002	2003	2004	2005	CHANGE 2005 ON 2004 - REPRESENTATION
Automotive manufacturing sector turnover	(WI) (£ billion)	44.2	42.5	42.6	44.6	46.0	49.0	48.8	-0.2
Total net capital investment	(WI) (£ billion)	2.2	2.9	2.3	1.3	6.3	6.4	1.9	-4.5
Value of exports	(WI) (£ billion)	19.3	19.8	18.0	20.9	21.9	22.5	23.7	1.2
UK sector share of global passenger car production	(%)	4.5	4.0	3.7	3.9	3.9	3.7	3.5	-0.2
Number of cars and CVs produced	(million)	1.98	1.81	1.69	1.82	1.85	1.86	1.80	-0.06

Of 26 key indicators:

14 green progress

6 amber, static

6 red, concern

For full data sheets see Appendix table 2.1

Future: In each section of the report we highlight current expectation of future trends for major indicators.

Signatory performance:

- The number of the signatories to the report remained constant.
- Progress on reducing the environmental impact of operations continues, with the exception of volatile organic compounds (VOCs), an increase in absolute terms is largely due to the addition of IBC Luton, VOC per vehicle remains unchanged.
- Signatories turnover was up by nearly 14 per cent on 2004 to nearly £40 billion per annum. A reflection of the premium value of products produced in the UK and the success of the industry in export markets.
- Declining numbers of signatory employees, down over five percent on 2004, is a major concern.
- Safety and training performance have both improved in 2005.
- The sector continues to be have excellent standards of employment and a staff turnover figure of less than six per cent.

Total sector:

- Turnover for the sector was virtually unchanged on 2005, net investment was negative.
- Exports for the sector as a whole increased to a record £23.7 billion.
- The UK share of global car production fell to 3.5 percent, reflecting growth in production in developing markets.
- Employment in the sector as a whole fell by 22,000 to 820,000
- Automotive sector added value fell from £9.6 billion to £9.4 billion, but remains at a high level in recent years.
- All auto sector added value was 3.5 per cent of Gross Value Added (GVA).
- Average new car CO_2 emissions fell by 2 g/km in 2005, a higher rate than 2004, but a smaller percentage reduction than required to achieve reduction objectives.

3.0 Life cycle overview

Throughout the report we consider three key elements of the life cycle:

- Production
- Use
- Disposal

The chart below illustrates major sustainability elements at each stage of the life cycle. Where we believe the impact to be greatest we have highlighted this issue by a relatively longer bar element in the relevant stage of the life cycle.

To summarise major sustainability issues in each of the life cycle stages:

Production and Distribution:

- Water use
- Air quality, Volatile organic compounds (VOC)
- Economics
- Energy and waste

Use Phase:

- Waste from tyres and servicing
- Air quality, traffic emissions
- Road safety
- Employment, including servicing, retailing and insurance
- CO_2

Disposal:

- Vehicle waste
- Health and safety of employees

Structuring the reporting process in this way is a significant change and realignment, which we will be developing in forthcoming years.

Note 1 Disposal phase: Five per cent becomes negative if consideration is given to the energy saved in the remanufacture of metal from scrap as opposed to virgin material.

3.1 Life cycle and CO_2 emissions

Climate change and CO_2 emissions are the number one concern for stakeholders, government and industry. CO_2 is emitted at each stage of the life cycle of the vehicle.

Elghali, McColl-Grubb, Schivi and Griffiths (2004) (2) estimate some 98 percent of CO_2 emissions occur during the use phase, based on data for all vehicle types (car, van, bus, truck).

Volkswagen life cycle analysis of a Golf mark 3 suggests that some 70 to 73 per cent of energy is consumed during the use phase, Schweimer and Levin (2000)(3). This study includes reference to energy to produce the fuel, emphasising the use phase.

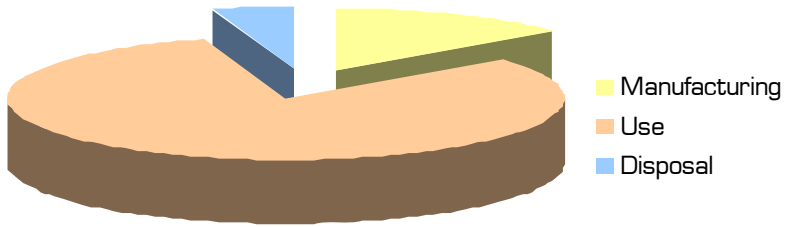
CO_2 analysis work by Ben Lane for Camden Council (2006) (4) on fuels and production emissions suggests higher emissions in fuel production, but similar emissions from vehicle production and use to that outlined by Schweimer and Levin.

A breakdown of the three life cycle phases, based on Lirecar (2004) (5) suggests that five percent of energy is consumed in disposal.

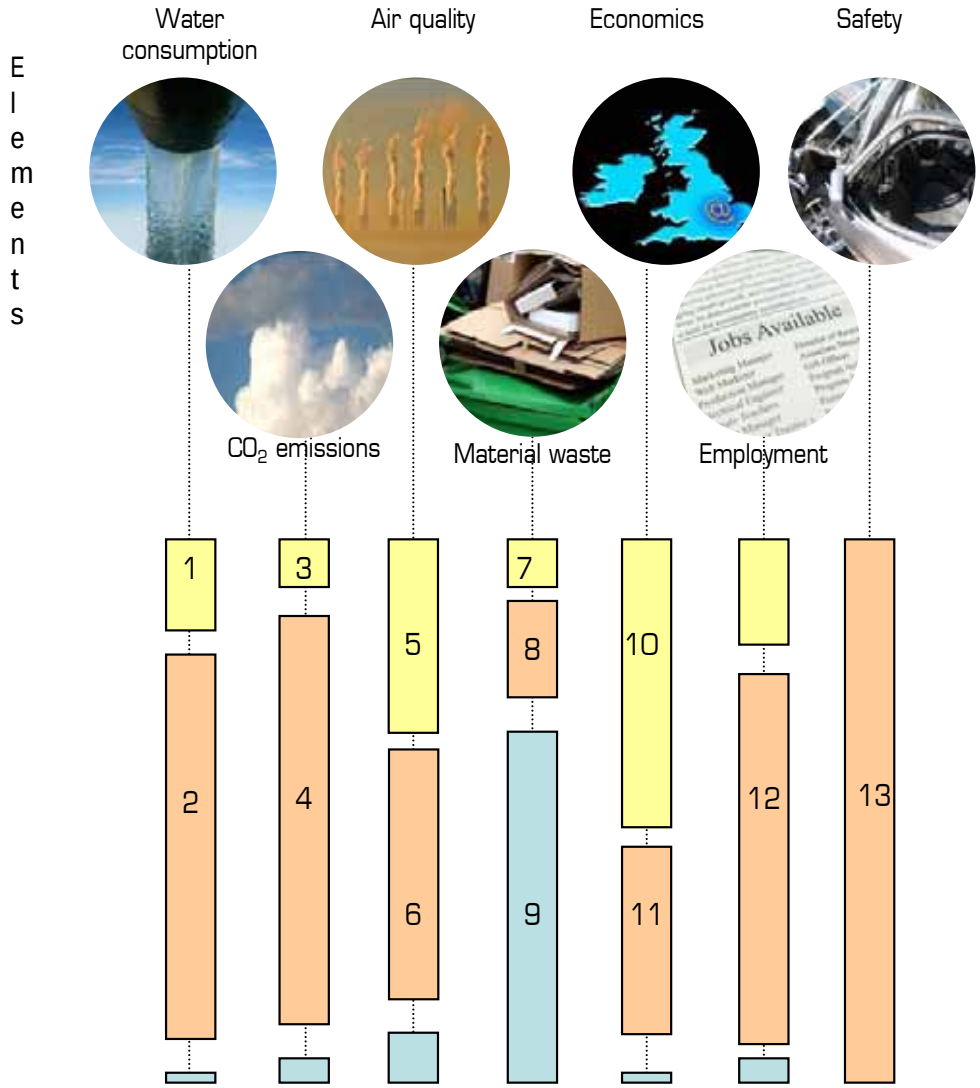
Full life cycle analysis is complex and result will vary according to vehicle type and geographic region (driving distances vary nationally). For a mid range car, used in the United Kingdom we suggest life cycle and CO_2 can be allocated in the following way:

- Manufacturing 10 per cent
- Use 85 per cent
- Disposal 5 per cent (see Note 1)

CO_2 emissions through the vehicle life cycle



Life cycle elements and indicative impacts



Economics: we refer to direct economic benefits. The wider indirect economic benefit of road transport is not included and levels and extent are subject to much analysis.

Throughout the lifecycle of the vehicle there are sustainability impacts. We have considered seven important sustainability elements at each stage of the lifecycle. These are:

1. Water: Consumption in paint shops.
2. Water: Washing of vehicles.
3. Energy use in assembly.
4. Energy use in driving.
5. Air quality: Emissions of VOC, NOx, SO_2 and PM.
6. Air quality: Vehicle emissions as above.
7. Waste: Manufacturing waste including steel scrap.
8. Waste: In use servicing waste, tyres, fluids and parts.
9. Waste: Whole vehicle.
10. Economics: Capital, research and development.
11. Economics: Maintenance and insurance.
12. Employment: Sales, maintenance, insurance, licensing.
13. Safety: road traffic deaths and injuries.

This highlights the relative importance of the use phase, not only in CO_2, but also in the other sustainability elements.

Data Sources:

Water Consumption: SMMT, Thames Water.

CO2 emissions: SMMT report

Air quality: Schweimer and Levin (Volkswagen Golf A3)

Material Waste: SMMT, Acord, DTI

Economics: SMMT and AA

Employment: SMMT

Safety: National Statistics UK

4.0 New commitments

The following outlines the updated commitments developed in response to changes in our business and responsibilities.

Performance of the sector in relation to the updated commitments is highlighted at the front of each section. Green implies progress, orange static or too early to quantify and red, concern.

Sustainability reporting

1. Improve and enhance sustainability reporting, respond to stakeholder feedback.

Production and distribution

2. Control and reduce the environmental impact of company operations.
3. Affirm economic growth, turnover and investment toward securing competitiveness in the global economy.
4. Add value to employment capital through development, skills and training.
5. Improve the working environment, health and safety of employees.
6. Improve our understanding of the impact of pre and post production logistics towards the environment.
7. Support development of a high quality and strong environmental supply and reverse supply chain network.

Use

8. Improve fuel efficiency of new product design.
9. Research, develop and bring cleaner technologies to the market to improve tailpipe emission standards, where practicable to introduce vehicles with higher emission standards in advance of legislation.
10. Improve the safety of the product.

End of life

11. Provide facilities for consumer to return vehicles for disposal at end of life.
12. Design and make cars so that at least 95 per cent of the weight of materials used can be recovered at the end of life.

Engagement and information

13. Engage proactively with external stakeholders.
14. Provide information to customers to enhance their awareness and understanding of product environmental and safety features.
15. Support strategies to reduce the environmental impact of road transport through fuel, driver and infrastructure development, the integrated approach.

5.0 The UK government 2005 revised sustainability strategy – "Securing the future"

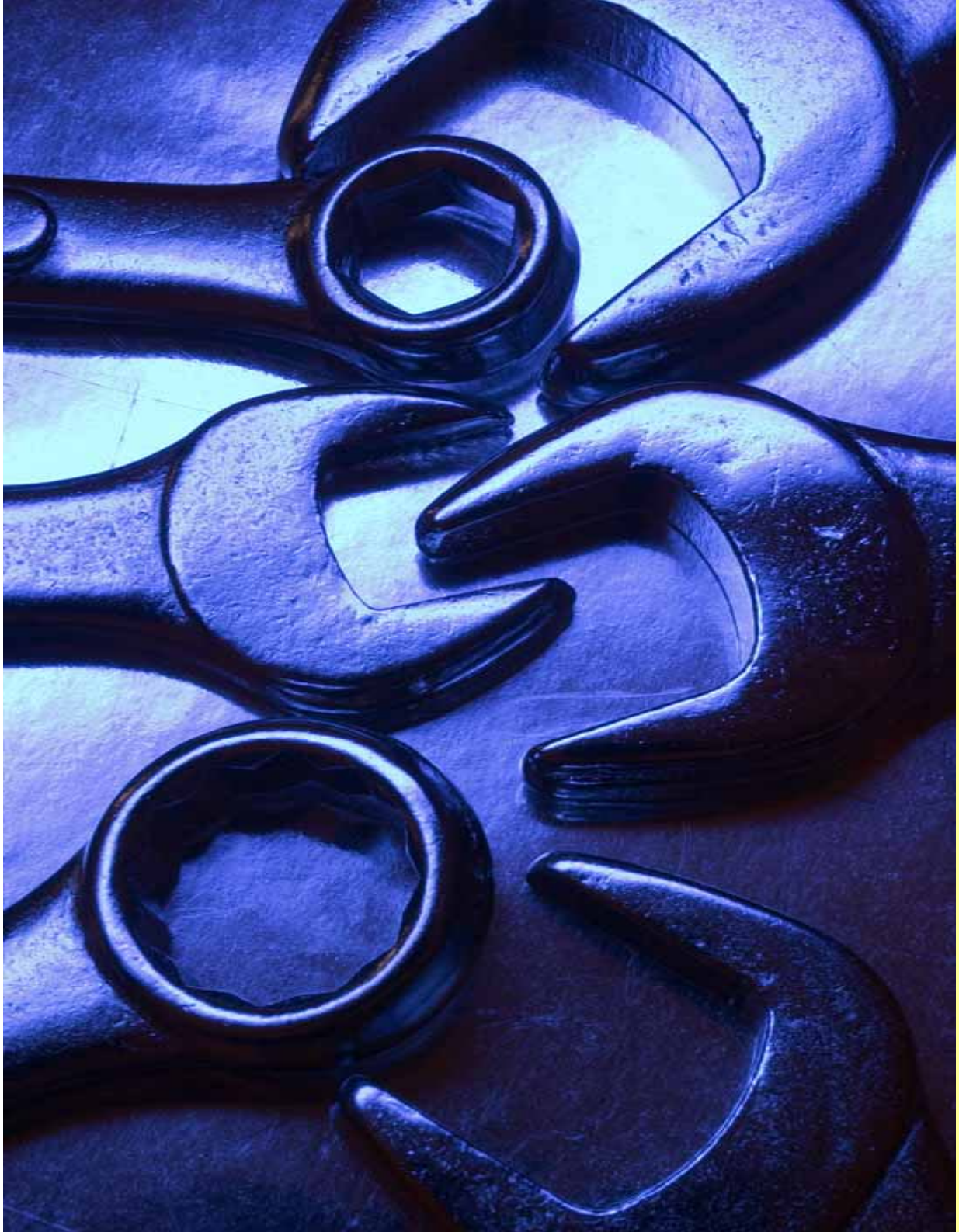
In updating these commitments SMMT referred to the UK government sustainability strategy, "securing the future" (2005) (1), in particular the four priorities for action listed opposite:

Sustainable use of resources – production and consumption

Climate and energy impacts

Integrated policy frameworks for resources and environmental protection

Partnership, engagement and good governance



Production, distribution and manufacture

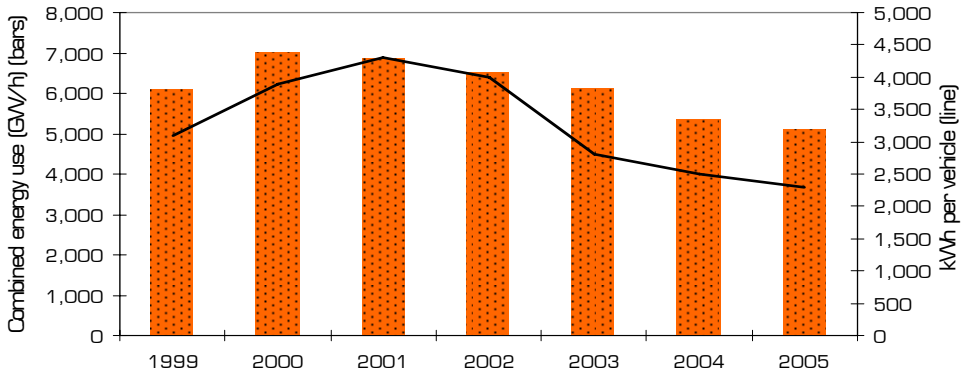
Materials, employees and economics

6.0 Vehicle production and distribution

6.1 Production inputs

Commitment 2: Control and reduce the environmental impact of company operations.

6.1.1 Energy Consumption



IBC Vehicles Ltd, producer of light vans, joined the reporting process in 2005. Even with the addition of data from another vehicle manufacturer total energy consumption for signatories fell in 2005.

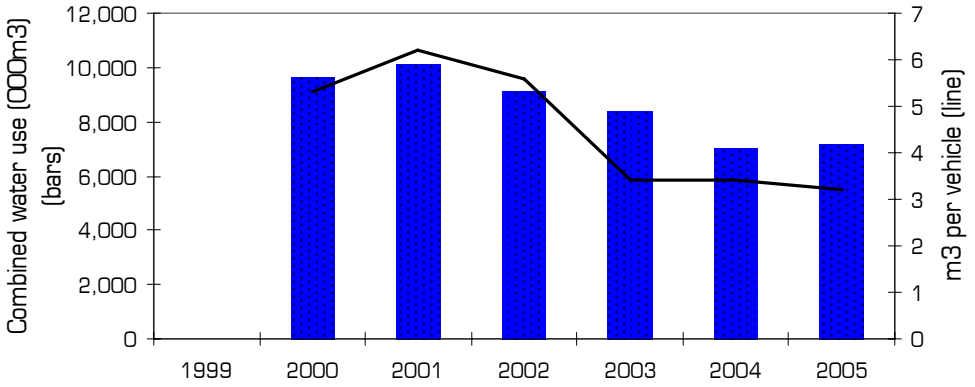
Energy consumed per vehicle fell to 2.3 MWh/unit, down a further eight per cent from 2.5 MWh/unit in 2004.

Increasing cost of energy makes reduction a major focus in plant and process management. EU emissions trading scheme (ETS) and UK climate change levy (CCL) complement energy reduction programmes.

Future: Continued falling energy consumption, both absolute and per vehicle.

Two signatories are now using wind turbines to generate power for consumption on site. This together with the comprehensive use of combined heat and power (CHP) contributes to carbon reduction in the manufacturing process.

6.1.2 Water use



With the addition of IBC, total water use increased slightly. Water use per vehicle, after remaining stable in 2004 vs. 2003, declined again in 2005. The figure of 3.2 m^3 per vehicle is approaching half that of the highest figure 6.2 m^3 in 2001.

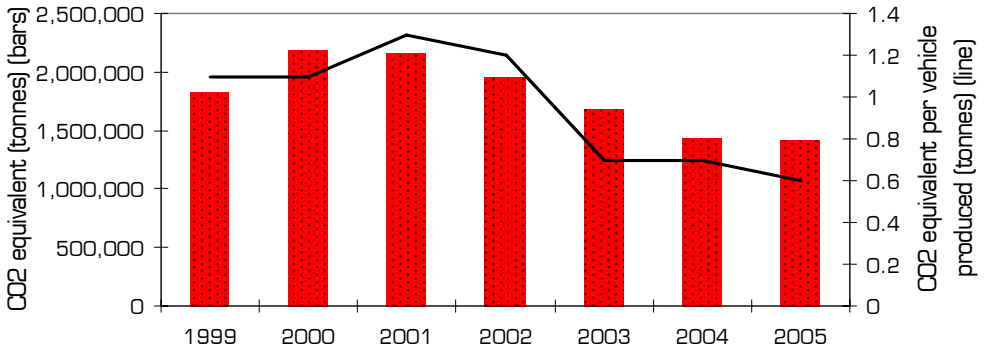
Although not a great user of water in relation to other sectors, the industry recognises the value of this resource.

Future: Further small declines in water use may be offset by increases in production.

For full data sheets see Appendix table 6.1

6.2 Material outputs

6.2.1 CO_2 emissions from production and distribution



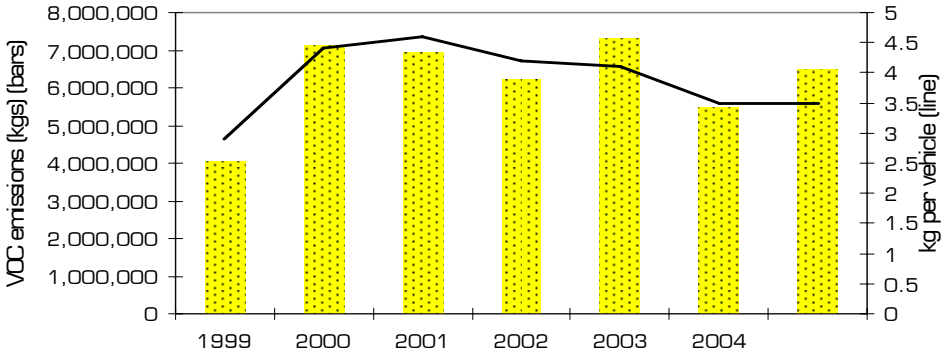
For full data sheets see Appendix table 6.2

Despite the addition of a further vehicle manufacturer total CO_2 from manufacturing and distribution fell in 2005.

Energy consumed per vehicle fell to 0.6 tonnes, less than half the 2001 figure.

Future: Increased use of renewables and green energy. Ongoing concerns of gas security of supply and prices may result in the use of higher carbon fuels.

6.2.2 Volatile Organic Compound (VOC) emissions



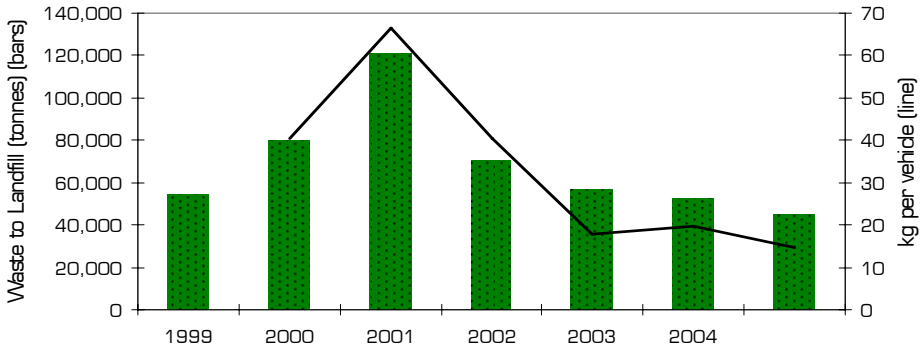
Reported total emissions of volatile organic compounds (VOC) increased in 2005, due not only to the inclusion of IBC but also to the inclusion of one major manufacturer who did not provide data in 2004.

VOCs emitted per vehicle produced remain static.

Indications suggest of increased use of VOC by some manufacturers who have extended product ranges into premium vehicles.

Future: Efficiency improvements to improve VOC emissions influenced by product and volume changes.

6.2.3 Waste to landfill



Total waste to landfill and per vehicle both decreased in 2005.

This is complemented by increases in recycling.

Waste per vehicle is less than one quarter of the 2005 figure. Returnable packaging and waste minimisation contribute to this reduction.

In 2005 recycling per vehicle increased to nearly 100 kg, nearly seven times the waste to landfill figure.

Future: Zero waste to landfill strategies by one signatory suggest there is opportunity for further absolute and per vehicle reductions.

6.3 Economics and investment

Commitment 3: Affirm economic growth, turnover and investment toward securing competitiveness in the global economy.

Table 6.3 Contribution to UK Economy		1999	2000	2001	2002	2003	2004	2005
Value of UK automotive exports	(£ billion) (WI)	19.3	19.8	18.0	20.9	21.9	22.5	23.7
Expenditure on business R&D	(£ billion) (WI)	1.1	0.8	0.9	0.9	1.2	0.9	1.0
Sector share of total GDP at market price	(%) (WI)	0.9	0.8	0.9	0.8	0.8	0.8	0.7

Signatories design and manufacture in the UK successful products for global markets. The UK industry is highly export dependent, exporting over 70 per cent of manufactured product. Industry consistently spends over one billion pounds on research and development.

Share of UK GDP declined slightly in 2005, a reflection of a growing UK economy and the relative strength of the non manufacturing sector to the total economy.

Foresight vehicle

The Foresight Vehicle Steering Group was set up by the Transport Panel and the DTI to define the detailed objectives of a programme designed to develop, demonstrate and exploit technology "... to stimulate the UK automotive supplier base to develop products and systems which satisfy increasingly stringent environmental requirements while meeting mass expectations for safety, performance, cost and desirability".

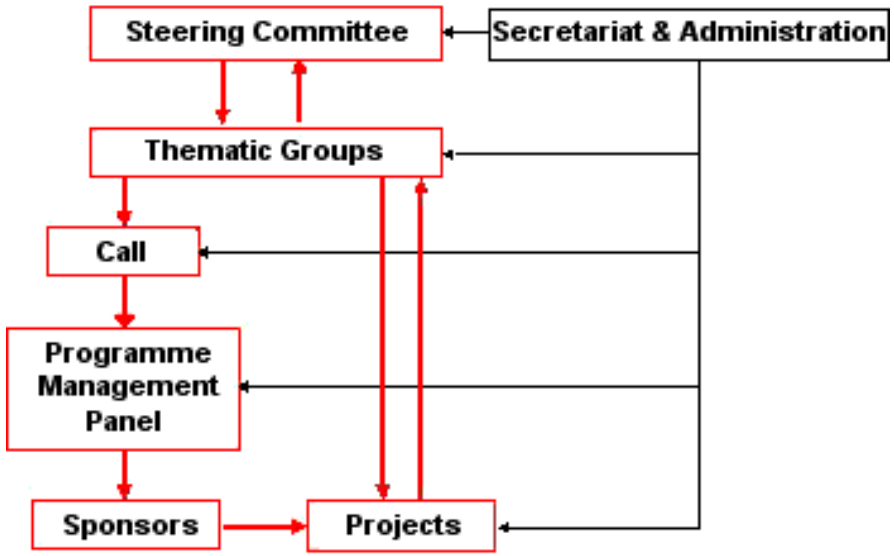
It consists of representatives of vehicle builders and their suppliers, independent research consultancies and university departments, government departments and user representatives such as motoring organisations.

Research Projects are brought forward through 5 Thematic Groups, whose representatives are all expert in their chosen field.

The five Thematic Groups are:

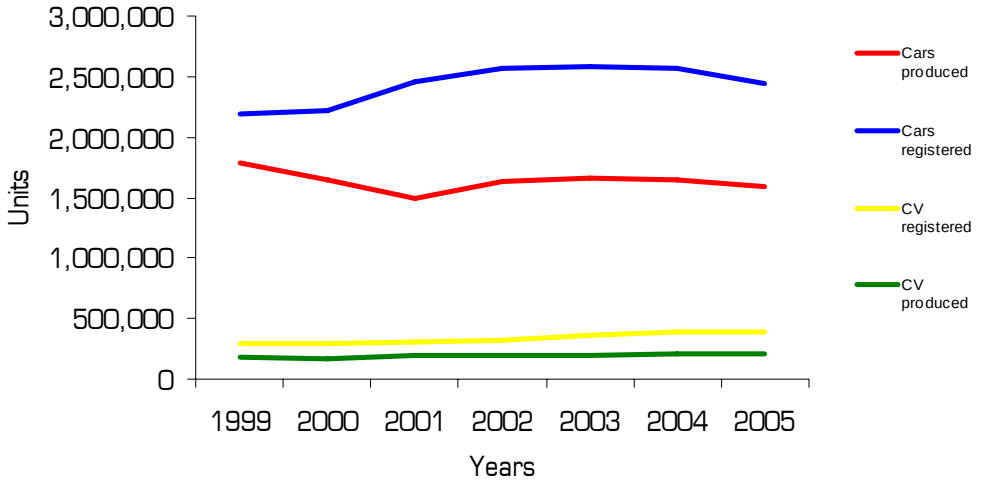
- EPT — Engine Powertrain
- HAEFV — Hybrid, Electric, Alternatively Fuelled Vehicles
- ASSET — Software, Sensors, Electronics and Telematics
- FASMAT — Advanced Structures and Materials
- DMAP — Design and Manufacturing Process

Structure of the Foresight Vehicle programme



www.foresightvehicle.org.uk

6.3.1 UK production and registration



Production of cars and CVs declined by three per cent in 2005. This reflects the loss of MG Rover. Of the reporting companies three saw a decline in production and nine increased production.

Registrations declined as the market for new cars in the UK fell back slightly.

Future: Car and CV production. Total production will decline in 2006 as the Peugeot Ryton operation is wound down. However some individual plants production volumes will increase dependent on model cycle changes.

Future: Car and CV registrations. Dependent on the economic cycle, high interest rates and rising fuel costs suppressing demand.

6.3.2 Investment

Table 6.32 Investments

		1999	2000	2001	2002	2003	2004	2005
Auto manufacturing sector net capital investment	(£ billion)	2.2	2.9	2.3	1.3	6.3	6.4	1.9
Inward direct investment into automotive manufacturing	(£ billion)	3.3	2.6	-0.9	-4.4	-3.3	-0.6	-1
Signatories combined UK investments	(£ billion)	-	1.3	1.2	1.5	1.8	ND	ND

ND No data

After MG Rover

"Companies have restructured as a result of MG Rover, while some are looking for new business. There is still quite a lot of flux in the market, with takeovers and mergers. True, some companies are finding the going harder than others, but investors are coming in and out and doing business."

Small is creative

"OEMs are looking beyond their big tier one suppliers, because there tends to be a lot of innovation in smaller companies. In larger firms sometimes, the amount of processes that projects go through can stifle creative thinking, whereas in smaller operations people can think outside the box a lot more."

New automotive locations

"Soon there will be one million cars per year produced in Slovakia, making it the biggest per capita car producer in the world. Many of our firms are setting up operations over there to make the most of this, and be near to the big car makers who are moving eastwards. Sertec for example is investing in a new factory in Estonia, which is not a bad place to be if production starts increasing in Russia."

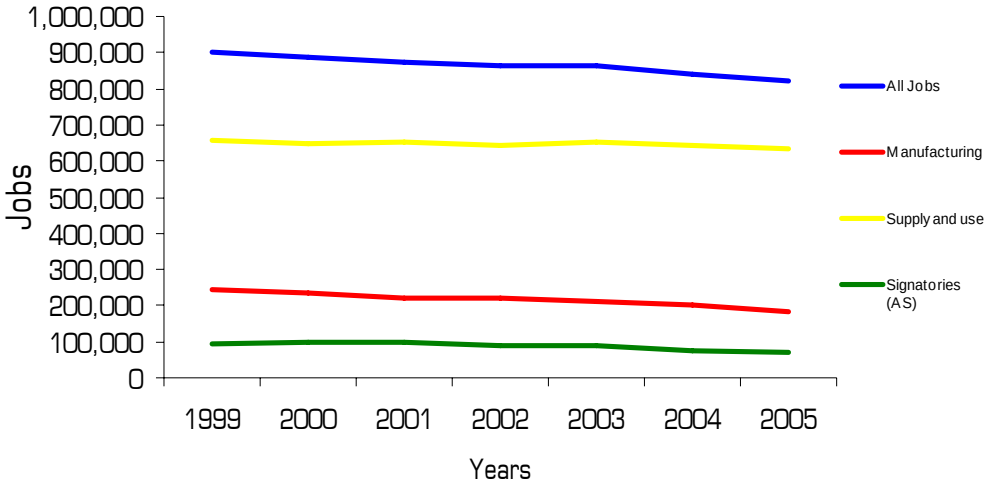
David Malpass, Senior Operations Manager at Accelerate, the supply chain initiative

www.accelerate.uk.net

6.4 Employment and employees

6.4.1 Employment

Commitment 4: Add value to employment capital through development, skills and training.



Employment throughout the sector continues to decline. As a continued reflection of the need to remain competitive, manufacturing is becoming more capital intensive.

However, the sector's high standards of training, safety and flexible employment practices all make automotive an attractive place to work.

A feature of signatories' response in 2005 was increased flexible working for both leave time and working hours.

Future: Employment levels will continue to decline at a steady rate. A smaller, more skilled, flexible workforce will be in place.

6.4.2 Training

Table 6.4.2 Training	2003	2004	2005	Change 2005 on 2004
Total number of training days [a]	241,549	128,709	118,620	-10,089
Average number of training days per employee	3.8	2.9	3.2	0.3

[a] For reporting signatories.

Although total training days reduced, we received data from less signatories for 2005. From those included in the survey training days increased to 3.2. Investment in training is seen as key to safe productive operating plants, and from the aspect of importers, key to product knowledge.

Future: Ongoing an average three days per year staff training.

The Automotive Academy promotes globally competitive standards of training and skill development for the UK automotive industry.

It has been established with the backing of up to £12 million of Government funds through the Department of Trade and Industry.

Automotive manufacturing in the UK is much more than the highly visible international vehicle makers. It comprises over 3000 businesses of all sizes in the supply chain, distribution networks and all the support services needed to maintain Britain's status as a world leader.

The Academy's vision is to be the national centre of learning for people in the automotive industry. Over 250,000 UK jobs depend on automotive manufacturing, so what we do really matters.

www.automotiveacademy.co.uk

6.4 Employment and employees

Commitment 5: Improve the working environment, health and safety of employees.

6.4.3 Health and safety

Table 6.4.3 Reported Lost-Time Incidents	2002	2003	2004	2005	Change 2005 on 2004
Number of incidents	669	710	491	410 (1)	-81

(1) like for like basis

Lost time incidents continue to decline, down a further 16 per cent on a like for like basis in 2005.

The reduction in the number of injuries has been the result of a concerted campaign by signatories over the last four years.

Future: further progress requires commitment from companies and staff.

Reducing accidents and improving the health of the workforce.

Signatories are addressing the capability of staff before they join, during their employment and after an accident or incident.

Pre employment checks can significantly reduce the accident incident rate, fifteen fold in the case of one signatory.

During employment new media such as video information screens raise awareness of health and safety issues.

The majority of companies have a "no smoking" programme in place and will provide free of charge support to those wanting to give up smoking.

Back to work programmes are in place to speed recovery.

One signatory provides advanced driver training for all staff, to enhance road safety.

6.4.4 Staff turnover

Table 6.4.4 Staff Turnover	2003	2004	2005	Change 2005 on 2004
Per cent staff turnover [a]	6.1	8.7	5.8	-2.9

[a] For reporting signatories

Staff turnover was less than six per cent in 2005, which is lower than many other sectors.

This indicates that employment conditions are strong and that job satisfaction high. Signatories consistently show low staff turnover. This is an important factor in continuity of knowledge and skills, and will help the UK maintain a strong future skills base.

Future: Continuing low staff turnover.

Some examples of good employer practice:

- Staff suggestions schemes winning perhaps a car or a prestige car driving day experience
- Flexible working schemes for employees over 50 years old to work 16 to 29 hours per week
- Part time working
- Sabbatical leave
- Community work, support for a local children's nursery
- Pre-retirement education, information and coaching
- Sports and social facilities
- Comprehensive employee driver safety programmes
- Report and feedback programmes and initiatives communicated in magazines and over the internet

6.5 Supply chain

6.5.1 Logistics

Commitment 6: Improve our understanding of the impact of pre and post production logistics towards the environment.

Components for the automotive sector are manufactured and distributed globally. In recent years in a UK context this sourcing stream has extended beyond the EU15 to the EU25, together with India and China.

At the present time we are unable to quantify the contribution of the extended logistics network to life cycle CO_2 emissions. Though one member does report that logistics represent some five percent of total manufacturing emissions.

During 2006/7 we intend to undertake data collection from signatories on this issue, to review the extent of information and standards being used. We will further investigate the option of case studying one model to determine the impact of supply chain logistics on CO_2.

Future: More data is required to track progress of this indicator and to quantify trends in this important area of development.

6.5.2 Supply stream quality

Commitment 7: Support development of a high quality and strong environmental supply and reverse supply chain networks.

As well as realising the impact of emissions standards the industry supports the development of high quality supply and reverse supply networks, to social, economic and environmental standards.

This is done for "tier one" suppliers. Those are suppliers of components directly ordered by the manufacturers. Components used further down the supply chain will be assessed in terms of quality. We are aware that steel produced in India for example uses twice as much energy as that produced in OECD countries, and much of that energy is coal based. (7)

Reverse supply is important to ensure that recycled waste from production (2005 estimated at 198,000 tonnes) is processed to high standards. Frequently this waste is recycled outside of the United Kingdom and members are now reviewing the sustainability of these reverse supply chain logistics.

Future: To learn more about lower tier quality supply streams and a need for a greater understanding of where and how material is recycled.

Good news from signatories' on the supply chain:

"greenhouse emissions from trucks reduced by 45 per cent"

"fuel consumption from trucks reduced by six per cent"

"doubling 20 foot containers on one chassis saved 1,350 litres of fuel per annum"

"repacking sun-roofs saved 9,500 litres of fuel per annum"

"concentrating our local supply network to reduce miles hauled of finished components"

"a significant project to reduce truck miles"

Use

CO_2, air quality and safety

7.0 Vehicle usage

7.1 Introduction

The "use phase" of the vehicle life cycle has environmental, social and economic impacts. High quality design of the product, combined with suitable use will minimise use phase impact.

In this section we consider the use phase impacts of vehicles in terms of:

- CO_2 emissions
- Air quality emissions
- Safety and noise

Resources are utilised in the manufacturing and distribution of vehicles, but in terms of CO_2 over eight times the CO_2 produced the in manufacturing stage will be generated during the use of the vehicle. In the case of some vehicle types, trucks that cover high mileages for example, the ratio will be in excess of ten.

The vehicle parc

This refers to all vehicles on the road, 32.9 million in the UK in 2005, as opposed to new vehicles registered per annum (2.4 million in 2005).

Vehicles last for an average of over 13 years, but some types, coaches for example will be in excess of 15.

New vehicles emit less CO_2, produce fewer air quality emissions and are quieter than their older counterparts, but new vehicles less than one year old represent just seven per cent of the parc. As a result, constant improvements to technology take time to impact the total vehicle fleet (parc).

Measures to reduce emissions and improve safety that affect the whole parc through an integrated approach can have greater total impacts than new vehicle measures alone.

7.1.1 Comparative data

In order to benchmark progress over improvements to CO_2, air quality, noise and safety in this section we have selected five car segments for analysis, these are:

- Super mini
- Lower Medium
- Upper Medium
- Multi purpose vehicle (MPV)
- Luxury

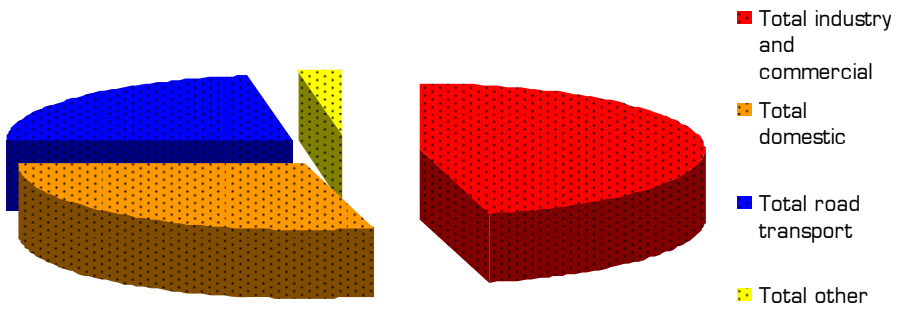
These segments represent over 91 per cent of cars sold in the UK in 2005.

The five best sellers for 2005 are identified in the box below, data for this section is taken from the vehicle certification agency (VCA) website.

Segment	Best seller 2005 (SMMT)
Supermini	Vauxhall Corsa
Lower Medium	Ford Focus
Upper Medium	Ford Mondeo
MPV	Vauxhall Zafira
Dual purpose	Land Rover Freelander

7.2 CO_2

7.2.1 Sources of CO_2



For full details see appendix table 7.2.1 (source AEA technology)

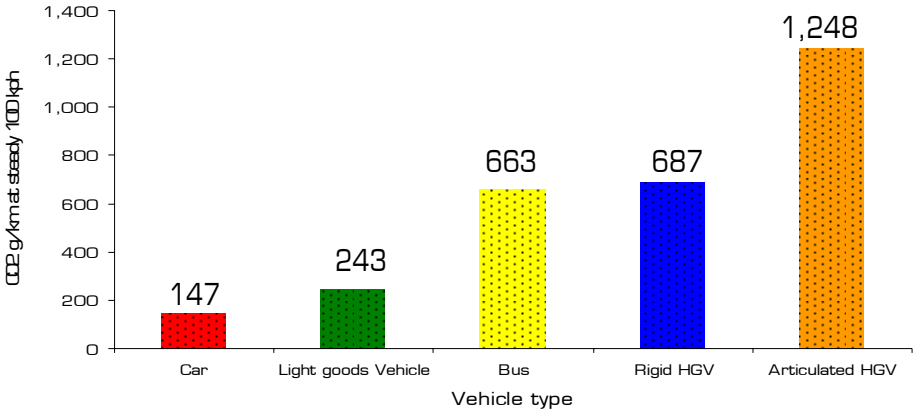
For the UK in 2003, sources of emissions of CO_2 by sector (per cent) were:

46.1	Industry and agriculture
28.8	Domestic
22.6	Road transport
2.5	Other

Future: Total CO_2 emissions from road transport to increase toward 2012 by between two and three per cent per annum, despite further developments in new vehicle technology. Subsequently emissions will start to fall as new technology is widely absorbed into the vehicle parc. (Source: Department for Transport)

An effective integrated approach to CO_2 emissions from road transport will further impact this timescale.

7.2.2 Tailpipe CO_2 emissions and vehicle type



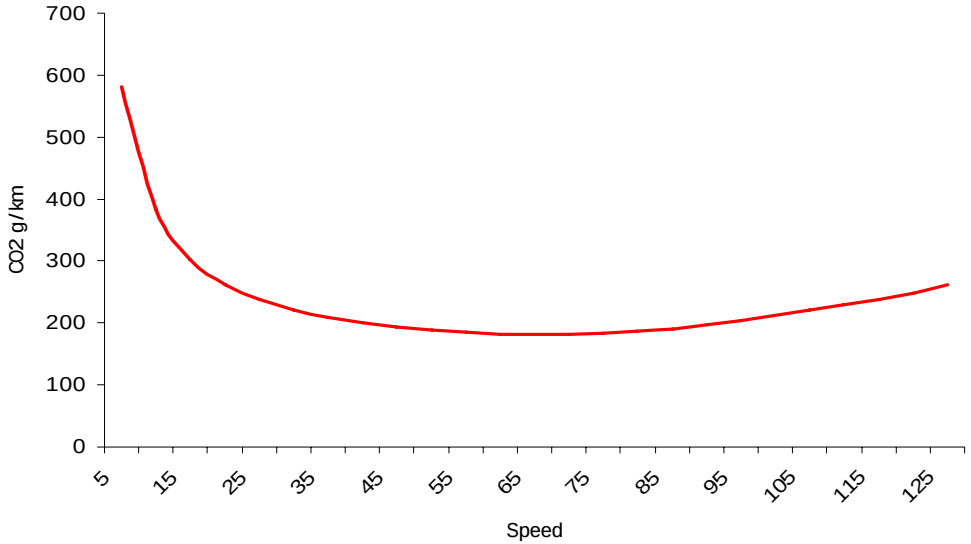
Source: Highways Agency Design Manual for Roads and Bridges 2003

Different types of road vehicle have different CO_2 emission levels. The UK Highways Agency (6) estimates the average CO_2 by vehicle type at a steady 100 kph.

These estimates have been made to assess the impact of traffic management on all aspects of air quality.

When quantifying the impact of larger vehicles, weight and load factors will play a vital part in ensuring the environmental impact of heavy duty vehicles is reduced. Large vehicles often carry three of four times as much cargo as their smaller counterpart, emphasising the importance of load planning and using the correct vehicle(s) for the task in hand.

7.2.3 Tailpipe CO_2 emissions and vehicle flow speed



Source: Highways Agency Design Manual for Roads and Bridges 2003

Traffic flow speed impacts CO_2 emissions, with significant increases at lower speed and smaller increases at higher speeds.

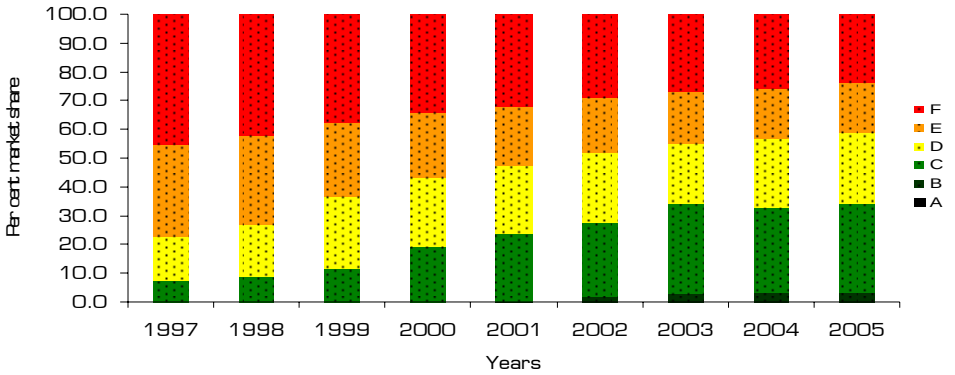
Highways Agency information for a mixed traffic flow, including ten per cent heavy duty vehicles (HDV) indicates that at 5 kmh CO_2 emissions are three times higher than at 45 kmh.

This chart illustrates the benefits of a smooth consistent driving style in any class of vehicle and the potential to reduce CO_2 by smoothing traffic flows.

The SMMT supports the work of the Department for Transport in the Safe and Fuel Efficient Drivers (SAFED) Scheme which aims to encourage safer, cleaner and cheaper driving in the commercial vehicle sector.

For further information see: www.safed.org.uk

7.2.4 New car Tailpipe CO_2 by VED band



Source SMMT. new car CO_2 emissions are sales weighted

This graph illustrates the sales of new cars in the UK form 1997 to 2005 by vehicle excise duty (VED) band "A" to "F". See www.vcacarfueldata.org.uk for full details.

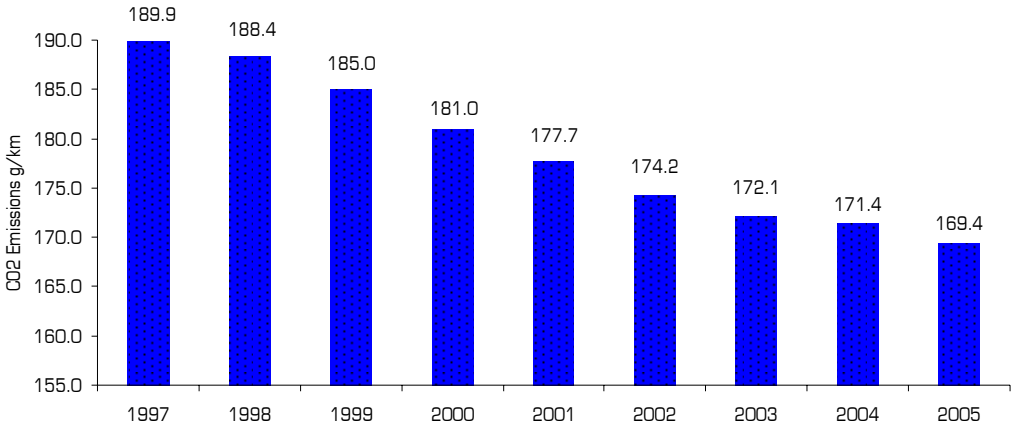
A new higher "G" band was introduced in 2006, this will be included in next years data.

- a reduction in the number of new cars sold in the high band (F), down from 45.1 per cent in 1997 to 23.8 per cent in 2005.
- a significant increase in sales in the "B" band (100 to 120 g/km) highlighting the increased availability of low carbon alternatives including hybrids.
- a very small number of new cars sold in the "A" band with tailpipe emissions of less than 100 g/km, just six cars registered in 2005.

As a result of this trend fuel efficiency of cars sold in the UK has increased. Improvements in efficiency are mainly the result of the increased penetration of diesel cars into the UK market, (36.8 per cent in 2005), but also improved gearboxes, engine management systems and electric power steering among other new technologies.

7.2.5 New car tailpipe CO_2 grams per kilometre

Commitment 8: Improve fuel efficiency of new product design



Source: SMMT

New car CO_2 emissions fell by an average of 2 g/km in 2005, or 1.2 per cent.

The new car average CO_2 for 2005 was 169.4 g/km. This represents a reduction of 10.7 per cent since 1997.

In five out of the nine market segments (Supermini, Lower Medium, Sports etc.) it is possible to purchase vehicles with CO_2 of less than 142 g/km. These segments represented 84.6 per cent of new cars sold in 2005.

Increasing fuel prices during 2005/2006 may impact consumer choice of new cars. Diesel sales are expected to increase.

Table 7.2.5 Best selling models - CO_2	2000			2005	% down
Vauxhall Corsa - petrol	137	Vauxhall Corsa - diesel		115	-16.1
Ford Focus - diesel	142	Ford Focus - diesel		125	-12.0
Ford Mondeo - diesel	166	Ford Mondeo - diesel		154	-7.2
Vauxhall Zafira - diesel	177	Vauxhall Zafira - diesel		165	-6.8
Land Rover Freelander - diesel	208	Land Rover Freelander - diesel	*	205	-1.4

Source: VCA www.vcacarfueldata.org.uk

* New model pending launch 194 g/km CO_2

This table illustrates the lowest CO_2 options for the best selling models in five best selling market segments in 2000 and 2005.

This demonstrates developments in technology for specific models, though lower carbon choices are available in these segments.

In the case of one models, the Vauxhall Corsa the power train type for the lowest model has changed from petrol in 2000 to diesel in 2005.

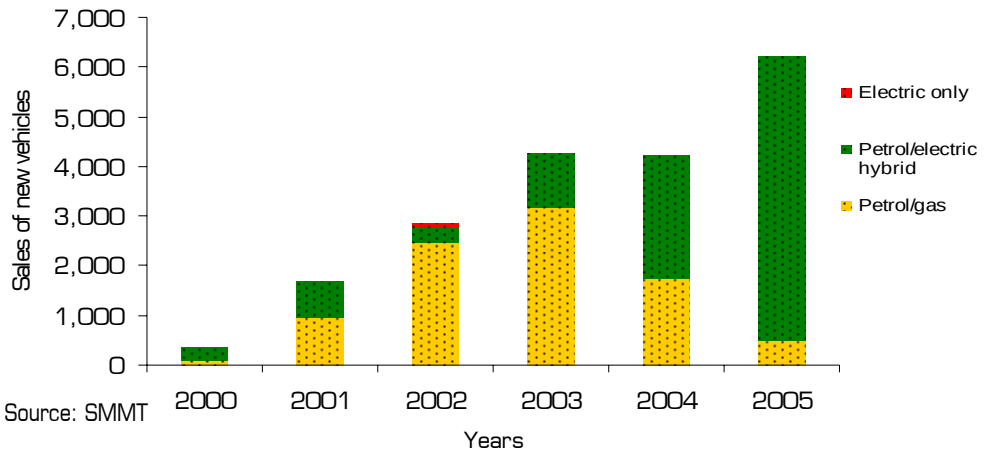
Analysis of VCA data from 2000 to 2006 for the lowest emitting best selling models demonstrates reductions in CO_2 between 1 per cent and 19 per cent.

This range of actual reductions compares to the reduction in the sales weighted corporate average of 6.4 per cent for the same time period.

Future: New car CO_2 emissions will continue to fall. This will depend on product replacement cycles and technological developments and most importantly the incentives for buyers to choose lower carbon cars on the market.

7.3 Alternative fuels

7.3.1 Sales of alternative fueled vehicles



Source: SMMT

Sales of new alternatively fueled vehicles increased by 48.3 per cent in 2005. However, sales of new liquid petroleum gas vehicles (LPG) fell once again. Now no new LPG cars are available in the UK.

Alternatively fueled vehicles represent 0.26 per cent of new car sales or just one in every 389 cars sold.

2005 saw a significant increase in the sales of petrol electric hybrid models, with this technology available in more market segments.

Future: sales of AFV's will increase, however new AFVs are likely to be hybrid or all electric.

7.3.2 Biofuels and flexfuel vehicles

The development of biofuels in road transport in the UK is increasing, albeit from a very low base. In 2005 just 0.3 per cent of fuels sold in the UK were biofuels. (Source: DfT)

Biofuels offer total carbon savings because fuels are made from waste or plant material. CO_2 can be absorbed during growth of crops thereby making the fuel carbon beneficial. Fertilisation of crops, transport and energy processing all need to be considered to accurately calculate the total carbon benefits of alternative fuels.

Biofuels are an important element of the integrated approach to total CO_2 reduction from road transport.

A European Commission supported analysis of "well to wheel" fuels demonstrated the potential CO_2 savings of biofuels, for more details see:

www.ies.jrc.cec.eu.int/wtw.html

The UK Renewable Transport Fuel Obligation (RTFO) (8) was announced by the Secretary for State for Transport at the UK Environmentally Friendly Vehicle Conference in Birmingham in November 2005.

The RTFO facilitates a content by volume of five per cent of fuel sold being biofuels by 2010.

The programme includes a system to ensure the environmental sustainability of fuels as part of the obligation.

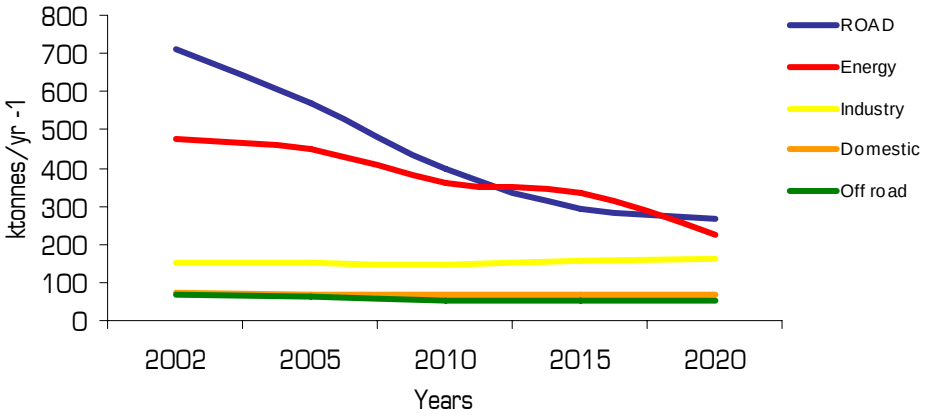
Flex fuel vehicles are capable of running on higher (up to 85 per cent) blends of ethanol. These vehicles are now available for sale in the UK.

Future: in line with the UK RTFO there will be an increase in the percentage of biofuels in the fuel stream and cars capable of running on ten percent biofuel (up from the present five per cent). Flexfuel and vehicles capable of running on higher percentages of biofuels will supplement the market for lower carbon alternatives.

7.4 Air quality

Commitment 9: Research, develop and bring cleaner technologies to the market to improve tailpipe emission standards, where practicable to introduce vehicles with higher emission standards in advance of legislation.

7.4.1 NOx Emissions



Source Netcen (9)

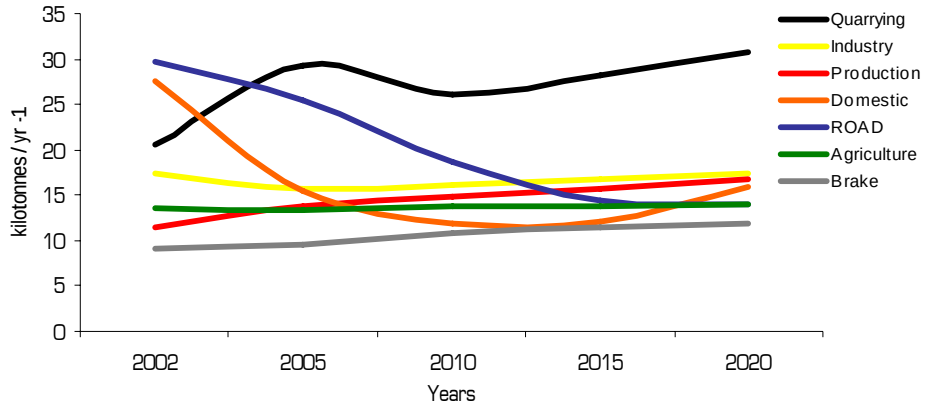
Reducing NOx emissions is one of the major challenges faced by the industry, in particular reducing those emissions for diesel engine vehicles.

Diesel technology is a fundamental tool in addressing climate change, however as a fuel source it generates relatively higher volumes of NOx and PM than petrol equivalent, but far lower CO_2. These issues can be addressed with exhaust treatment solutions.

Total NOx emissions are forecast to reduce, but technological solutions to drastic NOx reduction can be complex and costly.

Future: Euro standards will continue to be tightened, investment in technology may result in higher engine costs impacting lower carbon emitting power trains.

7.4.2 PM10 Emissions



Source Netcen (9)

Particulates emitted by road transport will continue to fall. In line with current and future Euro standards on the vehicle parc. This reduction takes place against forecast increases in all other sectors.

Standards for Euro 5 (cars) and Euro VI (heavy vehicles) have yet to be finalised. Continual investment in new technology is being made by industry to achieve tightened emission standards.

Long term incentives and fiscal policy can accelerate the introduction of new standards and give significant benefits to air quality.

Future: Higher particulate standards on new vehicles feed through the vehicle parc, PM generated by other sectors increases in relative terms.

7.4.3 Vehicle air quality emissions and noise

Table 7.2.3 Best selling models - lowest CO_2

	CO_2	Noise	PM	NOx	HC and NOx	CO
2000 Values						
Vauxhall Corsa - petrol	137	71	0	ND	0.056	0.127
Ford Focus - diesel	142	71	0.044	0.489	0.727	0.526
Ford Mondeo - diesel	166	74	0.049	ND	0.528	0.244
Vauxhall Zafira - diesel	177	71	0.044	ND	0.574	0.591
Land Rover Freelander - diesel	208	74.1	0.088	ND	0.846	0.573
2006 values						
Vauxhall Corsa	115	69	0.012	ND	0.215	0.202
Ford Focus - diesel	125	71	0.019	0.205	0.221	0.178
Ford Mondeo - diesel	154	71	0.02	0.218	0.229	0.033
Vauxhall Zafira - diesel	165	74	0	0.189	0.213	0.235
Land Rover Freelander - diesel	205	72	0.031	ND	0.531	0.271
Percentage change						
Vauxhall Corsa - diesel	-16.06	Quieter			283.93	59.06
Ford Focus	-11.97	Same	-56.82	-58.08	-69.60	-66.16
Ford Mondeo	-7.23	Quieter	-59.18		-56.63	-86.48
Vauxhall Zafira	-6.78	Noisier	-100.00		-62.89	-60.24
Land Rover Freelander - diesel *	-1.44	Quieter	-64.77		-37.23	-52.71

Source VCA data g/km and dB(A) moving
ND = No data
* new model pending launch

www.vcacarfueldata.org.uk

VCA data illustrates the improvement in air quality on a range of best selling models (in terms of CO_2 emissions) between 2000 and 2006, (all data is in g/km).

Reductions in PM are between 60 and 100 per cent. Reductions in hydrocarbons and NOx up to 60 per cent.

However the table illustrates that where a diesel model has replaced petrol in our example, NOx levels for the diesel version are higher than for the petrol version (although these vehicles are better than legal requirements for the fuel type).

This illustrates the air quality challenge that some lower CO_2 fuel options can face.

Low Emissions Zones (LEZ)

During 2005 we have seen the proposal for the first low emission zone (LEZ). Consistently applied effectively and efficiently implemented LEZs can improve local air quality, but other strategies offer a better cost benefit. Defra Air Quality Strategy Review (2006) (11)

Future: Air quality standards will continue to improve, road transport's contribution to overall poor air quality will decline.

7.5 Safety

7.5.1 Product safety

Commitment 10: Improve the safety of the product.

Table 7.2.3 Best selling models - ncap safety	Reference year	NCAP star		Reference year	NCAP star
Vauxhall Corsa	1996	★★★	Vauxhall Corsa	2002	★★★★
Ford Focus	1999	★★★★	Ford Focus	2004	★★★★★
Ford Mondeo	1997	★★	Ford Mondeo	2002	★★★★
Vauxhall Zafira	2001	★★★	Vauxhall Zafira	2005	★★★★★
LandRover Freelander		no data	LandRover Freelander *	2003	★★★

www.euroncap.com

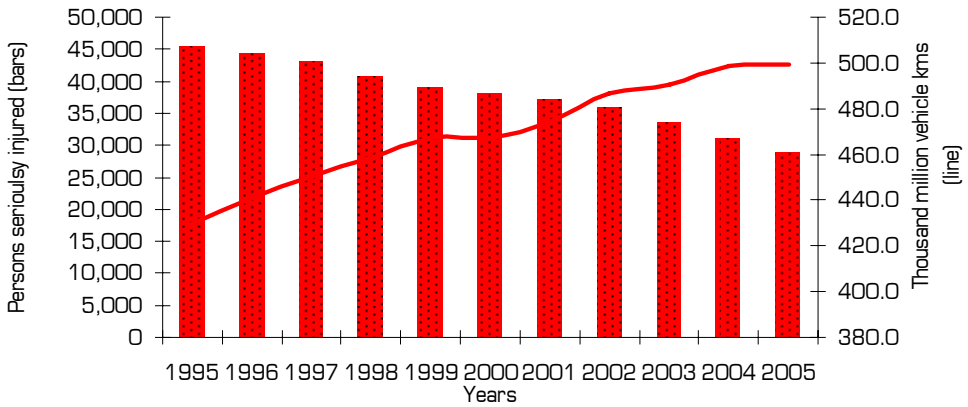
* new model pending launch

The data of EuroNCAP highlights improvements in vehicle safety over the last six years.

This table compares the NCAP rating of four of the five top sellers for the current model in relation to the previous model on sale in 2000.

Passive safety equipment such as side impact bars, air bags and increased rigidity have all contributed to improvements in vehicle safety. This has however increased vehicle weight which has to be considered in the context of CO_2 reductions.

7.5.2 Serious injuries and miles travelled



Source: Department for Transport, national statistics

The graph opposite illustrates the reduction driven in serious injuries against the increase in traffic.

A 22 per cent rise in vehicle kilometres has been accompanied by a 40 per cent reduction in serious injuries in the UK since 1995.

This is partly as a result of improvements in passive vehicle safety and importantly investment in new active safety systems like ABS and ESP. These prevent accidents happening rather than mitigating the effect on occupants and pedestrians, however the provision of this equipment is not reflected in NCAP data.

Public information and education, improved infrastructure design and management through the Think! campaign is an excellent example of the effect of an integrated approach to road safety management.

Future: Improvements to safety in cars, benefits to other road users through the pedestrian protection programme in car design. The integrated approach to higher driving standards can also support road safety initiatives.

Disposal

End of life vehicles (ELV)

8.0 Vehicle disposal

8.1 End of life vehicles

8.1.1 The End of Life Vehicle (ELV) directive

Implementation of Directive 2000/53/EC in 2005 has impacted the disposal phase of a vehicle takes place, by:

1. Setting targets for re-use, recycling and recovery of materials from vehicles.
2. Setting environmental standards for vehicle dismantlers and scrap metal recyclers.
3. Requiring manufacturers to consider ELV in the design and manufacture of vehicles, and to exclude the use of certain materials in vehicles, lead for example.
4. Introducing certificates of destruction (CoD) to capture disposal through authorised treatment facilities.

To address this all manufacturers of cars and light vans have to demonstrate that they have systems in place to achieve recycling rates of 85 per cent by weight. Plans are being developed by the European Commission to increase this to 95 per cent by 2015.

8.1.3 Process and methods

To improve environmental standards, vehicles are now required be de-polluted, this is achieved by removing the battery, draining and collecting all fluids, removing the tyres draining and collecting the air conditioning gas, removing the oil filter and any known hazardous material such as lead wheel weights.

Cars with air bags and pre-tensioners are increasingly arriving as ELVs and these must be deployed as part of the de-pollution process.

The table opposite outlines the de-pollution process.

8.1.2 Establishment of take back networks

Commitment 11: Provide facilities for consumers to return vehicles for the disposal at end of life.

From January 2006 all Manufacturers of cars and light vans have put in place a network of authorised treatment facilities (ATFs) to receive, treat vehicles for recycling and recovery. The ATFs are spread across the UK to provide convenience for last owners who will be given a Certificate of Destruction (COD) as proof of the vehicles de-registration relieving them of any obligations for continuous taxation of the car. The networks which have been set up are managed by either of the two following organisations:

- Autogreen www.autogreen.org
- Cartakeback www.cartakeback.com

- Remove battery
- Remove fuel filler cap and oil filler cap
- Set heater to maximum
- Remove wheels and separate lead balance weights
- Remove any parts identified as containing mercury
- Put vehicle onto support frame
- Drain engine oil and remove oil filter
- Drain transmission oil, including rear differential if applicable
- De-gas air conditioning unit (if fitted)
- Drain coolant
- Drain brake fluid
- Remove catalyst (if fitted)
- Drain washer bottle
- Drain brake / clutch reservoir
- Drain power steering reservoir (if fitted)
- Drain fuel tank
- Drain shock absorbers or remove suspension fluid
- Replace drain plugs / fit plastic stoppers
- Remove vehicle from support frame
- Remove air bags (if fitted, and can not be deployed in-situ)
- Deploy airbags in-situ (if fitted and able to conduct this operation)

8.0 Vehicle disposal

8.1 End of life vehicles (ELV)

Commitment 12: Manufacturers will design and make cars so that at least 95 per cent of the weight of materials used can be recovered at the end of life.

8.1.4 Vehicle design

The strategy of planning for a vehicle's end of life begins with its design. This is achieved in the following ways:

1. Guidelines and information; support for the design of recyclable vehicles and vehicle components. Standards are checked against environment management system such as ISO 14001 to ensure that it is in line with the latest requirements.
2. Avoiding hazardous substances; the removal of lead. cadmium and chrome for materials and components.
3. Recycled materials; the use of quality controlled recycled products.
4. Labeling of components: In 2003, the European Commission decided that plastic parts should be labeled according to ISO standards (Commission decision 2003/138/EC from 27 February 2003).

8.1.5 Weights and recycling/recovery targets

In 2005 Department for Trade and Industry (DTI) contracted the Consortium for Automotive Recycling (CARE) to conduct a trial to determine the metallic content of cars being scrapped.

The result was that 75 per cent of a car is metallic and a further 1 per cent is fuel all of which is recycled. Therefore producers and ATFs need to re-use, recycle or recover an additional 9 per cent vehicle weight to meet the 85 per cent target set by the ELV regulations.

Some ATFs will remove components for resale or for specific material stream recycling. Ultimately, however cars will end up at a shredder site where the car will be reduced to small pieces and then further separated into material streams for ongoing recycling or energy recovery.

Future: To monitor and publish information on vehicle recycling rates. To continue design vehicles for recycling, to research recyclability of lightweight and composite vehicles and components together with increased total recycling level.

Stakeholder engagement

Integrated approach

9.0 Stakeholder engagement and consumer information

Commitment 13: Engage proactively with external stakeholders

The automotive sector engages with stakeholders on an international, national, regional and local level.

In November 2005 the SMMT and members supported the Environmentally Friendly Vehicle Conference (EFVC) in Birmingham, established to support the Uk presidency of the G8. The exhibition provided an international showcase for clean, low carbon vehicles and technologies.

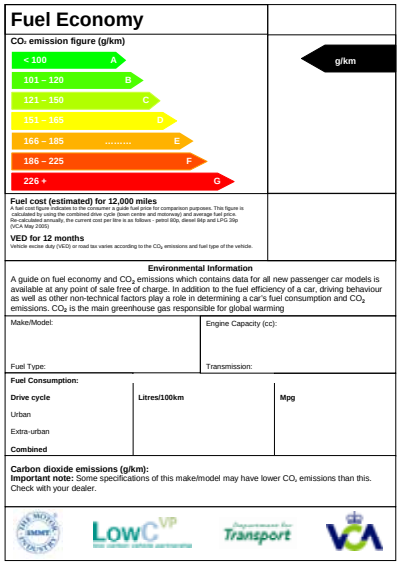
Global warming and climate change remain the main focus for interaction with the industry. CO_2 emissions from the sector are the biggest challenge the industry faces.

Vehicle manufacturers are adopting a technology neutral approach to this significant challenge and share with stakeholders their strategies for lower carbon products. The Low Carbon Vehicle Partnership (LowCVP) is an important stakeholder forum to catalyse this.

Manufacturers remain very aware of their significant impact as major employers, working with regional local and company stakeholders supporting numerous charities, trusts and good causes, acknowledging the contribution their own employees make to this.

Future: A significant challenge as the voluntary agreement on CO_2 emissions from new cars comes to an end in 2008/2009 is to develop strategies to take forward a reduction in CO_2 from the sector.

Commitment 14: Provide information to customers to enhance their awareness and understanding of product environmental and safety features.



Fuel Economy

CO_2 emission figure (g/km)

g/km

< 100	A
101 – 120	B
121 – 150	C
151 – 165	D
166 – 185	E
186 – 225	F
226 +	G

Fuel cost (estimated) for 12,000 miles

A fuel cost figure indicates to the consumer a guide fuel price for comparison purposes. This figure is calculated by using the combined drive cycle (town centre and motorway) and average fuel price. For comparability purposes only, the current cost per litre is as follows - petrol 80p, diesel 84p and LPG 39p (VCA May 2005).

VED for 12 months

Vehicle excise duty (VED) or road tax varies according to the CO_2 emissions and fuel type of the vehicle.

Environmental Information

A guide on fuel economy and CO_2 emissions which contains data for all new passenger car models is available at any point of sale free of charge. In addition to the fuel efficiency of a car, driving behaviour as well as other non-technical factors play a role in determining a car's fuel consumption and CO_2 emissions. CO_2 is the main greenhouse gas responsible for global warming

Make/Model: | Engine Capacity (cc):

Fuel Type: | Transmission:

Fuel Consumption:

Drive cycle	Litres/100km	Mpg
Urban		
Extra-urban		
Combined		

Carbon dioxide emissions (g/km):

Important note: Some specifications of this make/model may have lower CO_2 emissions than this. Check with your dealer.

2005 saw the successful translation of the mandatory CO_2 vehicle labelling scheme into a voluntary adopted colour-coded label closely akin to the "white goods" consumer label. Brokered through the forum of the Low Carbon Vehicle Partnership (LowCVP) the development of the new labelling system included government, industry and non governmental organisations (NGO).

The label gives the purchaser information on the annual fuel cost and excise duty road tax as well as fuel consumption. A Low CVP survey in February 2006, just six months after its introduction, indicated awareness of the label at 40 per cent.

However, there remains an "attitude action" gap of consumer intention to purchase cars and their ultimate purchasing choice, Ecolane (2005) (10). A significant contribution to CO_2 reduction could be made by consumers choosing the lowest CO_2 emission car irrespective of the type of car they purchase.

Future: Ongoing work to raise awareness of the importance of product selection and the availability of lower carbon options in all vehicle types.

10.0 Integrated approach

Commitment 15: Support strategies to reduce the environmental impact of road transport through fuel, driver and infrastructure development; the integrated approach.

An integrated approach to improving important issues in road transport is not new. This report refers to the success of an integrated approach to road safety, supported by the Think! campaign by the Department for Transport in the UK.

From a climate change perspective developing a strategy to reduce CO_2 from road transport through an integrated approach recognises that vehicle technology alone cannot be entirely responsible for CO_2 reduction.

This need for an integrated approach to CO_2 reduction was acknowledged under the Competitive Automotive Regulatory System for the 21st Century, CARS21 programme during 2005.

CARS21 and the integrated approach. (recommendation number 7)

The CARS21 High Level Group has agreed to recommend an "integrated approach" to the reduction of CO_2 emissions.

The adoption of a comprehensive strategy to tackle CO_2 emissions from motor vehicles involving all relevant stakeholders (i.e. vehicle manufacturers, oil/fuel suppliers, customers, drivers, public authorities, etc.).

The underlying assumption in support of such an approach is that CO_2 reductions can be achieved more efficiently by exploiting the synergies of complementary measures and optimising their respective contributions rather than by focusing on improvements in car technology alone.

The integrated approach in the UK.

During 2005 the SMMT and members worked to understand how the integrated approach to CO_2 reduction could be applied in a UK context.

This was done by developing a "mind map" the total CO_2 generated by road transport The mind map shows road transport CO_2 as a function of:

- Efficiency
- Fuel type
- Load factor
- Distance driven

Modal choice (road, cycle, walk rail or air etc.) and even road vehicle choice, (car and bus etc.) influence total transport CO_2 and consideration needs to be given to this to supplement the impact of the integrated approach.

The following pages of the report demonstrate the elements of the integrated approach and the tools, policies and choices that factor in each of those elements, for example, vehicle emissions labelling is a factor in influencing vehicle choice.

The SMMT believes the role of the individual and organisations is fundamentally important to ensure the success of the integrated approach.

SMMT hopes its contribution to this important issue is a positive one, that work by manufacturers on vehicle technology can be supplemented by necessary synergies to reduce total road transport CO_2.

Future: To illustrate the benefits of the integrated approach to CO_2 reduction. To identify and support combined strategies to gain the best road transport CO_2 reductions, to monitor and evaluate contributions where possible.

10.2 Total CO_2

A CONVERSION EFFICIENCY	LITRE PER KM	Illustration
	1.0 Vehicle selection	Choose the type of vehicle you need.
X	2.0 Vehicle efficiency	Within the type choose low carbon.
	3.0 Driver efficiency	Drive carefully, adopt a new eco-driving style.
	4.0 Infrastructure efficiency	Select quieter times to drive when roads are not congested and flowing freely, plan your journey.
B TYPE OF FUEL	**CO_2 PER LITRE**	
	5.1 extraction or growing	Use low carbon alternative fuels.
X	5.2 refining or harvesting	Efficient harvesting/refining to maximise yields of bio crops and minimise energy.
	5.3 transport to dispensing	Reduce the carbon impact of transporting and retailing fuels.
C LOAD FACTOR	**PER CENT OCCUPIED/LOADED**	
X	6.0 Load factor	Maximise load (tonnes, M3) or passengers.
D TOTAL VEHICLE DISTANCE	**KMS**	
	7.0 Passenger or Goods km	Minimise mileage

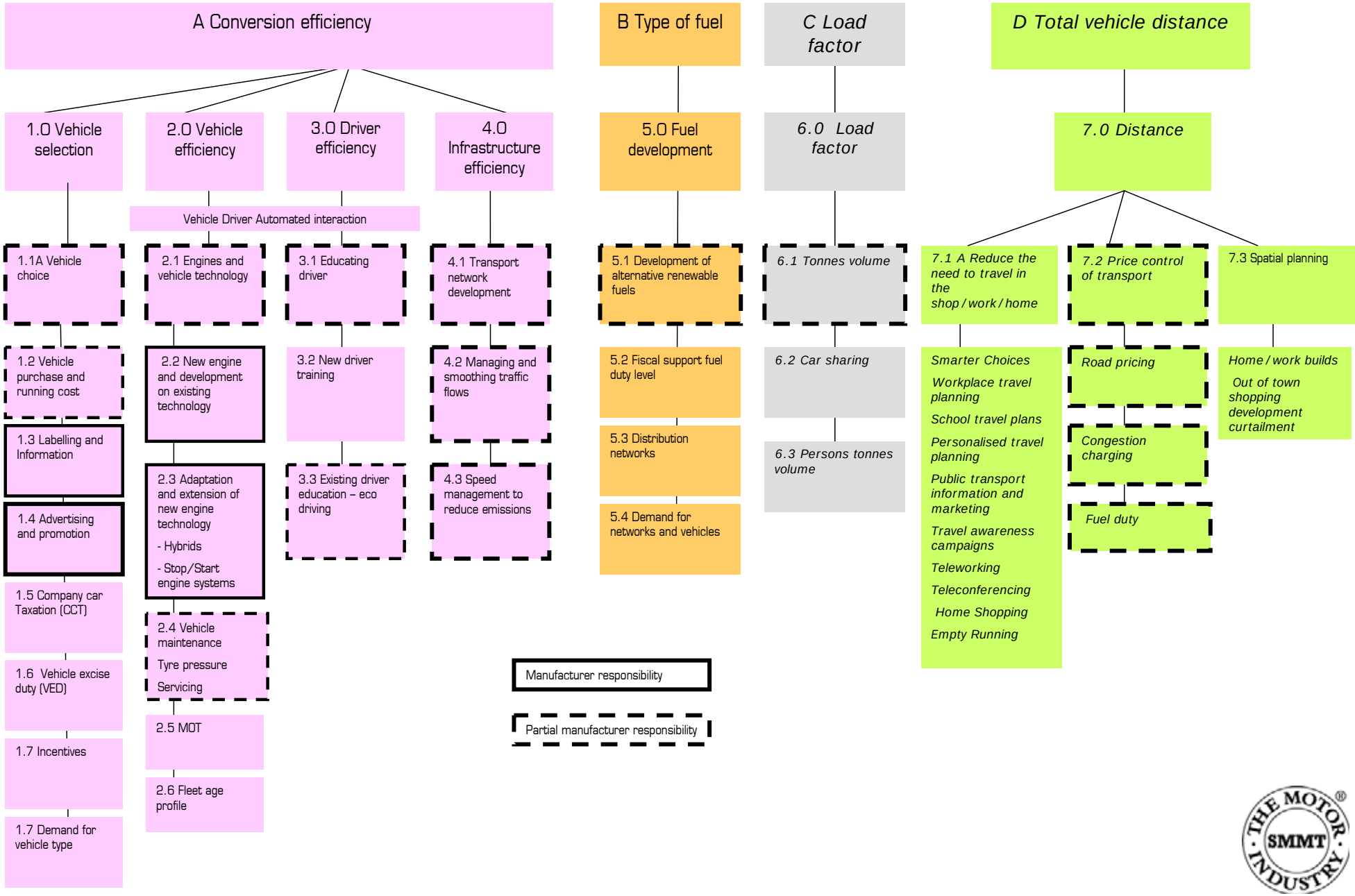
Modal choice

Selecting the correct mode of transport (road, rail, cycle walk or fly) for a given journey can reduce CO_2 in its own right

A x B x C x D = TOTAL CO_2

10.3 CO_2 reduction strategy

The Integrated Approach to reducing CO_2 from road transport



Appendix tables

Appendix Table 5.1 Sector Fact Sheet	1999	2000	2001	2002	2003	2004	2005
Automotive manufacturing sector turnover (WI) (£ billion)	44.2	42.5	42.2	44.6	46.0	49.0	48.8
Share of total transport manufacturing turnover (UK turnover) (%)	64.0	65.0	64.0	68.0	68.0	68.0	68.0
Total net capitalilnvestment (WI) (£ billion)	2.2	2.9	2.3	1.3	6.3	6.4	1.9
Automotive sector value added (WI) (£ billion)	9.0	7.8	9.0	8.3	8.5	9.6	9.4
Total employees directly dependent on the automotive sector (WI)	902,000	886,000	873,000	866,000	863,000	842,000	820,000
Value of exports (WI) (£ billion)	19.3	19.8	18.0	20.9	21.9	22.5	23.7
Percentage of total UK export (%)	11.5	10.5	9.5	11.2	11.6	11.8	11.2
Sector value added share of UK GVA (%)	3.9	3.4	3.8	3.7	3.6	3.6	3.5
UK sector share of global passenger car production (%)	4.5	4.0	3.7	3.9	3.9	3.7	3.5
Number of UK volume passenger car manufacturers (WI)	-	9	9	9	9	9	8
Number of UK commercial vehicle (CV) manufacturers (WI)	-	10	10	9	9	9	9
Number of cars and CVs produced (million)	1.98	1.81	1.69	1.82	1.85	1.86	1.80
New car registrations (AC) (million)	2.19	2.22	2.45	2.56	2.58	2.57	2.44
Cars and light CVs on the road (million)	29.50	29.90	30.50	31.30	31.9	32.4	32.90

Appendix Table 6.1 Production and distribution Inputs	1999	2000	2001	2002	2003	2004	2005
Total combined energy use (GWh) (AS)	6,110	7,013	6,857	6,540	6,126	5,337	5,104
Energy use per employee (kWh) (AS)	64,175	70,108	71,166	74,685	69,912	69,923	70,559
Energy use per £1million turnover (kWh) (AS)	303,828	309,717	281,036	186,943	156,419	154,062	129,602
Energy use per vehicle produced (MWh/unit) (VMS)	*3.1*	*3.9*	*4.3*	*4*	*2.8*	*2.5*	*2.3*
Total combined water use ('000m^3) (AS)	-	9,620	10,105	9,108	8,404	7,037	7,127
Water use per employee (m^3) (AS)	-	96.2	104.9	101.8	95.9	92.2	98.5
Water use per £1million turnover (m^3) (AS)	-	457	414	255	215	203	181
Water use per vehicle produced (m^3) (VMS)	-	*5.3*	*6.2*	*5.6*	*3.4*	*3.4*	*3.2*

Report format

Data in the report is quoted in a number of ways:

Whole industry data	(WI)
All car sales in the United Kingdom	(AC)
SMMT members data	(SMMT)

Report format

Data in the report is quoted in a number of ways:

All signatories	(AS)
Vehicle manufacturing signatories	(VMS)

Appendix Table 6.2 Production and distribution - material outputs	1999	2000	2001	2002	2003	2004	2005
Total combined CO_2 equivalent (tonnes) (AS)	1,821,586	2,182,926	2,149,771	1,954,295	1,679,832	1,447,900	1,417,129
CO_2 equivalent per employee (tonnes) (AS)	19.3	21.8	22.3	23.9	19.2	19.0	19.6
CO_2 equivalent (tonnes) per £1million turnover (AS)	90.6	95.3	88.1	59.9	42.9	41.8	36.0
CO_2 equivalent per vehicle produced (tonnes) (VMS)	*1.1*	*1.1*	*1.3*	*1.2*	*0.7*	*0.7*	*0.6*
Total combined emissions of VOC (kg) (AS)	4,018,951	7,136,682	6,926,340	6,240,100	7,336,780	5,479,870 (1)	6,478,430
Emissions of VOC per employee (kg) (AS)	42.2	71.3	71.9	69.7	83.7	71.8	89.6
Emissions of VOC per £1million turnover (kg) (AS)	199.8	339.0	284.0	174.6	187.4	158.2	164.5
Emissions of VOC per vehicle produced (kg) (VMS)	*2.9*	*4.4*	*4.6*	*4.2*	*4.1*	*3.5*	*3.5*
Total combined waste to landfill (tonnes) (AS)	54,954	80,399	121,207	70,897	56,743	52,842	44,910
Waste to landfill per employee (tonnes)(AS)	0.6	0.8	1.3	0.8	0.6	0.7	0.6
Waste to landfill per £1million turnover (tonnes) (AS)	2.7	3.7	4.9	2.0	1.4	1.5	1.1
Waste to landfill per vehicle produced (kg) (VMS)	-	*40.3*	*66.4*	*40.5*	*17.9*	*19.8*	*14.5*
Total combined site waste for recycling (tonnes) (AS)						145,797	197,752
Site waste for recycling per employee (kg) (AS)						1,910.2	2,733.8
Site waste for recycling per £1million turnover (kg) (AS)						4,208.7	5,021.4
Site waste for recycling per vehicle produced (kg) (VMS)						*78.2*	*99.7*
Total combined site waste for recovery (tonnes) (AS)						3,373	2,506
Site waste for recovery per employee (tonnes) (AS)						0.0	0.0
Site waste (tonnes) for recovery per £1million turnover (tonnes) (AS)						0.1	0.1
SIte waste (kg) for recovery per vehicle produced (VMS)						*2.2*	*1.5*

(1) Large vehicle manufacturer excluded from 2004 data

Appendix Table 6.31 Economic Indicators	1999	2000	2001	2002	2003	2004	2005
UK automotive manufacturing sector turnover (£ billion) (WI)	44.2	42.5	42.6	44.6	46.0	49.0	48.8
Signatories combined turnover (£ billion) (AS)	20.1	21.0	24.4	35.7	39.2	34.6	39.4
Total UK number of new cars produced (AC)	1,786,623	1,641,317	1,492,146	1,629,744	1,657,558	1,646,881	1,596,356
Total UK number of new CVs produced	185,905	172,442	192,872	191,267	188,871	209,293	206,753
Total UK number of new vehicles produced	1,972,528	1,813,759	1,685,018	1,821,011	1,846,429	1,856,174	1,803,148
Total number of new vehicles produced by signatories		1,572,642	1,470,659	1,441,794	1,731,894	1,614,981	1,769,810
Total number of new car registrations (AC)	2,197,615	2,221,647	2,458,769	2,563,631	2,579,050	2,567,269	2,439,717
Total number of new CV registrations	288,100	298,043	313,411	322,258	363,687	389,923	385,969
Total number of new vehicle registrations	2,485,715	2,519,690	2,772,180	2,885,889	2,942,737	2,957,192	2,825,686

Appendix Table 6.4 Employment Indicators	1999	2000	2001	2002	2003	2004	2005
Number of jobs dependent on the sector	863,000	847,000	835,000	838,000	816,000	806,000	820,000
· Automotive manufacturing	260,000	250,000	237,000	232,000	225,000	218,000	185,000
· Automotive supply and use	608,000	597,000	598,000	606,000	591,000	588,000	635,000
Signatories total combined employees (AS)	95,214	100,036	96,357	89,455	87,625	76,327	72,337

Appendix table 7.2.1 Sources of CO_2 by sector

	Kt CO_2	Sub total	Per cent	Sub total
Industrial and commercial electricity	109,166		19.22	
Industrial and commercial gas	62,559		11.01	
Industry commercial oil	37,494		6.60	
Industry process gases	16,030		2.82	
Industry commercial solid fuel	14,658		2.58	
Industry non fuel	8,431		1.48	
Industrial gas	6,245		1.10	
Industry off road machinery	2,613		0.46	
Industry commercial waste and biomass	2,291		0.40	
Agriculture and deforestation	1,058		0.19	
Railways	963		0.17	
Agricultural oil	566		0.10	
Agricultural solid	12		0.00	
Total industry and commercial		262,086		46.13
Domestic gas	84,181		14.82	
Domestic electricity	65,301		11.49	
Domestic oil	9,676		1.70	
Domestic solid fuel	4,327		0.76	
Domestic home and garden	252		0.04	
Total domestic		163,737		28.82
Road transport petrol	67,670		11.91	
Road transport diesel	59,253		10.43	
Road transport other	1,683		0.30	
Total road transport		128,606		22.64
Land use change	13,676		2.41	
Total other		13,676		2.41
TOTAL		568,105		100.00

References

(1) www.sustainable-development.gov.uk/publications/uk-strategy/index.htm

(2) Sustainable resource use in the motor industry: a mass balance approach Elghali, McColl-Grubb, Schiavi and Griffiths TRL 2004

(3) Life cycle inventory for the Golf A4 Schweimer and Levin (2000)

(4) Life Cycle Assessment of Vehicle Fuels and Technologies Final Report. London Borough of Camden, March 2006, Dr Ben Lane, Ecolane Transport Consultancy on behalf of London Borough of Camden www.lowcvp.org.uk/resources/reportsstudies/index.cfm?Start=21

(5) Life Cycle Assessment of Lightweight and End-of-Life Scenarios for Generic Compact Class Passenger Vehicles Wulf-Peter Schmidt, Elisabeth Dahlqvist, Matthias Finkbeiner, Stephan Krinke, Silvia Lazzari, Dirk Oschmann, Sophie Pichon and Christian Thiel (2004)

(6) Highways Agency www.highways.gov.uk/knowledge/1801.aspx

(7) Indian Iron and Steel Joint Plant Committee www.jpcindiansteel.org/tech01sep.asp

(8) www.dft.gov.uk/stellent/groups/dft_roads/documents/divisionhomepage/610328.hcsp

(9) Projections of Air Quality in the UK for Additional Measures for the 2006 Review of the Air Quality Strategy 2005

(10) Car buyer research report, Consumer attitudes to low carbon and fuel-efficient passenger cars March 2005 Dr Ben Lane, Ecolane Transport Consultancy www.lowcvp.org.uk/resources/reportsstudies/index.cfm?Start=21

(11) Defra Air Quality Consultation www.defra.gov.uk/corporate/consult/airqualstrat-review/index.htm

Contact information

Audi	www.volkswagen-environment.de and volkswagen.co.uk
Bentley Motors	www.bentleymotors.com
BMW Group	www.bmwgroup.com and www.bmw.co.uk
Ford Motor Company	www.ford.com
GKN Driveline	www.gknplc.com
Honda UK Manufacturing	www.mfg.honda.co.uk
Jaguar Cars	www.jaguar.com
Land Rover	www.landrover.com
LDV	www.ldv.com
Nissan	www.nissan.co.uk and www.nissan-global.com
PSA Peugeot Citroën Automobiles	www.sustainability.psa-peugeot-citroen.com
Rolls-Royce Motor Cars	www.rolls-roycemotorcars.com
SEAT	www.volkswagen-environment.de and volkswagen.co.uk
Skoda Auto	www.volkswagen-environment.de and volkswagen.co.uk
Toyota	www.toyotauk.com and www.toyota.co.uk
Vauxhall Motors	www.vauxhall.co.uk
Volvo Car UK	www.volvocars.co.uk
Volkswagen Group	www.volkswagen-environment.de and volkswagen.co.uk
Volkswagen Commercial Vehicles	www.volkswagen-environment.de and volkswagen.co.uk

Look for links to 'about us' or 'company' to be directed to sustainability and environmental information.

Auto Industry	www.autoindustry.co.uk
Automotive Academy	www.automotiveacademy.co.uk
Carbon Disclosure Project	www.cdproject.net
Department for Food Environment and Rural Affairs (DEFRA)	www.defra.gov.uk/environment/sustainable
Department for Transport (DfT)	www.dft.gov.uk
Department of Trade and Industry (DTI)	www.dti.gov.uk/sustainability/
EC Sustainable Development	www.europa.eu.int/comm/sustainable
Energy Savings Trust	www.transportenergy.org.uk
Environment Agency	www.environment-agency.gov.uk
European Environment Agency	www.eea.eu.int
Foresight Vehicle Programme	www.foresightvehicle.org.uk
LowCVP	www.lowcvp.org.uk
Royal Society for the Prevention of Accidents	www.rospa.org.uk
Sector Skills Council for the Automotive Sector	www.automotive-skills.org.uk
SMMT	www.smmt.co.uk
Sustainable Development Research Network	www.sd-research.org.uk
The Carbon Trust	www.thecarbontrust.co.uk
The Sustainable Development Commission	www.sd-commission.org.uk
The World Business Council for Sustainable Development (WBCSD)	www.wbcsd.org
UK Climate Change Impact Programme	www.ukcip.org.uk
UK Commission for Integrated Transport	www.cfit.gov.uk
UK GOV SITE	www.sustainable-development.gov.uk
UN Division for Sustainable Development	www.un.org/esa/sustdev
United Kingdom Petroleum Industries Association (UKPIA)	www.ukpia.com
Vehicle Certification Agency (VCA)	www.vca.gov.uk

Published by:

The Society of Motor Manufacturers and Traders Limited., September 2006. SMMT and the SMMT Logo are registered trademarks of SMMT Ltd.

Printed on Revive made from 100 per cent waste paper. No chlorine or chlorine compounds are used in the paper's production. The paper is also free of OBAs (optical brightening agents)

Images from www.dreamstime.com

The Society of Motor Manufacturers and Traders
Forbes House, Halkin Street, London, SW1X 7DS UK
Telephone: +44 (0)20 7344 9200 E-mail: sustainability@smmt.co.uk Website: www.smmt.co.uk/sustainability