House of Commons

Transport Committee

Cars of the Future

Seventeenth Report of Session 2003–04

Volume I

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Report, together with formal minutes

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The Transport Committee

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Summary

Cars offer unparalleled personal mobility and convenience. It is hard to see that the majority will ever wish to give this up. The challenge for policy makers and manufacturers is to capture the benefits of the car whilst minimising the ill effects. Great steps are already being made. The car of the future may look very similar to the car of today, but its technology will be quite different. New forms of engine technology, fuel technology, crash protection and driver assistance systems are being developed, and the capabilities of future vehicles are likely to be far beyond those of the cars on the road today. The Government has made some progress in trying to encourage early take-up of advanced technology through a series of targets, strategies and incentives. It has been among the world's leaders in developing such policies. Inevitably, given the uncertainty surrounding new technology, some policies have been effective whilst others have floundered. If we are to have safe clean cars in the future, we need to learn the lessons of such policy success or failure so that customer confidence in new technology is not damaged, and industry is encouraged to take it up.

Car safety has improved continuously over many years. Whilst "cars that drive themselves" have been under discussion for decades, the reality draws nearer, with cars on the road today already assisting with steering and braking and capable of following vehicles automatically on motorways. New systems can require breath tests for repeat offender drink-drivers before the vehicle can start and can remotely immobilise stolen vehicles: initiatives that we support in principle. There could be significant safety and capacity benefits on our roads if we can achieve more than just the commercial benefits that the manufacturers seek. Existing and proven technologies, such as intelligent airbags, seatbelt reminder systems and advanced braking systems could have considerable casualty reduction potential if they are introduced across the range of cars rather than being restricted to luxury models.

It would be quite possible, within the timeframe covered by the recent transport White Paper[1], for cars to be developed which will not operate unless the driver is appropriately insured, licensed and taxed, and under the permitted blood alcohol concentration. Vehicle technology can prevent drivers breaking the speed limit, driving too close to the vehicle in front, losing control of the vehicle at corners and drifting across lanes. This is not science fiction. With appropriate leadership by the Government these vehicles could be on the road within 10-20 years. Manufacturers can already design cars which help the driver by preventing the minor errors which can be fatal. We need to ensure that these cars reach the market place. The Government must not miss the opportunity to design out crime and casualties before they occur

Whilst manufacturers are investing considerable sums in developing and testing new systems of vehicle control, we found there was a lack of understanding about the implications for driver training, law enforcement and liability in the event of a crash. We therefore recommend the urgent development of a clear plan for Intelligent Transport Systems, setting out the roles and responsibilities of the Department for Transport, the

[1] Department for Transport (2004) The future of transport: a network for 2030 Cm 6234

Home Office, The Department of Trade and Industry, the emergency services, the Highways Agency and the Driving Standards Agency. New technologies should be thoroughly evaluated before introduction, and those with the biggest cost-benefit ratios should be prioritised.

The emissions from new cars have fallen significantly due to stringent legislative standards and the introduction of new engine technologies. Sophisticated new technologies have a cost penalty and are unlikely to appear on the market unless there is a regulatory requirement or consumer demand. The Government should, at the appropriate stage, support the use of regulation to encourage cleaner and safer vehicle design. Ultimately we might hope for fuel cell vehicles powered by hydrogen generated from renewable energy sources – the zero emission vehicle. However, fuel cell vehicles and surplus renewable energy for the transport sector are unlikely to be commercially available for at least 30 years. It is essential therefore that there are short to medium term steps in place to ensure that we meet our environmental obligations.

Progress to date has been slow. Low carbon and alternative fuel cars are few and far between on Britain's roads. Despite initiatives such as graduated Vehicle Excise Duty linked to emissions, most consumers still have little awareness of, or interest in, the environmental credentials of new cars. The Treasury and the Department for Transport must do more to make the environmental impact of a vehicle as important to customers as style and safety features when buying a car. The Government's incentives must be effective and adequately funded. The Department's own evidence shows it is well behind on its emission targets and greater commitment is needed with clear messages to make cleaner cars cheaper and to penalise the big polluters. We support the introduction of significantly higher Vehicle Excise Duty for high emitting 'gas guzzlers', and we believe this should be combined with a greater commitment to support new technologies.

The Treasury has an important part to play in encouraging clean fuels, particularly through the ongoing fuel duty incentives it can offer. We urge the Government to use more of the £22 billion raised by fuel duty to help one of the most polluting energy sectors, the road transport sector, in its difficult transition to the low carbon economy.

There are many opportunities for vehicle and component manufacturers in the UK to contribute to a vehicle manufacturing base of 'greener' and safer vehicles. Their efforts will be greatly enhanced by a more ambitious research, development and demonstration budget and a more coherent strategic approach. Some steps have been taken in the right direction with the establishment of the Low Carbon Vehicle Partnership. Concerted action and a sense of urgency not currently apparent in the Department of Trade and Industry is needed to follow this through and to improve commercialisation of new technology. It is clear from our evidence that other countries are already investing more than the UK in an attempt to become world leaders. Without action now, industrial opportunities will be missed, and although the car of the future may be driven in the UK, the UK based automotive industry will not be involved in its production.

1 Introduction

1. Cars are the most heavily used form of transport in the United Kingdom; they offer unequalled flexibility and convenience to the user. However, car use leads to thousands of deaths and serious injuries in the UK each year, and has a significant impact on the environment, both through local air pollutants, and globally through its contribution to carbon dioxide, the main greenhouse gas. The policy challenge is therefore to capture the benefits of car use while reducing the negative impacts of car travel on safety and the environment. New vehicle technology promises to be part of the solution to that challenge. Cars have already become cleaner, safer and more efficient than ever before. But there could be a more radical change in future as new fuels and propulsion systems challenge petrol and diesel. For example, cars powered by hydrogen fuel cells emit steam, not toxic pollutants. If the hydrogen is produced from renewable sources the benefits would be global as well as local, since no carbon would be emitted. Developing uses for hydrogen could in itself be beneficial to the renewable energy sector, since conversion of surplus energy generated in periods of low demand into hydrogen allows renewable energy to be stored.[2] Vehicle technology will also transform road safety, through the enhancement of crash protection, active safety measures and the introduction of advanced driver assistance systems to prevent crashes occurring.

2. **Many exciting technological developments have been promised for the cars of the future, and the Government has tried to encourage the use of cleaner and safer vehicle technology through the adoption of a variety of targets and incentives. We welcome this work; the challenge is to ensure that policies are effectively translated into practice.** New vehicle technologies are rapidly developing and the technological status quo is not maintained for long; this creates particular pressures for policy makers. Some policies have not had the intended impact. While progress towards the casualty reduction targets is on track, more lives could be saved. Progress towards the climate change targets has fallen far behind. For these reasons we decided to hold an inquiry to look at the possible developments and establish whether Government has the right policies and funding in place to increase safety, protect the environment and win market share for UK business.

3. Since we started our inquiry the Department for Transport has published "The Future of Transport: a network for 2030".[3] This 30-year strategy pulled together much of the Government's existing policy, but did not announce any significant new policies to tackle the negative impacts of car use. While the Government's objectives are well stated, and we welcome the fact that it is looking to the future, more is required than scenario planning. The Government needs to take action to encourage desirable developments. It also needs to be aware that some new technologies may be introduced more quickly than expected, and ensure that its strategies take this into account.

4. In the course of the inquiry we heard evidence from: the Society of Motor Manufacturers and Traders, Toyota Motor Europe, PSA Peugeot Citroen, Ricardo, ippr, Institute for European Environmental Policy, UK Petroleum Industry Association, BP plc, Lex Vehicle

[2] See Annex A of this report, 'Report of the Select Committee Visit to United States 2004'. Tim Lipman of California Partners for Advanced Transit and Highways (PATH) presentation to the Committee.

[3] Department for Transport (2004) The future of transport: a network for 2030 Cm 6234

Leasing, Association of British Insurers, Thatcham, Norwich Union, Retail Motor Industry Federation, Parliamentary Advisory Council for Transport Safety, Professor Oliver Carsten, Professor Mike McDonald, Chief Inspector Jim Hammond, Rt Hon Jacqui Smith MP, Minister of State for Industry and the Regions and Deputy Minister for Women and Equality, The Energy Saving Trust, Low Carbon Vehicle Partnership, Mr David Jamieson MP, Parliamentary Under-Secretary of State, Department for Transport, and Mr John Healey MP, Economic Secretary, HM Treasury. We are grateful to all our witnesses for giving evidence and to the Specialist Adviser, Greg Marsden of the University of Leeds, for his assistance.

5. We also undertook three committee visits in the course of this inquiry. We visited Johnson Matthey Fuel Cells' Technology Centre in Reading, looked at a hydrogen fuel cell bus at Transport for London, and visited the United States in January 2004, where we met with organisations and government departments in Washington, Detroit, and California. We are most grateful to all our hosts for the valuable information they provided.

2 Industrial advantage and vehicle technology

6. The UK is home to world-class automotive research organisations and a prominent manufacturing base.[4] These have developed significant vehicle expertise, particularly in the fields of internal combustion engines and hybrid vehicle technology.[5] In the Energy White Paper the Government recognised that the low carbon economy could be a significant opportunity for British industry and the research and development sector.[6] Although a significant amount of work is going on in this area, we were told that there is insufficient funding available to support research, development and demonstration programmes, and that the UK's position as a global leader in automotive expertise could be under threat from a lack of progress in the low carbon vehicle sector. We were told that the UK automotive and fuel industries are already slipping behind the international competition.[7] In Germany the fuel cell industry supports three times as many jobs as in the UK.[8] The DTI Minister did not even have a grasp of how many jobs could be created in the UK if this industry was expanded.[9]

Research and development funding

7. The strength of the fuel cell industry in competitor countries is attributed to substantial and co-ordinated government support in the form of direct funding and strategic

[4] Visit Note A: Transport Committee Visit to United States 2004 Appendix A: Clean Vehicle Technology and Inward Investment Prospects for the UK

[5] "Carbon to Hydrogen": Roadmaps for Passenger Cars: A Study for the Department for Transport and the Department of Trade and Industry" (November 2002) Ricardo Consulting Engineers.

[6] DTI (2003) Energy White Paper, Cm 5761, para 1.2

[7] Ev 3 & Q562 & Ev 9

[8] Ev 3

[9] Q468

guidance. Government funding in the UK is below that in other countries, notably Canada, Germany, the United States and Japan.[10] Johnson Matthey Fuel Cells told us that without increased levels of government investment in research, development, and demonstration projects, along with incentives for component manufactures, the UK "runs the risk of falling significantly behind in the development of a fuel cell industry and missing out on the associated economic benefits."[11]

8. The UK suffers from having too many different organisations and programmes involved in supporting the development of low carbon vehicles, with not a great deal of funding between them.[12] We identified at least ten different government programmes and agencies which offered grants and support for new vehicle technology and related research. Under the DTI these include the Fuel Cell Programme; Foresight Vehicle; the New and Renewable Energy Programme; the Automotive Innovation and Growth Team; and the Sustainable Technologies Initiative. Under the Department for Transport and led by the Energy Saving Trust there are the New Vehicle Technology Fund; PowerShift Grants; and CleanUp Grants. In addition there are a number of partnerships and agencies supporting this work, including the Low Carbon Vehicle Partnership and the Carbon Trust.

9. There is a clear need for more focus and leadership to be introduced to this growing sector. The academic community and the automotive industry alike identified the need for co-ordination.[13] The DTI Minister, Jacqui Smith MP, accepted that there had been a lack of focus:

> I think it would have been a fair criticism before the development of that partnership [Low Carbon Vehicle Partnership] to say that there was a limited amount of synergy between the sort of developments that were happening in terms of the fuels technology on the energy side and the developments in relation to the sort of technology and mechanics that were happening in relation to the car manufacturing industry.[14]

10. The Low Carbon Vehicle Partnership (Low CVP) was established in January 2003 to address the lack of co-ordination in the clean vehicle sector.[15] Jacqui Smith suggested that Low CVP was pioneering for the way in which it brought together research, development, and industrial input to examine the key issues.[16] Mr Owen of Ricardo Consulting Engineers agreed:

> I believe that initiatives such as the Low Carbon Vehicle Partnership are setting strategies which will make research in the UK a lot more coherent and better integrated with European and international research than it has in the past.[17]

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[10] DTI, Carbon Trust and EPSRC "A Fuel Cell Vision for The UK – The First Steps: Taking the White Paper Forward" May 2003.

[11] Ev 3

[12] Q108 & Ev 8

[13] Ev 8 & Ev 43

[14] Q410

[15] Q410

[16] Q410

[17] Q75

In addition to co-ordinating research, the Low CVP has a role in identifying industrial opportunities, spreading best practice from demonstration projects and helping to build the UK's capabilities through partnership.[18]

11. The Low Carbon Vehicle Partnership will be advising the Government on the development of the Centre of Excellence for Low Carbon and Fuel Cell Technologies announced in the Energy White Paper.[19] Jacqui Smith told us that the Government would be investing £7.5 million in the Centre.[20] The intention is that through a process of benchmarking, co-ordination and best practice, the Centre of Excellence will maximise the opportunities for UK industrial development and will help nurture the necessary supply chains for a successful manufacturing industry.[21] Mr Wood of the Low CVP told us:

> I think the point here is that there is no doubt that the low carbon technology arena is a huge opportunity and that if we wait other people will take the initiative. There is a lot of work going on among the mainland European based automotive manufacturers. I think in this country we have an opportunity to develop particularly niche models and niche applications. The aim of the Centre is very much to support the development of UK produced technology.[22]

We were told that the business case for the Centre of Excellence would be prepared by the end of March 2004 and that the first year's priorities would be launched by the end of May 2004[23]; but at the time this report was prepared these had yet to appear on the Low CVP or the DTI websites.

12. To date, the main source of government funding for vehicle design and technology has come through the Foresight Vehicle initiative. The research programme provides matched funding aimed at "making Britain the undisputed high technology leader in automotive design and development."[24] More than 400 companies and universities have been participating in the initiative, taking forward projects valued at £100 million.[25] At a European level a budget of €2.1 billion (£1.5 billion) is available from Europe for sustainable energy and transport research between 2003 and 2006.[26] By way of comparison, the USA has agreed a budget of $1.7 billion over five years for the FreedomCAR programme[27] and the Hydrogen Fuel Initiative.[28]

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[18] http://www.lowcvp.org.uk/

[19] DTI (2003) Energy White Paper, p67

[20] Q488

[21] Q473

[22] Q561

[23] Q413

[24] Press Notice from Foresight Vehicle http://www.foresightvehicle.org.uk/info_/FV/PressRelease40213.pdf, 13/02/04

[25] DTI (2003) Energy White Paper para 5.11

[26] Through the Sixth Research Framework Programme (2003-2006), Ev 46

[27] FreedomCAR is an approach to powering the vehicles of the future. The "CAR" in FreedomCAR stands for Cooperative Automotive Research between the U.S. Department of Energy, the U.S. Council for Automotive Research, and the energy industry. FreedomCAR focuses government support on fundamental, high-risk research that applies to multiple passenger-vehicle models and emphasizes the development of fuel cells and hydrogen infrastructure technologies.

[28] Ev 22B & Visit Note A: Transport Committee Visit to United States 2004.

13. At the demonstration stage, the New Vehicle Technology Fund provides funding to the UK transport industry to develop technically innovative low emission vehicles for near-term market adoption. The Fund, administered by the Energy Saving Trust, was launched in April 2003 and has a budget of £10 million over three years. It currently supports 17 projects, including the Ultra Low Carbon Car Challenge.[29] The Energy Saving Trust (EST) told us that the New Vehicle Technology Fund had been so successful in inviting good quality applications that the 2004-05 budget allocation of £4.6 million has already been committed. The Energy Saving Trust considered the budget constraints to be a limiting factor in the demonstration stage of low emissions transport technology in the UK:

> While this shows the vitality of the UK advanced engineering base, the volume of applications exceeds the available budget. Consequently, budget constraints are acting as a bottleneck, slowing down the UK in its ability to demonstrate new future vehicle technology, and also the development of SME's / OEM's and a UK supply chain for future vehicle developments.[30]

14. Jacqui Smith told us the Government is now developing the DTI's Technology Strategy.[31] The Minister told us the Technology Strategy was likely to include low carbon fuel and vehicle technologies in its activity:

> Although we have not made final decisions about what the priorities for the first calls on support from that Technology Strategy will be, I think it is highly likely that a significant number of those will relate to some of the technologies here, like how we develop low carbon fuels… and some of the other technical and technological issues. That is the way forward for supporting the car industry side of the equation.[32]

15. The main funding for research into fuel cell applications has been through the DTI's Advanced Fuel Cell Programme, which has operated since 1992. This programme provides £2 million per year for research.[33] However, it has directed little attention to transport applications. The DTI Minister, Jacqui Smith, told us:

> That is not all about fuel cell use in transport because in many ways the development of the use of fuel cells in transport is likely to be towards the end of the line in terms of the technology development.[34]

More recently the DTI has supported the development of Fuel Cells UK which is "effectively a trade association that is raising the profile of the fuel cell industry in the UK."[35] In May of this year, the DTI awarded a grant of £3.2 million to Johnson Matthey Fuel Cells Ltd, to develop more efficient and economically viable fuel cell technology for large-scale automotive applications.[36] Despite the fact we were told that Britain's

[29] Under the Ultra Low Carbon Car Challenge five proposals have been taken forward to develop a new car, capable of travelling 1,000 miles before needing a refill, which could be mass produced within four to eight years.

[30] Ev 32A

[31] Q466

[32] Q466

[33] Ev 22B

[34] Q408

[35] Q408

[36] Low Carbon Vehicle Partnership Press Notice 01.05.04

competitors are supporting their fuel cell industries more effectively with larger investment, the UK does have a research programme, a forum for discussion, and an industry 'vision' in place to promote development.[37]

16. **While we welcome the Centre of Excellence for Low Carbon and Fuel Cell Technologies, the amount the Government intends to invest is trivial. Low carbon transport should be a major commercial opportunity for the UK. Funding for vehicle research, development and demonstration has been spread too thinly and between too many agencies. It is insufficient to safeguard the place of the UK in a global industry.**

The commercialisation stage

17. We heard that Government support for technological innovation has been weakest in relation to product development and commercialisation.[38] Turning a prototype idea into a commercially viable product can require considerable capital investment. Developing innovative ideas for hydrogen and fuel cell vehicle technologies is costly and risky to business. The commercialisation of new technologies is made easier where both the market and supply industry have been promoted. A vibrant home market enables rapid and low cost testing and development during the commercialisation phase.[39] Mr Fendick, of the Department for Transport, recognised the importance of this:

> I think one of the most positive things we can do nationally is to create the right consumer environment for these technologies because we do see, even though the industry is global, that they tend to focus their activity in those areas where the markets are most demanding... So the more we can actually create the market for these vehicles, the more we stand a chance of keeping some of the technology and the engineering here to address it.[40]

18. Johnson Matthey was very clear in its evidence to the Committee that the use of progressive legislation creates markets for better technology and drives innovation. Johnson Matthey pointed to the example of catalytic converters, the development and introduction of which was greatly facilitated by the adoption of challenging legislative requirements in the 1990s. The Government should not be afraid to legislate to bring about beneficial technologies in the marketplace.

19. The Carbon Trust, through its Low Carbon Innovation Programme, provides venture capital funds for low carbon technologies. But according to the policy experts from whom we took evidence, the funding has been insufficient and transport has not been a priority for the Trust.[41] **The transition from the design stage to commercialisation appears to be a particular weakness in the UK. There should be more support for the commercial development of low carbon cars and the associated components industry.**

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[37] DTI (2003) A Fuel Cell Vision for the UK – The first steps. Taking the White Paper Forward. www.fuelcellsuk.org/team/Library/1stStepsVision.pdf

[38] Ev 46

[39] 'Review of UK Fuel Cell Commercial Potential' February 2003 Summary of the report by E4tech (UK) Ltd to Carbon Trust and DTI.

[40] Q653

[41] Q110

3 The environment and the car of the future

20. Tackling global warming is one of the biggest challenges we face. Car use produces two types of emissions: carbon dioxide, one of the main greenhouse gases which contributes to climate change; and toxic air pollutants which are harmful to human health on the local scale. These include oxides of nitrogen (NOx), un-burnt hydrocarbons, carbon monoxide and fine particles (PM) and contribute to phenomena such as acid rain. Significant progress has been made in reducing both the local pollution and the carbon dioxide emitted from cars over the past decade. Even so, transport accounts for over one-fifth of domestic carbon dioxide emissions, and road vehicles account for half of all oxides of nitrogen, two-thirds of carbon monoxide, half of all hydrocarbon emissions, and most of the particulate emissions in cities.[42] The Government, through national and international policy, has adopted a number of targets and strategies intended to reduce the environmental impact of car use.

Carbon emissions

21. The Government has both international and domestic commitments to reduce carbon emissions. The Kyoto Protocol was signed in 1997 as part of the UN Framework Convention on Climate Change. Developed nations were required to cut overall greenhouse gas emissions below 1990 levels over the period 2008-2012, and the UK set a target of 12.5 per cent reduction, from 168 million tonnes of carbon in 1990. Domestically, in 2000 the Government published its Climate Change Programme which set out a strategic approach to tackling climate change and contained a domestic goal of reducing carbon dioxide emissions by 20 per cent from 1990 levels by 2010. Also in 2000 the 10 Year Plan for Transport set out the carbon reductions which were anticipated specifically from the transport sector, breaking down estimates for behavioural and technology change.[43] In 2003 the Energy White Paper committed the UK to a long-term goal of reducing carbon dioxide emissions by 60 per cent by 2050.[44] In the 2004 Spending Review the 2010 carbon reduction goal was included in the Public Service Agreements between the Department for Transport and the Treasury; we welcome this development.

The domestic 2010 carbon reduction target

22. Even though average carbon dioxide emissions from new cars have reduced over recent years, increases in car ownership and mileage mean that total carbon emissions from road transport have been roughly flat for the last decade.[45] The transport sector produced 31.5 million tonnes of carbon (MtC) in 2000.[46] The 10 Year Plan for Transport aimed to reduce

[42] Ev 3

[43] The overall reduction was expected to be 5.6 Million tonnes Carbon (MtC) with 1.6 MtC from 10 Year Plan policy proposals and 4 MtC from the vehicle design Agreement with European vehicle manufacturers. Transport 2010: The 10 Year Plan, (2000) DETR.

[44] DTI (2003) Energy White Paper: Our energy future – creating a low carbon economy. Cm 5761.

[45] DTI (2003) Energy White Paper

[46] DfT (December 2002) Progress Report Chart 7.3, p122

this by 1.6 MtC by 2010 through proposals such as modal shift and congestion reduction. However, the Transport Minster, David Jamieson, accepted that slow progress on some policies will mean that this target will be missed by about 25 per cent.[47] Research by the ippr and the Institute for European Environmental Policy suggested that rising road transport emissions could, if not addressed, endanger the prospects of meeting not only the transport sector targets, but the Government's overall 2010 target.[48] Indeed, the Government now projects that road traffic in England could increase by 20-25 per cent by 2010, with the associated emissions.[49]

Powering Future Vehicles strategy

23. The Powering Future Vehicles strategy was complementary to the Energy White Paper and contained a target that by 2012, 10 per cent of all new car sales will be cars emitting 100g/km carbon dioxide or less at the tailpipe (in 2003 a new car on average emitted 172.1 grammes of carbon dioxide per km[50]). Although the motor industry welcomed the carbon-neutral approach, the targets were criticised by some witnesses on the basis that low carbon cars are already available in the market but people do not choose to buy them. Encouraging the development and manufacture of further niche vehicles which are low carbon but only purchased by a small minority of customers will not generate a mass move to low carbon cars across the market.[51]

European commitments

24. The main mechanisms for encouraging the design of cleaner cars have operated at the European level, through the Euro Standards to reduce local air pollutants, and the Voluntary Agreements to reduce carbon dioxide.

European voluntary agreement for carbon dioxide reduction

25. The European Commission and the European Automobile Manufacturers Association came to an agreement in July 1998 that committed manufacturers to reduce the carbon dioxide emissions from new passenger cars by over 25 per cent, to an average carbon dioxide emission figure of 140 g/km by 2008. The Table below shows the success to date in reducing carbon dioxide emissions from new cars.

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[47] Q598

[48] Foley and Fergusson (2003) Putting the Brakes on Climate Change. Ev 46

[49] Department for Transport (2003) Managing Our Roads

[50] SMMT: http://lib.smmt.co.uk/articles/sharedfolder/Publications/CO2%20Report.pdf

[51] Q78

Table 1: Average new car carbon dioxide emissions in the UK (1997-2003)

Year	Average carbon dioxide g/km	y/y % change	% change on 1997
1997	189.8	-	-
1998	188.4	-0.70%	-0.70%
1999	185	-1.80%	-2.50%
2000	181	-2.20%	-4.60%
2001	177.6	-1.90%	-6.40%
2002	174.2	-1.90%	-8.20%
2003	172.1	-1.20%	-9.30%

Data Source: SMMT UK New Car Registrations by CO_2 Performance, 2004

The Voluntary Agreement has brought about consistent vehicle efficiency gains of around 2 per cent year on year.[52] However, it has taken six years to reduce carbon dioxide emissions by 17.7 g/km, and only four years remain to reduce carbon dioxide by a further 32g/km in order to fulfil the Agreement.

26. The 10 Year Plan for Transport anticipated a reduction of four million tonnes of carbon (MtC) compared to 2000 levels by 2010 through the vehicle technology changes promised by the Voluntary Agreement.[53] The Transport Minister, David Jamieson, confirmed that this now appeared over ambitious:

> We had an ambition of a reduction of between 2.6 and 5.9 million tons and a figure in the *White Paper* was given as 4 million. The simple answer to your question is no, currently we are not on target to meet that. We are probably at the lower end of our ambition of probably about the 2.6.[54]

27. The Transport Minister told us the original expectation was "over-optimistic" and the transport sector would underachieve because of customer preference for large cars in the UK compared to other European countries, and because of the delayed introduction of fuel efficient technologies such as direct injection engines. The DTI added that the carbon reductions would be at the lower end of the scale expected "largely because fuel prices are currently lower than was originally anticipated, and consumers have continued to demand more fuel consuming cars than originally expected."[55]

Air pollutants and the Euro standards

28. Toxic pollutants have been tackled through the Euro standards. In 1992 exhaust emission limits, (the Euro I standards) were introduced for new cars. The standards have been increasingly tightened, and Euro IV standards come in on the 1st January 2005. These

[52] Ev 32i

[53] DfT (October 2003) Powering Future Vehicles The Government Strategy First Annual Report, para 7.1.

[54] Q596

[55] Ev 22B

emissions limits have forced significant improvements in the level of local pollutants. Some of these emissions have been reduced by 95 per cent over the last two decades.[56] Toyota told us that it had developed new exhaust treatment technology which far surpassed the next round of requirements: the catalyst technology could halve NOx and cut particulate matter (PM) by over 90 per cent. Toyota maintained it would not be commercially viable to introduce the technology onto the market unless the Euro standards were much more stringent:

> To bring this technology to market in any numbers… the next round of European diesel emission standards (Euro V) must be much more stringent. Without this, there will be no commercial impetus to develop systems any more sophisticated than those already available.[57]

Conclusion

29. It is clear that the Department for Transport will fall significantly short of its expected contribution to the domestic climate change targets. Rising car ownership and the persistent preference of British drivers for larger, more polluting vehicles, and increases in distances travelled by car, are all obstacles to carbon reduction in road transport. The Government will be taking forward a comprehensive Review of the 2000 Climate Change Programme later this year and we were told that as part of that process projections will be made of the carbon savings from the 10 Year Plan for Transport and from the measures described in the Energy White Paper and Powering Future Vehicles Strategy.[58] The new transport strategy, "The Future of Transport: a network for 2030"[59] does not set out the actions which would put the road transport sector on track to meet its emissions targets for 2010. Vehicle emissions standards have driven environmental improvements in the past and the Government must press for further stringent standards which continue to encourage progress. These standards must be policed further down the line through the use of accurate MOT emissions tests. **The Government has set a range of commendable targets to reduce greenhouse gas emissions from surface transport. However, it has failed to match its commitments with tough policies to achieve these goals. The introduction of stringent legislative requirements has in the past successfully achieved great improvements in vehicle technology; the Government must not be afraid to legislate. The deadline for the 2010 domestic carbon reduction target is fast approaching and we are far off track. The Department for Transport must set out exactly what action it will take to put the road transport sector back on track.**

4 Future fuels and technologies

30. We need cleaner fuels as well as more efficient engines. The full environmental impact of a fuel, including the pollution emitted during production and distribution, is termed the 'well-to-wheel' emissions. The vehicle technologies and fuels of the future offer at least the

[56] Ev 22

[57] Ev 6

[58] Ev 22B

[59] Department for Transport (2004) The Future of Transport: a network for 2030" Cm 6234

potential for very low and even zero-emissions, both at the tail pipe and in the production and distribution of the fuel. During the course of our inquiry we heard evidence to suggest that the following fuels and vehicles could play a larger role in the short and medium time-frame: Liquefied Petroleum Gas, hybrid electric cars, electric cars, and biofuels. In the longer term hydrogen fuel cell cars are anticipated. A brief outline of each is given to provide context for the recommendations made in our report. The Table below shows the number of vehicles on the road in the UK, by fuel type plus hybrid vehicles.

Table 2: Total Motor Vehicles By Fuel, 2002

Fuel Type	Number of Vehicles
Petrol	23,405,680
Diesel	7,098,451
LPG	25,345 *
Electricity	13,586
Gas/Bi-Fuel	7,760
Gas (CNG)	3,167
Steam	1,694
Hybrid Electric	883
Gas / Diesel	108

*Source: CAR 32 (DfT & DVLA). *The actual number of LPG cars is higher, there is a time-lag in conversions being reported to DVLA*

31. Realistically, petrol and diesel will continue to power the majority of the UK passenger car fleet in the short-term at least. The main driver behind the fall in new vehicle emissions is the growing proportion of diesel vehicles. Car manufacturers are using advanced diesel technologies to meet their voluntary carbon dioxide agreements with the European Commission.[60] Mr Mumford of BP Oil UK told us that the environmental performance of conventional fuels can be improved:

> I think there is a lot of opportunity to improve fuel technology. I think we have been rather lulled into an assumption that conventional fuels are at the end of their technological evolution.[61]

Liquefied Petroleum Gas

32. Liquefied Petroleum Gas (LPG) has the largest market share of all the alternative fuels in the UK. There are currently estimated to be 100,000 LPG vehicles on the road[62] which represents less than half of one per cent of the total number of cars. Well-to-wheel carbon

[60] Ev 32A – 'The EC/ACEA Joint Monitoring Report for Monitoring Year 2001 (published 2002) notes: "Technologies (such as high-pressure injection diesel engines) have been commercialised on a very large scale…. and [have] driven the recent exceptional carbon dioxide performance." '

[61] Q157

[62] Ev 32

emissions from LPG vehicles are similar to those from diesel and approximately 18 per cent lower than from petrol vehicles.[63] However, LPG offers local air quality benefits over diesel, provided that cars are properly converted to use LPG. This is not always the case.[64] The LP Gas Association initiated an Approved Installer Scheme in 1998 to tackle the problem of inferior LPG conversions.[65] This is a voluntary scheme and the Association told us:

> [A] significant number of conversions are not subject to any form of control in terms of safety or emissions performance. Within this segment are installers who use inferior equipment and standards. Such installers not only produce potentially unsafe vehicles but thrive by undercutting on price the responsible elements of the industry and bringing into question the viability of the good installers.[66]

33. A proposal for certification of LPG conversions was included in the Department for Transport's memorandum to the Committee on road safety legislative proposals.[67] **A vehicle certification and inspection regime must be introduced to ensure the after-sales conversions to Liquefied Petroleum Gas meet the highest environmental and safety standards. We welcome the Department's proposal for certification. It should be accompanied by a strengthened MOT for gas-powered vehicles to correct poor performance from existing LPG conversions.**

Hydrogen Fuel Cell

34. The "dream ticket" for the clean car of the future is the hydrogen fuel cell car. The consensus timeframe for hydrogen fuel cell cars is 2020, although General Motors told us that they are aiming to produce fuel cell cars by 2010.[68] The ultimate hope is for zero emission road transport. There are many obstacles to overcome before that is achievable.[69]

35. Fuel cells function in a similar way to batteries; they have no moving parts and convert chemical energy into electricity very efficiently. Unlike batteries, fuel cells never need to be recharged and will produce electricity for as long as the fuel, usually hydrogen, either compressed or liquefied, is provided. Leaving aside the need to ensure the car technology is robust enough to give the high standards of reliability we now expect, the fuel industry needs to determine how to supply hydrogen, when to convert it, and how to resolve safety and storage problems. These barriers mean fuel cell vehicles are some way from commercial introduction, although pilot vehicles are in operation now, including three fuel cell buses in London.

36. Hydrogen is an energy carrier that can be manufactured from a range of sources; if the hydrogen is made from fossil fuels then there will be some well-to-wheel carbon emissions.

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[63] Ev 32

[64] Q340 & Ev 32 & Ev 22 & Ev 12 & Ev 4

[65] Ev 12

[66] Ev 12

[67] Department for Transport (June 2004) Memorandum to House of Commons Transport Committee on Legislating for Road Safety.

[68] Q8, Visit Note A: Transport Committee Visit to United States 2004, Ev 3, Ev 6, Ev 17, Ev 22.

[69] Q98

Hydrogen made from biofuels or renewable electricity would produce less emissions. However, Britain currently produces only 1.3 per cent of its total electricity supply from renewable sources.[70] In overall carbon reduction terms, it is better for initial supplies of renewable energy to be used in the electricity system rather than to produce hydrogen as a transport fuel.[71] It is estimated that "renewable hydrogen" will not be available for use by fuel cell cars for 30 years.[72] In the medium-term there would be some environmental benefit in producing hydrogen from natural gas to power vehicles, but this should not be considered a zero-carbon system. **The availability of surplus renewable energy will be vitally important for the road transport sector in its transition to low carbon or even zero carbon cars, whether or not this is a hydrogen-based system. The Government must address this supply issue with more urgency.**

Hybrid Vehicles

37. Hybrid vehicles use a combination of a small conventional engine and an electric motor to achieve efficiencies. Unlike dedicated electric vehicles, hybrid vehicles do not require electric recharging facilities. Hybrid vehicles have the potential to halve carbon dioxide emissions from new vehicles. Petrol hybrid cars have only recently entered the UK market and there are relatively few on the roads to date.[73] However, new hybrid electric models have recently been launched, and manufacturers are predicting total sales in excess of 2,000 vehicles for 2004. The fact that hybrid cars are exempt from the London Congestion Charge is thought to have boosted sales, as the Transport Minister, David Jamieson, said: "the London congestion charge exemption has caused quite a frisson in the showrooms in London."[74]

38. Although a manufacturer told us that it saw hybrid technology as "a major mainstream technology as of now"[75], in the longer-term, the development of hybrid technology could help bring about the introduction of hydrogen-powered fuel cell vehicles through the development of electric vehicle technologies.[76] A third aspect of hybrid vehicles is that they provide a "safety net"; should fuel cell vehicles fail to become commercially available, hybrid vehicles powered by biofuels offer the prospect of vehicles with greatly reduced carbon emissions.[77]

Biofuel

39. Biofuel is a catch-all term for alcohols, ethers, esters and other organic compounds made from biomass such as herbaceous and woody plants, agricultural and forestry residues or municipal waste. Biofuels could be carbon neutral, but calculations must take

[70] DTI (2003) Energy White Paper para 4.6 page 45

[71] "Fuelling Road Transport – Implications for Energy Policy", Energy Saving Trust, Institute for European Environmental Policy and the National Society for Clean Air www.est.org.uk/est/documents/Fueling_Road_Transport_Jan_03.pdf

[72] Eyre N, Fergusson M, Mills R, (2002) Fuelling Road Transport: Implications for Energy Policy.

[73] In the United States a hybrid version of a S.U.V. is soon to be launched.

[74] Q580

[75] Q69

[76] "Carbon to Hydrogen": Roadmaps for Passenger Cars: A Study for the Department for Transport and the Department of Trade and Industry" (November 2002) Ricardo Consulting Engineers.

[77] Q102

account of energy used in growing and processing the crops, and other inputs such as fertilisers. It is possible that biofuels will become an option in the fairly short-term since a blend of conventional diesel with 5 per cent biodiesel can be used in unmodified cars and could reduce carbon dioxide emissions by up to 5 per cent. One vehicle manufacturer, PSA Peugeot Citroen, told us it had developed cars capable of running on 30 per cent blends.[78] The introduction of biofuels may be slowed by the difficulties in assuring quality of the fuel. The motor industry and the fuel suppliers are working together to agree standards.[79]

40. In the the Energy White Paper the Government announced that alongside renewably-produced hydrogen, biofuels represent an important potential route for achieving the goal of zero-carbon transport. The European Union has adopted a Biofuels Directive which requires the UK and other Member States to set their own indicative targets for the use of biofuels and other renewable fuels. The Commission's reference targets are two per cent use by 2005 and 5.75 per cent use by 2010.[80] The UK recently consulted on what targets to set for the UK.[81] The fuel cell industry has a 'Vision' published by the DTI, a forum for liaison through "Fuel Cells UK", and a separate research budget from DTI: biofuels do not have equivalent support . We concur with the conclusions of our colleagues on the Environment Food and Rural Affairs Committee that there is a lack of clear leadership in relation to biofuels.[82] The Department for Transport has now published an assessment of the implications of biofuel and renewable hydrogen powered road transport, but it has yet to adopt a strategy to achieve the widespread use of biofuels.[83] **Biofuels do not appear to be enjoying the same degree of focus and support as the Liquefied Petroleum Gas sector or the fuel cell industry, and this discrepancy should be addressed. The Department should transfer the recently published assessment of biofuels and hydrogen for transport use into action.**

Electric Cars

41. The vehicle manufacturers told us that electric cars are the most energy efficient cars on the road consuming one quarter the energy of the average petrol car.[84] They produce no tailpipe pollution, and if the electricity is generated from renewable energy sources, they produce no emissions. However electric cars have a limited range of up to about 50 miles before they need recharging, which is a significant drawback.[85]

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[78] Q32

[79] Q161

[80] The EU Biofuels Directive on the promotion of the use of biofuels or other renewable fuels for transport (2003/30/EC) was adopted on 08 May. The Department for Transport launched a 12 week public consultation on 26 April 2004 on the implementation of the Directive in the UK.

[81] DfT (April 2004) Towards a UK strategy for biofuels – public consultation www.dft.gov.uk. Closing date for responses was 16 July 2004.

[82] House of Commons Environment, Food and Rural Affairs Committee, "Biofuels" Seventeenth Report of Session 2002-03, HC 929-I and Third Special Report, Government Reply to the Seventeenth Report of the Committee, session 2002-03, HC 270 published 27 January 2004

[83] DfT (July 2004) Liquid Biofuels and Renewable Hydrogen to 2050: An assessment of the implications of achieving ultra-low carbon road transport.

[84] http://www.goingreen.co.uk

[85] Ev 32 & http://www.goingreen.co.uk

New fuel infrastructure

42. If there is to be a wholesale departure from conventional petrol and diesel cars over the next two decades the fuel infrastructure in the UK will have to change. There may be a need for "petrol" stations to offer a range of fuels, both liquid and gas. Table 3 below shows the existing refuelling infrastructure.

Table 3: Refuelling Stations on 15 July 2004

Type of Fuel Station	Number
Petrol Filling Stations	11,400
LPG stations	1182
Natural Gas stations	12
Electricity recharging points	13
Biodiesel stations	106

Data source: Energy Saving Trust and UK PIA

Role of Government

43. The Government clearly has a role in setting planning guidelines, developing operating and safety standards, and informing the public about such a major potential change to the road transport system. The Vice President of BP Oil UK told us that there had been difficulties in getting planning permission for alternative fuel sites such as hydrogen plants.[86] The DTI Minister, Jacqui Smith, acknowledged that the Government should play a part in setting safety standards to protect and reassure the local population.[87] However, a key and unresolved issue is the degree to which public sector engagement in the financing of new fuelling infrastructure is required.[88] Any future alternative fuels must ultimately be commercially viable and not dependent on subsidy.

Public funding of alternative fuel infrastructure

44. The Energy Saving Trust told us that the existing LPG refuelling stations had been installed by business without government assistance. In contrast, the Compressed Natural Gas infrastructure for use by heavy goods vehicles has received fairly significant funding, and this year grants of up to £70,000 are available from a total budget of £350,000.[89] Despite this investment, the DTI Minister, Jacqui Smith, suggested that public provision of a national alternative fuel infrastructure would not be desirable, and declared that the Government will not have a big role in terms of funding.[90]

[86] Q165

[87] Q662

[88] Ev 46

[89] Q503

[90] Q424

45. We were told that the Government considers that its primary role will be to create a market for alternative fuels, providing the commercial incentive which industry requires to develop the infrastructure itself. Jacqui Smith told us:

> What we learnt from LPG is that you need to put in place the incentives to create the demand and then that will make it commercially viable for the fuel companies to develop that infrastructure.[91]

However this approach leaves those investing in infrastructure vulnerable to downturns in the market, as the LPG industry is now discovering.[92] There is little incentive for the fuel companies to invest in completely new fuel infrastructure until there is a market to sustain such a change. Witnesses from the petroleum industry seemed confident that cars would continue to be powered on petrol and diesel for the foreseeable future and that oil reserves were available for many decades.[93] Accordingly, they seemed in no hurry to commit to introducing alternative fuelling infrastructure in the near-term. Mr Mumford of BP Oil UK was confident that 'when required' the fuel industry would be able to deliver:

> If you look at the example of what we did with AutoGas when we were asked to create a national network for that, we did it in a few years. The industry can respond fairly rapidly once there is a very clear direction.[94]

This raises the "chicken and egg" dilemma of alternative fuels: customers will not buy alternative fuel vehicles if the re-fuelling infrastructure is not available; but the fuel industry has no incentive to provide such an infrastructure if there is no demand.

46. **We do not advocate that the Government funds a wholesale replacement of the national fuel infrastructure. Nonetheless the Government should develop a 'road map' for future fuel infrastructure, which determines the timescale, legislation and investment required. The industry requires a clear statement of direction. The Government should be preparing to act as a leader in the accelerated development of such a network, if necessary. The Department of Trade and Industry has yet to demonstrate sufficient leadership for us to be confident it can play this role.**

Demonstration projects

47. The best way to introduce new fuel infrastructure is to start with small pilot schemes. These are most often geared towards fleet vehicles because this simplifies the provision of re-fuelling infrastructure required.[95] London is participating in a European Union project called Clean Urban Transport for Europe (CUTE) with a small fleet of hydrogen fuel cell buses.[96] A specific objective of this project is the "design, construction and operation of the

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[91] Q422

[92] Ev 4 & Ev 12 & Ev 51

[93] We were told by the fuel industry that "Conventional oil supply is estimated to be about three trillion barrels. To put that in context, we have used one trillion barrels of oil to date. Beyond that, there are unconventional oil reserves of something like four trillion barrels." Q151

[94] Q190

[95] Q96 & Q179

[96] Visit Note C: Transport for London Hydrogen Fuel Cell Bus

necessary infrastructure for hydrogen production and refuelling stations."[97] Vehicle demonstrations also help to establish and maintain the automotive supply chain.[98] Supporting demonstration projects does not amount to 'picking winners'.

48. The support of regional agencies has been important in the development of hydrogen demonstration partnerships, which have developed in London and Tees Valley.[99] Mr Evans of Johnson Matthey Fuel Cells told us that such demonstration projects could eventually be joined to create the basis of a hydrogen refuelling network.[100] While progress on hydrogen plants is at a very early stage in the UK, California already has a vision for installing a 'Hydrogen Highway' by 2010.[101] The goal of the California Hydrogen Highway Network initiative is to support and catalyse a rapid transition to a hydrogen transportation economy in California:

> The Hydrogen Technical Advisory Panel predicted several years ago that a hydrogen infrastructure will be in place in the US by the year 2050—with or without California's efforts. To bring the business and investment to the State, we must provide an unprecedented level of leadership to bear on the issue.[102]

49. The aim of the demonstration is to make hydrogen fuel available to the vast majority of Californians through a network of hydrogen fuelling stations every twenty miles on the major highways. Studies by the California Fuel Cell Partnership estimate that this initial network will cost $75 - $200 million. The majority of this investment will come from private investment by energy companies, vehicle manufacturers, high-tech firms, and other companies. The California Hydrogen Highway Network Action Plan suggests that the public sector needs to play a role in facilitating investment by the private sector and the development of the market though the use of incentives, loan guarantees, revenue bond funding, education and training. The 'Hydrogen Highway' is a huge demonstration project which is beyond the scope of the UK. California has chosen to invest very large sums in this development. While there may be dangers in backing specific technologies too soon, the 'Hydrogen Highway' project shows admirable ambition.

50. **Hydrogen fuel cell vehicles offer the prospect of zero emission road transport, yet infrastructure, distribution and storage difficulties remain major barriers to commercial development. Demonstrations such as the fuel cell bus project are vital in developing common standards for new fuelling and infrastructure systems. We strongly support initiatives such as the use of large scale low carbon bus fleet demonstrations. Early demonstration projects of this kind should ultimately be extended to form the beginning of a "hydrogen highway", or the equivalent for other emerging fuels.**

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[97] Clean Urban Transport for Europe: A fuel cell bus project in nine European cities. European Communities 2002

[98] Ev 39

[99] Ev 46

[100] Q508

[101] Governor Arnold Schwarzenegger's California Hydrogen Highway Network Action Plan, http://hydrogenhighway.ca.gov/ 20 April 2004

[102] http://hydrogenhighway.ca.gov/

5 Incentives for low carbon and alternative fuel cars

51. The consumer now expects a very high degree of comfort, performance and styling from a new car, all at a competitive price. When someone buys an alternative fuel car they are at a disadvantage in terms of cost, service, uncertain residual value and other risks. New car technology has a price premium because the vehicles do not benefit from the economies of scale associated with volume production and may be subject to additional costs linked to innovative technology and marketing costs. Consumer confidence in new or novel technologies remains one of the biggest challenges faced by vehicle manufacturers.[103]

52. Incentives are needed to encourage a significant number of people to purchase alternative fuel and low carbon cars. Toyota, for example, told us that the incentives provided were critical to the marketability of its hybrid car, because they help consumers overcome the price premium of such new technology.[104] Lex Vehicle Leasing illustrated why the incentives are vital to the low carbon and alternative fuel markets; Table 4 below compares the leasing and fuel costs of different versions of a Vauxhall Vectra Elegance from Lex Vehicle Leasing over three years based on 20,000 miles per annum[105]:

Table 4: Total Lease and Fuel Costs of a Petrol, Diesel and Liquefied Petroleum Gas Car

Fuel Type	3-Year Lease Costs[106] £	3-Year Fuel Costs[107] £	Total Lease and Fuel Costs £
Petrol	12,823	3,268	16,091
Diesel	13,276	2,529	15,805
LPG	14,403	2,059	16,462

Data source: Lex Vehicle Leasing Ev 47

The higher lease cost of Liquefied Petroleum Gas vehicles is driven by the higher purchase cost and lower residual value:

Table 5: Purchase Price, Residual Value, and Fuel Performance of a Petrol, Diesel and LPG Car

Fuel type	List Price £	3-Year Residual Value £	MPG	CO2 emissions g/km
Petrol	15,850	4,700	38.2	175
Diesel	16,760	4,900	50.4	151
LPG	17,800	4,550	30.4	157

Data source: Lex Vehicle Leasing Ev 47

[103] http://www.lowcvp.org.uk/uploaded/documents/PCWG-P-03-022_LowCVP_Submission_-_Pre-Budget_Report_Oct_2003.pdf

[104] Ev 6

[105] Assuming the organisation provides 60 per cent of the fuel for the vehicle (Ev 47).

[106] LVL costs assuming 20 per cent purchase discount & excluding any Powershift grant available (Ev 47).

[107] Based on average unleaded fuel costs of 76.4ppl, diesel 78.0ppl, lpg 38.3ppl – source Allstar fuels.

53. The Government committed itself to encouraging consumer take up of low carbon vehicles and fuels and overcoming 'market barriers' in its Powering Future Vehicles strategy.[108] There are currently a variety of incentives in place to attempt to encourage drivers to use low carbon and alternative fuel vehicles. These include the reformed company car tax, graduated Vehicle Excise Duty, purchasing grants for clean cars and catalyst technologies, fuel duty incentives, and exemption from the London Congestion Charge. These incentives are welcome, but they have had varying degrees of success.

The LPG experience

54. LPG was one of the first alternative fuels to appear in Britain. The Government attempted to support its introduction with a number of incentives. The package of incentives for LPG included purchasing grants towards the extra cost of LPG vehicles; reformed regimes for company car tax, graduated VED, and fuel duty relief - all of which reward cleaner vehicles. LPG has had a duty incentive over conventional petrol and diesel since 1994, which has increased over the years to the extent that in 2003-04 duty on LPG was 41 pence per litre lower than petrol. It is estimated that the cost to the Exchequer of providing this incentive has been approximately £185 million since 1996.[109]

55. The approach has been successful in that an LPG refuelling network has developed rapidly from scratch, to the point where there are now 1,350 LPG stations across the country. The number of LPG vehicles is now estimated at 100,000. The main difficulty with the LPG approach is that the Government identified a particular technology and pledged to support its introduction. This is a risky strategy in an area such as vehicle design where there is rapid technological development. Since 1994 many of the environmental benefits which LPG held over conventional fuels have been eroded (see Table 6 below). A modern diesel car produces less carbon dioxide per mile than LPG. A combination of advances in pollution abatement technologies and cleaner fuels suggests that the environmental case for LPG may grow increasingly weak.[110]

Table 6: Air quality and carbon dioxide emissions for LPG, diesel and petrol models of a car

Vauxhall Astra (2002)	Engine cc.	CO_2 (g/km)	NOx (g/km)	PM (g/km)	Euro Standard for local toxic pollutants
LPG	1598	151	0.031	n/a	IV
Petrol	1598	172	0.026	n/a	IV
Diesel	1686	119	0.412	0.023	III

Source: Julie Foley Tomorrow's Low Carbon Cars - Vehicle Certification Agency 2003

56. The LPG experience illustrates the difficulties that can arise when a particular technology is identified and supported, rather than establishing a framework based on

[108] Department for Transport, (2002) Powering Future Vehicles Strategy, para 2.4

[109] Ev 55

[110] Julie Foley (2003) Tomorrow's Low Carbon Cars, ippr.

environmental objectives. We were told that "picking winners" restricts technological options and distorts the market.[111] Toyota told us that technology-specific duty relief on LPG was damaging the introduction of other green technologies:

> Sales [of hybrids] have been inhibited by competition from (environmentally inferior) LPG and the additional fiscal benefit it receives at the pump. If the LPG subsidy continues, it will make it that much harder for any vehicle manufacturer to bring new technology to market.[112]

A strong message in the evidence we received was that a technologically-neutral approach to incentives should be adopted.[113]

57. Although the environmental benefits of LPG over diesel are declining, there has been significant investment, by the Government, the fuel industry and by other companies in LPG infrastructure and fleets. To simply abandon the support for LPG would jeopardize this investment. We were told that the LPG industry is already experiencing a significant downturn as a result of this uncertainty.[114] Calor Gas pointed to the damage that jeopardizing the future of LPG will bring to the alternative fuel industry as a whole, and suggested that if buyers sense that fuel differentials for green fuels are temporary, they will 'play safe'.[115] The Economic Secretary to the Treasury, John Healey, told us the Government was mindful of the need to move slowly in order to give the industry time to adjust.[116]

58. The Government should in future restrict itself to identifying the objectives it needs to achieve and encouraging and rewarding whichever technologies and fuels deliver against these aims, rather than attempting to "pick winners".

Purchasing grants

59. The Government funds purchasing grants to help offset the higher price of cleaner vehicles through the Energy Saving Trust's 'TransportEnergy' programme, which includes 'PowerShift' and 'CleanUp' grants. The PowerShift programme has a budget of £7.5 million for 2004-05 for grants to put towards the additional cost of buying a clean vehicle or converting an existing vehicle to run on cleaner fuels. PowerShift grants cover liquefied petroleum gas, natural gas, electric and hybrid vehicles. Since it began in 1996 the PowerShift programme has funded 17,000 vehicles.[117] The CleanUp programme gives grants to operators of commercial and public sector diesel vehicles (including black cabs, lorries, buses, emergency vehicles and refuse trucks) to assist with the cost of fitting emission reduction technologies. It has a budget of £7.5 million for 2004-05. The

[111] Q22 & Q168

[112] EV 6

[113] Q19, Q168, Ev 3, Ev 6, Ev 43, Ev 44, Ev 46, Ev 47, Ev 49.

[114] Q341 & Ev 12

[115] Ev 51

[116] Q594

[117] Q514

TransportEnergy programmes have saved 34,210 tonnes of CO_2 emissions in the last two years.[118]

60. The car manufacturers told us that the grants help new technologies and new types of vehicles break into what is essentially a very conservative market.[119] However the Transport Minister, David Jamieson, told us that the role of the grants is not to effect mass change in the car fleet:

> PowerShift and CleanUp are there to encourage new technologies. They are not there to make the major changes... These are to pump prime, to kick start. The real heavy lifting, as John [Healey] has indicated, is then done by the Treasury through other fiscal incentives.[120]

The Transport Minister and the Economic Secretary[121] were keen to emphasise that the Government would not use grant funding to subsidise the purchase of low carbon cars for the private motorist over the long-term:

> What we are doing with those grants is incentivising the take up of the new technologies, but there is absolutely no intention in the longer term that there would be a permanent subsidy for the private motorist on their vehicles. There may be longer term fiscal incentives to buy the cleaner fuels.[122]

Grant budget

61. The PowerShift and CleanUp grants have a combined budget of £15 million for 2004-05; a small increase on last year's budget of £14 million, which was fully committed by October 2003. Because of this the programme delayed accepting any applications until the start of the new financial year in April 2004.[123] We were dismayed by the Transport Minister's apparent complacency towards the inadequate funding of the grants scheme:

> This financial year, of course, it has been over-subscribed and next year it appears that we are going to be well-subscribed as well, although it will depend on applications... They ran out of funds this year and there were no more funds available, unless of course we had taken it from some other part of the Department's budget, which we were unwilling to do.[124]

62. The Energy Saving Trust has taken steps to spread the budget over the year to avoid last year's problem of being fully committed after only six months. A budget limit has been set for each two-month period. However, in the first two-month period of the new financial year, both programmes were once again fully committed and applications were delayed until the start of the following period.[125] Furthermore, in an attempt to make the budget

[118] DTI www.autoindustry.co.uk/news/industry_news/news-55akednk3j?s=1b9suo7p8bjwbnju

[119] Q79

[120] Q578

[121] Q593

[122] Q592

[123] Q521

[124] Q584

[125] www.transportenergy.org.uk/grantsavailable/latestgrantsupdates/

stretch further, the individual grants have been cut by about a third. The new grant levels are shown in Table 7. The Energy Saving Trust and the Transport Minister were confident that the market for cleaner vehicles was significantly robust to survive the reduction in grant awards.[126] They considered that the vehicles supported by PowerShift grants had improved in design, approached market viability and become higher volume products, and consequently the purchase price and barriers in the market had reduced.[127] We heard concerns that the market was not sufficiently robust to survive a cut in the grant awards.[128] The level of demand in the first two-months of the new financial year suggest these concerns are unfounded.[129]

Table 7: PowerShift Grant Levels for Cars, in England, Northern Ireland and Wales 2004-05

	Fuel/ Technology Type		
Vehicle Category	**Liquefied Petroleum Gas**	**Hybrid**	**Electric**
Mopeds	-	-	£200
Microcars	-	-	£1,000
Passenger cars and car-derived vans	£700	£700	£1,500

Data source: TransportEnergy

63. **The 2003-04 budget for PowerShift and CleanUp grants was fully allocated six months before the end of the financial year, but the Department for Transport failed to respond by increasing the budget for this year. Given the slow progress towards its environmental commitments the Department should provide extra funding for the grant scheme as a matter of urgency. Support should be available for the grant programme while it continues to be a necessary and effective incentive.**

Reform of the grant funding system

64. Until recently the TransportEnergy purchase grants were geared towards air quality benefits rather than low carbon emissions.[130] Additional factors such as the cost of the technology were also considered.[131] For this reason, technologies did not compete on equal terms. In January 2004 the Energy Saving Trust simplified the levels of PowerShift grant funding.[132] There are proposals to further review the PowerShift grant funding to ensure the scheme is focused on carbon dioxide reductions, and the Energy Saving Trust told us it is currently working with the Department for Transport and members of the Low Carbon Vehicle Partnership to develop a new Low Carbon Vehicle Incentive Programme.[133] A

[126] Q584 & Q545

[127] Q524

[128] Q235

[129] www.transportenergy.org.uk/grantsavailable/grantstructure2004/

[130] Q552

[131] Ev 32A

[132] Energy Saving Trust Stakeholder Discussion Paper: Proposed Changes to CleanUp and PowerShift for Financial Year 2004/05 (07/01/04).

[133] Ev 32A

further consultation on TransportEnergy clean vehicle grant programmes was announced on 28 June 2004.[134] **We agree that the new Low Carbon Vehicle Incentive Programme should use emissions as the sole criteria for grant levels. The Government must avoid discriminating according to technology type or vehicle category and should allow the industry to determine which technologies and fuels meet the objective of the lowest emissions.**

Fiscal incentives

65. The Transport Minister, David Jamieson told us that the 'heavy lifting' in terms of encouraging the use of cleaner vehicles was done through Treasury incentives. The fiscal incentives currently available are discussed below.

Company car tax reform

66. In April 2002 the Government reformed company car tax and began to calculate it on the basis of carbon dioxide emissions. The reformed system is designed to provide financial incentives for employers and company car drivers to choose cars which emit lower levels of carbon dioxide. Although it has not increased the use of alternative fuel vehicles, there was consensus among our witnesses that reformed company car tax has been extremely successful in encouraging cleaner conventional vehicles, and in particular a switch to diesel cars.[135] An evaluation of the company car tax reform found that in 2003 alone it had saved around 0.15 to 0.2 million tonnes of carbon, equivalent to around 0.5 per cent of the carbon dioxide emissions from all road transport.[136] Over half of employers who provide company cars have changed their policies towards carbon dioxide emissions and are actively encouraging their employees to switch to cars with lower carbon dioxide emissions. The cost of the company car tax reform in income tax and National Insurance revenues was estimated to be around £10 million in 2002-03, and around £120 million in 2003-04. Although significantly higher than the Inland Revenue anticipated, the additional costs are modest in the context of overall revenue receipts from company car tax accounts, which totalled £2,660 million in 2000-01.[137]

67. Companies buy about half of the new cars sold each year and because a significant proportion of the second-hand car market consists of ex-company cars there is potential for significant long-term environmental benefits from company car tax. We received evidence calling for the Inland Revenue to announce taxation levels for periods suited to the timeframe in which company car purchasing and leasing decisions are made. Companies typically change their cars on a three to four year cycle. The Inland Revenue has provided carbon dioxide taxation rates until 2005-06; this leaves companies uncertain what level of taxation will be charged on vehicles towards the end of a typical contract. **The**

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[134] DfT www.dft.gov.uk/stellent/groups/dft_roads/documents/page/dft_roads_029321-01.hcsp#P31_922

[135] Ev 47 & Inland Revenue (2004) Report on the Evaluation of Company Car Tax Reform www.inlandrevenue.gov.uk/cars/cct_eval_rep.pdf & Low Carbon Vehicle Partnership Passenger Car Working Group: 2012 Low Carbon Car Target – Barriers and opportunities Submission to the Pre-Budget Report 2003 October 2003. PCWG-P-03-014

[136] Inland Revenue (2004) Report on the Evaluation of Company Car Tax Reform

[137] Ev 55

Inland Revenue should publish the proposed taxation rates for company cars for the forthcoming four years and update them on a rolling annual basis.

68. Diesel vehicles tend to produce lower carbon dioxide emissions and there has been a significant increase in the sales of diesel cars since the details of the company car tax reform were first announced. It is estimated that the proportion of company cars running on diesel is around 40-45 per cent; and that this will increase to about 50-60 per cent by 2005.[138]

69. The reform of company car tax policy has had a number of unintended effects. We were told that the reform had been the catalyst for structured 'cash for car' schemes and that employees have opted out of traditional company car policies and into such schemes.[139] 'Cash for car' schemes remove the focus on carbon dioxide emission levels. Lex Vehicle Leasing told us that the average carbon dioxide emission level of the vehicles delivered by its personal leasing division was 11 per cent higher than those delivered to customers with traditional company car policies. The increasing popularity of 'cash for car' schemes could undermine the progress made within the company car market.

70. **The reformed company car tax regime has been most effective in encouraging cleaner cars. The challenge is to transfer this policy success to the private car market. At present, there are no incentives in place capable of achieving this. Moreover, people are now opting out of the company car regime and choosing higher emitting cars in the private market. The Department for Transport and the Treasury need to create effective mechanisms in the private market to relate motoring charges to pollution more directly.**

Vehicle Excise Duty

71. Vehicle Excise Duty contributes about £4.5 billion a year to general Government revenues.[140] Tax bands for cars registered after March 2001 are based upon levels of carbon dioxide emissions, with lower rates for cleaner cars.

[138] Inland Revenue (2004) Report on the Evaluation of Company Car Tax Reform

[139] Ev 47

[140] Q570

Table 8: Duty Rates for Private Cars Registered on or after 1 March 2001

Bands	Carbon Dioxide Emission Figure (g/km)	Diesel Car £	Petrol Car £	Alternative Fuel Car £
Band AAA	Up to 100	75.00	65.00	55.00
Band AA	101 - 120	85.00	75.00	65.00
Band A	121 – 120	115.00	105.00	95.00
Band B	151 – 165	135.00	125.00	115.00
Band C	166 – 185	155.00	145.00	135.00
Band D	Over 185	165.00	160.00	155.00

Source: DVLA at http://www.dvla.gov.uk/vehicles/taxation.htm (June 2004)

72. The evidence we received strongly suggested that graduated Vehicle Excise Duty was not influencing customer choice.[141] Research by MORI for the Department for Transport has shown that new car purchasing is dependent on a number of key factors (price, fuel consumption, size, reliability and comfort) but road tax is not among the most significant and environmental considerations are given least consideration.[142] In a recent survey nearly four in five car buyers did not look at the vehicle's emission rating before purchase. The majority of drivers are still not aware that VED is now calculated on the basis of emissions. Only fourteen per cent of drivers questioned identified that road tax is now based on the carbon dioxide emission of the vehicle. The majority of car buyers still believe that road tax is calculated using the size of a car's engine. The Department could take the opportunity to reinforce the message of how VED is now calculated when issuing the renewal note or through simple measures such as colour-coding the disk. **Car buyers are unlikely to be influenced by graduated Vehicle Excise Duty levels if they are not aware of how the system operates. The Department for Transport should review its publicity strategy and ensure that awareness of such initiatives is improved.**

73. In addition, the current graduated scheme does not offer a large enough incentive to encourage changes in behaviour. The difference in duty for the most polluting and the cleanest vehicles is small, and the difference between neighbouring bands is minimal. The maximum VED amount currently payable is £165 per annum for a Band D diesel car. This is only £100 more than the rate payable for a Band AAA petrol vehicle. Compared to the overall cost of buying a car and running a car, this charge is insignificant. Mr Sellwood of the Energy Saving Trust told us:

> Because there is no real differential it is very, very difficult to understand what point is trying to be made from an environmental point of view with VED.[143]

[141] Q511, Q513

[142] DfT www.dft.gov.uk/stellent/groups/dft_roads/documents/pdf/dft_roads_pdf_027589.pdf

[143] Q513

Department for Transport research suggests that a higher differential would change purchasing behaviour. If the differential between bands was £50, a third of people surveyed said they would change to a less polluting vehicle; if this differential were raised to £150, over half would change; and if it were £300, 72 per cent of private car buyers say they would change to a lower emission model.[144] The Energy Saving Trust told us it thought the Government should widen the differential between tax bands by £150.[145] In contrast, the Economic Secretary to the Treasury, John Healey, was not convinced that an increase in VED differentials would be effective:

> VED, at the top whack at the moment it is £165 per year, it is pretty small and any even substantial increase will still leave vehicle excise duty on its own as a factor as a relatively minor, modest part of the overall cost of a new car purchase.[146]

74. **The difference in the level of carbon emitted from various vehicles is significant: a 4x4 can produce up to four times more carbon dioxide per mile than the most fuel-efficient small cars.**[147] **The way we pay for road use may change radically in the future. However, whilst Vehicle Excise Duty continues to be part of that charge, the way it is structured should be made responsive to evolving policies. The differentials between Vehicle Excise Duty bands must be widened to ensure that the graduated system influences car purchasing decisions. Owners of cars which produce high levels of carbon should be made to pay for the environmental damage they cause.**

Fuel taxation

75. Last year the Government raised £22 billion from fuel duty.[148] But fuel duty is not just a source of income, it can also be used to encourage changes in consumer behaviour.[149] Fuel duty affects the overall running cost of driving a vehicle; a factor given more consideration by drivers than Vehicle Excise Duty or emissions levels. Drivers are sensitive to changes in the price of fuel, as the recent demonstration by road hauliers showed. Although John Healey, the Economic Secretary to the Treasury, told us "it is a blunt instrument",[150] fuel duty differentials have in the recent past successfully been used to encourage a transition towards unleaded petrol, ultra low sulphur fuels and to a lesser extent, towards road fuel gases. The success of this aspect of fuel duty is widely acknowledged.[151]

76. In the 2003 Pre-Budget Report the Government published an Alternative Fuels Framework for the future taxation treatment of alternative fuels. The purpose was "to ensure that policy continues to reflect the environmental benefits that alternative fuels can

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[144] MORI (2003) Assessing the Impact of Graduated Vehicle Excise Duty, research study conducted for Department for Transport.

[145] Q512

[146] Q572

[147] A Honda Insight emits 80 grams of carbon dioxide per kilometre compared to emissions of 324-350 grams of carbon dioxide per kilometre from a large petrol off-roader such as Mercedes-Benz M-Class. See https://www.theaa.com/portal/appmanager/cbg/live for more information.

[148] Q665

[149] Q672

[150] Q668

[151] Ev 22, Ev 24, Ev 46, Ev 48.

deliver and to establish a clear rationale for decisions on Government support."[152] In the Framework the Government announced a welcome three-year rolling period of stability in duty rates for alternative fuels.[153] The evidence we received indicated that stability is important for providing confidence for investors, and both vehicle manufacturers and fuel suppliers wanted long-term price signals.[154]

77. Within the Alternative Fuels Framework the Government announced that levels of support would reflect the full environmental impact of a fuel, with the emphasis being on "quantified benefits that are based on the life-cycle carbon performance of the fuel." Table 9 below gives the well-to-wheel emissions for different fuels compared to their duty levels. It demonstrates that duty levels and well-to-wheel emissions are not well aligned. Some biofuels would gain from a well-to-wheel approach to setting duty.[155] As the table shows, both the biodiesel and bioethanol options produce lower well-to-wheel emissions than Liquefied Petroleum Gas or Compressed Natural Gas; yet biofuels are liable to a higher rate of duty than road gas fuels. Our colleagues on the Environmental Audit Committee reached a similar conclusion about biofuel duty in 2003.[156]

Table 9: Relationship between fuel duty and well-to-wheel greenhouse gas emissions

Fuel	Greenhouse gas well-to-wheel emissions in grams of CO2 equivalent per kilometre	Fuel duty in pence per megajoule
Bioethanol - Ethanol From Woody Biomass	2.4 – 38.1	1.21
Biodiesel - Rape Methyl Ester	88.8	0.79
Bioethanol - Ethanol From Sugar Beet	125.7 – 140.1	1.21
Compressed Natural Gas	157.7	0.18
Diesel	173.5	1.28
Liquefied Petroleum Gas	181.9	0.20
Petrol	211.1	1.41

Data source: Tomorrow's Low Carbon Cars, Julie Foley, ippr, 2003

78. A system based on well-to-wheel emissions would require a radical overhaul of the methodology used to set fuel duty.[157] Malcolm Fergusson of the Institute for European Environmental Policy told us:

> It will not be easy for the Treasury... They are used to taxing a product, which is a litre of fuel. Actually having to look back down the chain to the process and to the

[152] HM Treasury (10 December 2003) 2003 Pre-Budget Report

[153] Q25

[154] Ev 46

[155] Q116

[156] House of Commons Environmental Audit Committee 'Pre-Budget Report 2002' Fourth Report of Session 2002-03 HC 167, para 9.

[157] Ev 46

> feedstock… to work out what the level of tax should be does not fit with the way the Treasury does things.[158]

The ippr considered that although the process may be complex, the current system is failing and it is therefore sensible to look for alternative ways of providing a technologically-neutral and transparent way of determining fuel duty.[159]

79. **The current fuel duty incentives send out a confused message. The Alternative Fuels Framework will only be truly transparent when it is technologically-neutral and based on a calculation of the full environmental impact of each fuel. As a first step we welcome the stability which the introduction of a three-year rolling fuel duty framework will bring to the alternative fuel market, but in the longer-term the Government must provide more transparency in how duty incentives are decided.**

Fuel duty revenues

80. Fuel duty incentives effect the overall revenue collected. Advances in fuel efficient vehicles combined with fuel duty incentives for alternative fuels could reduce the amount of fuel sold and the duty revenues the Government receives. Researchers have estimated that within the next two years, tax yield could drop by at least £1.5 billion per annum and decline steadily thereafter, largely as a result of increased fuel efficiency.[160] Such a drop in fuel tax revenues would indicate that environmental policies are working; however, "stealth tax cuts" on this scale could cause problems for the Treasury. The Economic Secretary to the Treasury, John Healey told us:

> In principle, with the gains in fuel efficiency of engines, if all other variables remain the same, you are going to get a drop off in the amount of fuel used and therefore a revenue hit. The sort of figures that you are talking about are not ones that are recognised, but in principle that may be a factor in the long term revenue projections.[161]

81. Reduced fuel duty revenue may not be sustainable indefinitely. **The Treasury's policies are expected to do the "heavy lifting" in terms of encouraging the use of cleaner vehicles. They have so far had limited impact due to the need to compromise between improving the environment, facing the political difficulties of increasing fuel duty on more polluting fuels, or reducing an important source of revenue. We recommend that the Department undertakes a comprehensive study to examine the role of the different driving related charges, and to identify an effective system of charges for the future.**

6 Vehicle safety technology

82. Continual development in car design has improved road safety over a number of years. There has been much discussion over the past few years about futuristic sounding

[158] Q111

[159] Q132

[160] Graham Parkhurst (ESRC 2003).

[161] Q628

technologies, such as systems which could make cars automatically avoid collisions. However, it became clear to us during the course of our inquiry that there is no need to wait for the cars of the distant future to realise significant safety benefits. Even using the many technologies already available great improvements in safety could be made, for example, it is estimated that half of all fatal and disabling injuries could be avoided if all cars provided the impact protection of the best cars in the same class.[162]

83. The background research to the Government's Road Safety Strategy concluded that out of all new policies under consideration, improved vehicle crash protection for car occupants and pedestrians would have the greatest effect in reducing road casualties.[163] The benefits of crash prevention and protection could be significant. The motor insurance industry pointed to the economic benefits:

> UK motor insurers deal with an estimated 9,500 vehicle collisions a day at a cost of £13.86 million per day. New vehicle technology, that seeks to limit the scope for such human error, could therefore have a huge and welcome implication for reducing the number of road traffic collisions in the UK and lowering casualty rates.[164]

A reduction in casualties would reduce the human tragedy and the burden on the health service of road crash victims. There are many potential vehicle technologies which could improve safety, and the systematic use of cost benefit analysis will be needed to decide which are most promising.

Potential safety technologies

84. The memoranda we received detailed a whole range of different vehicle technologies which could be used to reduce deaths and injuries on Britain's roads. Many of these technologies are already starting to appear in the luxury models. We heard about the casualty reduction potential of 'intelligent' seatbelt reminder systems and airbags which adapt according to seating position and occupant size to optimise protection; Advanced Braking Systems; Emergency Brake Assist; improvements in vehicle manoeuvrability, such as Electronic Stability Control which reduces lateral skidding and roll over crashes; and safer car fronts which are less likely to kill pedestrians in a collision. The impact of these technologies will increase as they are applied in a growing number of cars on Britain's roads.

85. Some technologies are just beginning to appear on the market. Toyota told us of a pre-crash technology it is introducing, which uses radar to detect obstacles in front and activates other technologies if an obstacle is detected, for example the pre-tensioner is tightened, the car slows down, and if need be the air-bags will deploy.[165] Other technologies are under development. There has been a lot of interest in 'preventive safety measures' which help the driver to avoid collisions. A limited number of preventive technologies are

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[162] European Road Safety Action Programme. Halving the number of road accident victims in the European Union by 2010: a shared responsibility. Brussels, Commission of the European Communities, 2003

[163] Broughton J et al. "The numerical context for setting national casualty reduction targets". Crowthorne, Transport Research Laboratory Ltd, 2000, (TRL Report No. 382).

[164] Ev 50

[165] Q40

already on the market, notably Adaptive Cruise Control which detects slower vehicles ahead and adjusts the speed of the car appropriately. More sophisticated preventive technologies are likely to be available in the medium-term, including Lane Assist and Intelligent Speed Adaptation. As we noted in the report on Road Traffic Speed, Intelligent Speed Adaptation could reduce fatal collisions by 59 per cent.[166] In the longer term we may see automatic collision avoidance systems.[167]

86. The next step is for these emerging technologies to be demonstrated and fully evaluated. We heard that the safety benefits of existing automated technologies are not always impressive.[168] Even when a technology has been proven effective, introducing it into such a competitive industry is a challenge and the pace of market introduction of safety technologies can be very slow.[169] The more sophisticated preventive technologies such as collision avoidance and Lane Assist require investment in public infrastructure to support the applications. The merits of investing public money in this infrastructure will need to be debated. The manufacturers, researchers and public authorities need to work in co-operation at an early stage to ensure that there is agreement about what is needed and who should bear the cost.

Government strategy on advanced safety technologies

87. Vehicle design standards are decided largely at international and European levels rather than nationally. Safety features are no exception. However, national governments have a role in setting priorities, commissioning research, collecting and analysing data and disseminating information. The UK Government continues to have significant influence globally, due to the size of the UK car market, the UK's position as a global leader in road safety and the role of the UK's vehicle design industry.

Human factors implications

88. Some Advanced Driver Assistance Systems (ADAS) introduce an element of automated driving and with this may come new safety problems and increased levels of risk. We were told that Adaptive Cruise Control was just the first step in a potential and planned path towards fully automated driving:

> The next stage is for ACC to be extended to driving down to 0 km/h and then to be supplemented by forward collision avoidance. At this point the car will be able to handle all car following situations and essentially we will have automated longitudinal control. The next stage is to add assistance systems for lateral control, including lane changes. Once a vehicle is capable of making autonomous decisions for both longitudinal and lateral control, most driving is automated. Full

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[166] House of Commons Transport, Local Government and the Regions Committee 'Road Traffic Speed' Ninth Report of Session 2001-2002 Volume 1. HC 557-I, para 101.

[167] Ev 11

[168] Ev 45

[169] Ev 11 & "Road Safety: Impact of New Technologies", Paris, Organisation for Economic Co-operation and Development, 2003 & DETR Tomorrow's Roads: Safer for Everyone (2000) p57, & Commission for the European Communities (2003) Communication from the Commission to the Council and the European Parliament: Information and Communication Technologies for Safe and Intelligent Vehicles (SEC(2003)963), p12 Brussels.

> "autonomous" driving is achieved with the addition of a "Crossing Assistant" to aid drivers at intersections.[170]

89. The desirability of replacing the human driver with automated technology is questionable and there is a pressing need for close evaluation. Professor Carsten told us:

> We… need to examine carefully whether a path of creeping automation of driving, in which the driver is progressively required to do less and less is a sensible one. A driver who is required to do almost nothing to keep his or her vehicle on the road is not likely to be an alert and safe driver.[171]

A specific concern is that drivers may not maintain their alertness and awareness when they are required to have very little input into driving their cars. Some drivers are expected to use the equipment not to improve safety but to drive more riskily, for example to follow the vehicle in front much more closely, or to drive faster in the hope that the systems will be able to handle imminent collisions. There may be risks when drivers have to move from automated driving on equipped roads to manual driving on unequipped roads, and drivers may not respond correctly to failures in the system. "Automation-induced complacency" means drivers become over reliant on the proper operation of the system and are unable to detect or respond appropriately when things go wrong.[172]

90. It was suggested to us that a "precautionary principle" approach should be adopted in relation to technologies which automate the driving task, and that such advanced technologies should not be deployed without a formal process of approval.[173] However Adaptive Cruise Control came on to the market without any formal safety certification, and there is a danger that other Advanced Driver Assistance Systems will be fitted without any empirical evidence that they do not inadvertently harm safety.[174] Professor McDonald argued that proper engagement between industry and Government would be necessary to make sure that new vehicle technology continues to reduce casualties and does not risk increasing them.[175] We were told that this kind of dialogue was not taking place effectively and that there was a "large gap in common understanding" between manufacturers and government policies.[176] A vehicle manufacturer told us it was developing technologies which "react to behaviour and mood patterns."[177] It seems likely that their use will raise new human factors issues which must be assessed and monitored.

Independent data analysis

91. Safety technology developments by vehicle manufacturers require independent analysis. The Government has an important role in directing technological development, research and evaluation. However, it currently collects little independent data on the safety

[170] Ev 45

[171] Ev 45

[172] Ev 45

[173] Ev 45

[174] Ev 45

[175] Q359

[176] Q358

[177] Ev 6

impacts of advanced active vehicle safety technologies, and largely relies on the data supplied by vehicle manufacturers.[178] Mr Fendick of the Department for Transport told us the main source of data is German manufacturing data, and that, "it is a very difficult sort of study to do, to actually look before and after and come to a conclusion about whether people are avoiding collisions because of vehicle technology."[179] It seems that the manufacturers are able to make claims about what safety benefits these systems provide, with little corroboration from independent research. Although, the Department for Transport's research programme includes advanced technologies such as driver assistance systems, these evaluations have been aimed at single systems rather than the combined effect of various systems.[180] Yet it is quite possible that when a variety of advanced technologies are introduced together in a vehicle, there will be negative effects on safe driving behaviour.

92. The safety experts from whom we took evidence suggested that Government should be involved in independent research of the benefits and risks of driver assistance systems.[181] Such research would enable the Government to have an authoritative voice to lead the debate on advanced vehicle safety technologies and would enable the Government to adopt a strategic view about which technologies are desirable. **New vehicle safety technology has been introduced incrementally in the past, with little evaluation by Government. This laissez-faire approach must not be applied to systems which take control from the driver and which may introduce new dangers as they seek to remove old ones. The Government must ensure that new systems are fully and independently evaluated before allowing their introduction. Such monitoring should look at the overall impact on safety of a combination of different technologies.**

Driver training

93. Features which are introduced with the intention of improving safety can have the reverse effect if the driver does not understand how to use the technology, or is not clear about the limitations of the device. Road safety campaigners, the insurance industry and the car retail industry all agreed that it is important to train drivers in the use of new technological devices, both to ensure the technology is used effectively and to ensure road safety.[182] The need for appropriate driver training is illustrated by the example of Advanced Braking Systems (ABS), where a large number of drivers did not fully understand how to use the technology at first, reducing the safety benefit. Professor Carsten told us:

> Some of the problems with ABS are that people get frightened when it first comes on because it does something they do not expect it to do - it makes a loud noise, bangs around or whatever – and they take their foot off the brake pedal in response to that loud noise which is the worst thing they can do in that situation... People do need training.[183]

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[178] Ev 22

[179] Q603

[180] Ev 22A

[181] Q380 & Q381

[182] Ev 38, Ev 44, Ev 11.

[183] Q369

94. The Transport Minister, David Jamieson, confirmed that there had not been much progress on training qualified drivers to use new vehicle technology, and that it needed further development.[184] Witnesses agreed that it was the role of the vehicle retailer to impart information about technological equipment before selling a car and that the driver should take necessary steps to ensure they understood how to operate the vehicle safely. The Retail Motor Industry Federation were confident that their members were capable of carrying out this function:

> Certainly if you are a dealer who is selling a car you would expect to – and you would be required to as things stand at the moment, although not perhaps legally – support that vehicle in terms of how people use it, training and the skills base that the customer needs to have to be able to use it safely.[185]

Professor McDonald drew attention to the possibility of imposing a legal requirement for retailers to train customers in the new equipment:

> In America if you buy a Mercedes with adaptive cruise control… you are given a short training course and you have to sign to say that you have been adequately trained and the use of ACC is your responsibility, before the car can be sold.[186]

95. Another option is the compulsory provision of information videos with new vehicles at the point-of-sale. Such videos should meet set standards and would advise the purchaser of any new technologies installed and how to make the most from their vehicle's advanced safety features. There may be difficulties ensuring that training takes place satisfactorily in the second hand car market.[187]

96. Although the driving test gives an opportunity to train the driver in vehicle technology, a better tailored driving test would not reach already qualified drivers. It seems reasonable that drivers should not get behind the wheel of a car without first making sure they know what systems it has installed and what to expect both when the systems are active and when they fail. According to a report by the RAC most drivers supported the idea of periodic refresher training for all drivers, typically every 5 to 10 years.[188] **Drivers must understand how to operate the equipment in a new car. Only car retailers are currently in a position to tell car buyers how to operate advanced technology properly. They should have a legal obligation to inform customers of the driver assistance equipment in a vehicle, and to explain the purpose, limitations, and function of the equipment. The Government should introduce a formal process for recording that a retailer has fulfilled this obligation.**

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[184] Q624

[185] Q339

[186] Q371

[187] Q349

[188] RAC Report on Motoring 2002: Going too fast, going too slow?

Liability

97. The Association of Chief Police Officers told us it was not satisfied with the legal situation in crashes involving automated driving technology.[189] It was Toyota's view that the driver should remain responsible for control of the vehicle and using the automated equipment safely, although it recognised that manufacturers should do all they can to make the ergonomics of the systems as failsafe as possible:

> Basically we believe that you cannot take responsibility away from the driver. We have our responsibility to make these things work, but it should never mean that the driver simply can forget his own responsibility.[190]

98. Nonetheless, new vehicle technologies, in particular those that automate parts of the driving task previously carried out manually, have created confusion about safety and liability in the event of a crash.

99. Manufacturers, insurers and enforcement agencies alike want to know where liability lies. Car manufacturers, component manufacturers, associations and governments have been involved in a working group at the European level to look at some of the legal issues, but we were told that progress in establishing standards had been slow.[191] Mr Jamieson, the Transport Minister, agreed that advanced vehicle technologies were moving into new legal situations and that these required attention by the Government.[192] **It is clear that aspects of vehicle technology and design are advancing ahead of associated legal, policing and driver training considerations. The Department for Transport, Home Office and Police Authorities must close this gap. It is in the interests of everyone to have liability and responsibility clarified. The Government must ensure that legislation and standards keep pace in order to protect both the industry and consumers.**

7 Telematics for intelligent transport systems and law enforcement

100. Telematics technology allows communication between vehicles, and between vehicles and the road infrastructure, using a combination of telecommunications and information technology. The application of telematics in "intelligent transport systems" can improve traffic control and efficiency, for example, electronic motorway tolling and congestion charging.[193] EADS Astrium Ltd claimed:

> The… car of the future will be a less discrete vehicle than it is today. It will become… a 'networked' product. That is to say that it will use modern technology to both receive information about its environment (in particular its location) and to some limited extent provide similar information about its own status to other parts of the

[189] Q363

[190] Q42

[191] Q48

[192] Q579

[193] ITS-UK http://www.its-focus.org.uk/index.html

> network. If the car of the future is networked in this way it could have significant implications for both the car user and the wider public interest.[194]

101. Telematics could be used to improve road safety, increase road capacity and reduce congestion.[195] The Government, local authorities and the emergency service providers will have to be fully involved if we are to achieve some of these benefits.

Satellite location technology

102. Vehicle manufacturers told us that the integration of navigation and communication technologies could present a host of opportunities. Toyota estimated that by 2010 all new cars would be equipped with satellite navigation.[196] The manufacturers anticipated that the current 'passive' navigational aids would be developed to become more active and intelligent technologies capable of providing warnings of congestion and ultimately providing alternative routes to different vehicles to divert congestion:

> Toyota vehicles are already available with "turn-by-turn" navigation, alerting drivers to less congested routes. However, even this is hindered by the fact that vehicles are likely to the follow similar advisory instructions, soon blocking up alternate routes. More "intelligent" systems are needed which can assess traffic conditions and the likely impact of diverting some vehicles to one route and a separate number to another alternative. In this way road capacity would be maximised and serious congestion largely avoided.[197]

103. The Department for Transport told us that satellite equipment could eventually provide information about such things as road traffic crashes, parking facilities, bus lane status, approaching bridge heights, and planned road maintenance.[198] Telematics equipment could also allow vehicles to transmit data to the roadside such as speed and flow density.[199] The provision of remote and real-time roadworthiness information could help both fleet managers and vehicle inspectors.

104. The Department for Transport recognised that it would need to research the regulatory, proprietary, institutional and other enabling factors necessary to enable key new technologies to flourish.[200] Co-operation will be vital to ensure systems deliver economic and policy benefits. Professor McDonald told us:

> More fundamental understandings are needed to guide legislation and ensure that market driven products do not negatively impact on long term policy goals.[201]

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[194] Ev 18

[195] Ev 18

[196] Ev 6

[197] Ev 6

[198] Ev 22

[199] Ev 23

[200] Ev 22

[201] Ev 52

105. The Department stressed that its approach to the introduction of telematics systems was one of partnership with business and consumers, local government, transport operators and technology providers.[202]

Automated 'platoons'

106. We heard from car manufacturers that telematics technology, rather than simply offering congestion avoidance advice, could also help maximise the capacity on our roads:

> Already top-of-the-range models can contain devices which calculate the distance to the car in front and adjust the speed via cruise control to maintain a safe distance. The logical extension to this system will become evident once it is in all cars. When that situation arises, traffic can move safely, close together in "platoons" at a regulated speed. Thus the capacity of roads should be further increased.[203]

107. The Committee saw a demonstration of a 'platoon' merging at a junction without driver intervention at the California Partners for Advanced Transit And Highways (PATH). At PATH we heard that road capacity is currently used with staggering inefficiency: in the United States only 5.5 per cent of a lane is used at any one time. Research identified that automated trucks had reduced levels of drag, reduced emissions, better fuel economy, and using platoons doubled road capacity from 800 trucks an hour to 1500.[204] However this technology is extremely expensive. Full automation is likely to require a dedicated lane[205] in addition to the automation equipment.[206]

108. Automated platoons may not be suitable on the UK's road network because the junctions are closely spaced and there are many short distance journeys.[207] There could be safety risks as drivers move between automated and manual driving on equipped and non-equipped roads[208] and there is also the problem of managing traffic flows away from the dedicated lanes. Professor Carsten told us:

> If you double the capacity of a motorway then urban areas and the other parts of the road network also have to double up on their capacity and that is almost impossible.[209]

109. **Congestion is forecast to get worse: we need to ensure that we get the most from the technology on offer. Vehicle and telematics technology could be used to increase the capacity of our road network. The Department for Transport should develop a technology strategy setting out what it, the Highways Agency, emergency services and local authorities need to do to guide the development of these systems.**

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[202] Ev 22A

[203] Ev 6

[204] Visit Note A: Transport Select Committee Visit to USA, January 2004.

[205] Q374

[206] Steve Shladover, Research Engineer, California 'Partners For Advanced Transit And Highways' (PATH) presentation to the Transport Committee on Visit to America in January 2004.

[207] Q373

[208] Q373

[209] Q384

Automatic emergency call systems

110. The time it takes for the emergency services to reach a crash is critical to the survival of the casualties, but the location of a crash cannot be accurately determined in 40 per cent of emergency calls. A system known variously as 'E-Call' or 'E-merge', uses two-way communication technology and 'location referencing' to automatically alert emergency services to the location of a car and the severity of the crash following a collision. The European Commission estimates that better location information could reduce road fatalities by 10 per cent through the consequent improvements in response times.[210]

111. In January 2004 tests of 'E-merge', a harmonised facility across the EU, began. This uses the sensors which trigger the airbags to automatically detect when a car has crashed and send a text message telling emergency services, in the local language, that the incident has taken place.[211] The company which developed the technology has said that if EU states are willing to fund the necessary infrastructure, E-merge could be working by 2008. In August 2004 the European Commission, European Automobile Manufacturers Association (ACEA) and ERTICO signed a Memorandum of Understanding aimed at introducing interoperable pan-European E-Call.[212] Systems which automatically alert emergency services to crashes provide a telling example of the need for Government to assess the potential benefit of the technology on offer and balance this against the infrastructure costs.

112. It is vital that organisations such as the emergency services which would be significantly affected by the development of these systems are aware of their application. The interests of the emergency services are represented on the relevant E-Merge working groups by the National 999 Liaison Committee.[213] Yet when we contacted the Greater Manchester Ambulance Service they told us:

> This is the first time I have heard of this particular initiative and therefore Greater Manchester Ambulance Service has had no input or involvement in the development or implementation of E-Call.[214]

Communication between the strategic level 999 Liaison Committee and the regional ambulance services appears to have failed in this instance; we believe more should be done to ensure a wide discussion of the potential costs and benefits of such technology.

'Intelligent' car insurance systems

113. Technology will not only radically change the types of car we will be driving in twenty years time, but will also significantly alter the systems which surround its use, including motor insurance. Far more flexible and responsive systems are promised, which could improve road safety by identifying and rewarding careful driving. For example, Norwich

[210] European Commission (2002) eSafety: Final Report of the eSafety Working Group on Road Safety. EC Information Society DG: Brussels. P29.

[211] 'E-Merge' James Randerson New Scientist 14 January 2004

[212] European Commission Press Release IP/04/1046.

[213] Ev 54A

[214] Letter from Derek Cartwright, Director of Operations, Greater Manchester Ambulance Service NHS Trust, 1 December 2003.

Union has a "Pay As You Drive"™ insurance scheme. During the 18 month pilot Norwich Union will gather data including mileage, speeds and direction, from 5000 of its customers in an attempt to understand how they drive their vehicle and to relate this to the customers' likelihood of being involved in a crash.[215] This information will be shared with each customer to see if it influences their vehicle usage.[216]

114. Telematics could change motor insurance from being a fixed cost to a variable one.[217] Norwich Union believes the technology should be used to monitor, encourage, and ultimately reward behavioural change. Drivers will be encouraged to adapt their driving style through the promise of lower premiums. The motor insurance industry, which already uses over 20 risk rating factors, will be able to more accurately price driving risk. A similar pilot by AXA Insurance in Ireland was extended to a full programme after the Traksure scheme found that young drivers using the system had a lower frequency of crashes and claims.[218]

In-vehicle technology to prevent crime

115. Vehicle technology can both help prevent crime in the first instance and can assist in the investigation and detection of offenders following a crime.[219] Many different organisations can work together to reduce vehicle crime; for example, under the motor insurance industry's 'Group Rating System' the level of security and likely damage costs for each new car model in the UK are tested. It is in the manufacturers' interest to improve security since their vehicles will then attract a lower motor insurance premium.[220] Mr Rosenstein of Toyota explained:

> All manufacturers have been trying just about everything you can think of, from making it difficult to break into the car, to the use of immobilisers… to satellite tracking, to all sorts of things. I think security levels have improved vastly with this new technology, and we can only continue.[221]

This has more than the obvious benefits for the vehicle owner: a stolen car is four times more likely to be involved in an injury crash than a legitimately driven car.[222]

116. Many of the vehicle technologies currently under development are designed to get one step ahead of car crime and road casualties and prevent incidents occurring in the first place. When the technology is available, such an approach could be more effective than attempting to monitor and enforce the driving behaviour of 32 million licence holders over 226,168 miles of road. **Vehicle design standards may be set at the European level, but the British Government must show leadership in pushing for design standards which**

[215] The customers have agreed to be participants in this trial.

[216] Q304

[217] Ev 33

[218] Irish News, 10 June 2003

[219] We are currently also inquiring into traffic law and its enforcement, Traffic Law and Its Enforcement' Transport Committee Press Notice PN 29 2002/03.

[220] Ev 50 (Annex A)

[221] Q84

[222] Knowles (2003) Research commissioned by the Home Office.

remove the opportunity for vehicle crime and casualties wherever possible. Technologies which prevent dangerous driving behaviour such as speeding and drink driving are already at demonstration stage. The legislation to ensure that they are used should speedily follow.

Vehicle and driver identification

117. Electronic Vehicle Identification (EVI) allows a vehicle's identity to be held and read securely and remotely. Combined with other technologies, EVI could support a range of applications including law enforcement and could help tackle uninsured, unlicensed and untaxed driving; it is estimated that the cost of uninsured driving is £500 million per year. However, although technologies are already available for some applications of EVI, policymaking in this field cannot advance until there has been careful examination of a whole range of both technical issues and complex legal, institutional, and socio-political aspects such as general acceptance, privacy and human rights issues.[223]

118. Correctly and quickly identifying the owner or the keeper of a vehicle is fundamental to effective compliance work in both mainstream crime and road safety. The Association of Chief Police Officers and the insurance industry wanted to see electronic identification be extended to include drivers, through the introduction of biometric recognition systems[224] and the Association of British Insurers suggested that finger print and iris recognition could be used to prevent the unauthorised use of a vehicle.

119. **The crime reduction implications of driver and vehicle identification equipment are promising but it is clear that its widespread adoption would raise important human rights and privacy issues. Clearly defined safeguards will be needed before the technology is introduced to protect the public from its misuse. We have looked at the technology and transport aspects of the equipment available. Ultimately, Parliament will have to debate the acceptability of advanced driver and vehicle identification technologies.**

Vehicle immobilisation

120. Last year 31 people were killed during police pursuits alone, far larger numbers were killed by criminal misuse of vehicles, and people driving under the influence of drink or drugs.[225] The Association of Chief Police Officers and the motor industry are developing a technology which enables the remote immobilisation of stationary vehicles.[226] A standard for the equipment has been developed in consultation with ACPO, Police Scientific Development Branch, and the Department for Transport.[227] We welcome this co-operation between ACPO, industry and the Department for Transport.

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[223] Ev 10 and Ev 13

[224] Ev 54

[225] Ev 54

[226] Ev 54 Should a vehicle be stolen, it will be tracked by a secure operating centre, and subject to the same procedures as for tracking devices, once the vehicle is stationary and in a suitable location and the keys removed, the device will be activated so the vehicle cannot be re started.

[227] Ev 54

Preventing re-offending

121. As well as its uses in deterring, detecting and preventing crime, technology can also be used to prevent re-offending. Alcohol ignition locks, which prevent a car starting if a breath test is failed, have proved an effective counter-measure to reduce re-offending among convicted drink-drivers in parts of America.[228] The Department for Transport's road safety research programme includes a project investigating the effectiveness of alcohol ignition interlocks.[229] The Transport Minister, David Jamieson, told us that the Government would look at the possibility of introducing the technology to tackle repeat offenders once the results of the research were available:

> If we find… that this has a road safety benefit for those people who do have a problem and need re-educating, then we will introduce it, but I think it will be a few years before we actually get round to that and we get the full information.[230]

122. **The number of drink-drive casualties on the UK's roads has been rising. If research demonstrates that alco-interlocks prevent re-offending we expect to see the technology introduced at the earliest opportunity. The potential for using technology to prevent repeat speeding offenders should also be explored.**

In-vehicle data recorders

123. Many new cars contain electronics which record a vehicle's driving history. The recorders store information such as pre-cash manoeuvres and vehicle speed which could be of valuable assistance to Investigation Officers attempting to establish the cause of a crash. However, the Association of Chief Police Officers reported that accessing the data in a safe and secure way so that it can be used as evidence is problematic:

> [W]e have spoken to road death investigators around the country, they have described instances of vehicle manufacturers… who have turned round and said there is no information in this system. We do not believe them, particularly when you are looking at whether or not the liability could be theirs. There are now one or two companies who… will offer to extract that information for us at extreme cost… We are not satisfied because we cannot even secure the evidence which is our primary role, so that we can put it before ourselves, the CPS or courts to make a decision on responsibility.[231]

The Society of Motor Manufacturers and Traders told us that manufacturers were reluctant to make the data openly accessible to the Police because of the costs involved and the legal implications of asking third parties (the manufacturers) to download information that is held in the property of the consumer.[232] **Data stored by vehicles is an important source of evidence which may improve the Police's understanding of the cause of**

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[228] Evidence 19 to Transport Committee's "Traffic Law and its Enforcement" Inquiry.

[229] DfT News Release 4 August 2004, New Technology Against Persistent Drink Drivers, www.dft.gov.uk/pns/newslist.cgi

[230] Q649

[231] Q365

[232] Ev 43A

serious crashes. The Department for Transport should take a lead in identifying and resolving barriers to its use.

8 Consumer awareness

124. The Government should make it as easy as possible for customers to choose the safest and cleanest vehicles. This not only needs the kind of incentives outlined above, but requires the provision of information to advise the customer of the personal and wider social benefits of various car models. The Transport Minister, David Jamieson, confirmed the Government intended to improve information available to car buyers:

> I think we need to get better information to people as to why or how they are purchasing a particular vehicle and to encourage people to buy them on the grounds of safety, of economy, of fuel efficiency, rather than just performance and all the glamour that goes with some vehicles.[233]

Safety information

125. By law, all new car models must pass certain safety tests before they are sold. Legislation provides a minimum statutory standard of safety for new cars. The European New Car Assessment Programme (Euro NCAP), established in 1997, aims to encourage manufacturers to exceed these minimum requirements by publicly announcing how well different car models perform in crash tests. The tests include frontal impact, side impact, pole impact, child protection and pedestrian impact. Euro NCAP claims to have "rapidly become a catalyst for encouraging significant safety improvements to new car design."[234] Several of our witnesses endorsed this claim.[235] The Department for Transport has invested approximately £6.5 million in Euro NCAP since the testing began.[236]

126. Euro NCAP compares different models within classes of vehicle, such as 'large family cars' and 'small off-roaders'. A five star mini vehicle does not provide the same level of safety as a five star full size family saloon.[237] We were not convinced that this distinction would be clear to potential car buyers. However, the Department for Transport insisted that providing information according to the category of car was appropriate information for the decision that potential purchasers would be about to make:

> We test within those batches because usually somebody who is going to buy a Mini is not in the market for buying an MPV and so to inform their choice, they want to know what the safest Mini category of vehicle is.[238]

127. Pedestrian safety is scored and listed separately to occupant protection. Euro NCAP states that having a separate score makes it less easy to mask poor pedestrian protection.[239]

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[233] Q582

[234] The European New Car Assessment Programme http://www.euroncap.com/

[235] Ev 22, Ev 11, Ev 15, Ev 24.

[236] Ev 22A

[237] Q392

[238] Q615

However safety campaigners have argued that the scores for occupants and pedestrians should be merged in order to encourage a more rapid improvement in pedestrian protection.[240] In November 2003 Euro NCAP introduced a separate star rating for child protection. The result is three separate star ratings for nine different categories of car type.[241] The overall effect can be confusing to the average car driver.[242]

128. The main impact of Euro NCAP has been in raising the safety standards met by the manufacturers in a "race to the top", rather than directing a mass change in consumer awareness.[243] Professor Carsten told us:

> The manufacturers do not want to score badly so they are all shooting – at least in terms of occupant protection – for the highest scores. In that sense it has operated extremely well… Clearly what happens is that manufacturers do not want to do worse than their peers. Some manufacturers have set themselves a target of scoring five stars on every model across their range... In that case it works.[244]

129. The Department for Transport is considering extending the Euro NCAP testing procedure to include active safety technology. The Department told us it was attempting to develop a scheme which allowed vehicles to be ranked according to how well they perform in manoeuvrability tests.[245] This was a development which was supported by safety campaigners and academics.[246] We welcome the prospect of extending Euro NCAP to other aspects of vehicle safety such as braking systems, stability control and car handling. However overloading the consumer with a mass of information could defeat the object. It seems sensible that the safety ratings should be collated into an overall score, with a separate breakdown of performance available for those interested in more detailed information.

130. The Euro NCAP system predicts how well a car would fare in a real crash using the results of crash tests carried out in laboratory conditions. It does not take account of real world crash data collected by the Police. The Department for Transport does produce a report on real world crash statistics by car make and model[247] but we were told this data is not available in a reasonable time frame for customers wishing to buy new car models. To collect enough data to make it statistically significant the information is only available four years after new models are introduced.[248] This report would be valuable to customers in the second-hand car market and we recommend the Department for Transport should raise its profile.

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[239] Euro NCAP http://www.euroncap.com/content/faqs/faqs.php

[240] Q386

[241] The star rating tests cover car occupant protection, pedestrian protection and child safety.

[242] Q394

[243] Q397

[244] Q398

[245] Q612

[246] Q390

[247] 'Cars: Make and Model: The Risk of Driver Injury in Great Britain: 1996-2000'. The analysis is based on personal injury road accident data reported to the Department for Transport by Police Forces, (available at www.dft.gov.uk).

[248] Q622 & Q623

Environmental information

131. Every year 2.5 million new cars are sold in the UK. But car purchasers are largely unaware of the level of greenhouse gas emissions produced by their car, and environmental impact is not given priority in their decisions.[249] The perception is that it is mainly the responsibility of Government and car manufacturers to ensure that steps are taken to protect the environment. A recent survey found that only one in ten people believed that drivers had primary responsibility for protecting the environment from the carbon dioxide emissions of cars. But cleaner cars benefit the driver because they are more fuel efficient cars, for example the Honda Insight does over 83 miles per gallon and emits just 80 grams of carbon per kilometre.[250] Numerous witnesses told us that the provision of easily understood information which related the carbon emissions to the fuel economy of a vehicle was a vital tool in the campaign to promote low carbon cars.[251]

132. Car showrooms are currently required to display uniform information about fuel economy and the carbon dioxide reading of the vehicles for sale in an A4 sized label.[252] But Mr Smith, Chairman of the Low Carbon Vehicle Partnership told us that the current labels did not provide information of most interest to customers:

> The problem is that the CO_2 figure outside of the company car market is not something which is widely understood or appreciated and certainly is not yet guiding consumer behaviour.[253]

It was suggested that better information about fuel economy in terms of typical fuel cost savings for the average motorist should be presented.[254] This system would alert the consumer to the financial advantages of buying a cleaner, more efficient vehicle.[255]

133. Research commissioned by the Department for Transport concluded that labels giving information about fuel economy and carbon emissions should display visual representation rather than numeric representation.[256] The research recommended that the labelling system should be similar to the colour-coded system that exists for electrical appliances. Our witnesses supported the move towards a visual coding system.[257] The European Commission is examining proposals for labelling to display fuel economy and carbon dioxide emissions data, and the vehicle manufacturers told us that they would rather the labelling system in the UK was not altered until a decision is made at European level, which they believed would be within two years.[258] **The Government and industry must produce an improved green labelling scheme for new cars as a matter of urgency. The information is already available in other forms and there is no excuse for delay.**

[249] DfT http://www.dft.gov.uk/stellent/groups/dft_roads/documents/pdf/dft_roads_pdf_027589.pdf

[250] VCA http://www.vcacarfueldata.org.uk/information/tables.asp#petrol

[251] Q493, Q125, Q127, Q128, Q226, Ev 32.

[252] Q494

[253] Q495

[254] Q575

[255] Q125

[256] Q496

[257] Q123 & Q124

[258] Q498 & Q496

134. Away from the car showroom, there are several sources of excellent information about the environmental credentials of different models of vehicles. Cleaner Drive is a European project which provides vehicle information and environmental ratings.[259] The AA website has a simple star-rating system which provides an indication of the relative impact on the environment of new cars within the same market segment.[260] The site provides other information such as used car price, insurance costs and Euro NCAP scores. The Vehicle Certification Agency website gives information on new car fuel consumption and exhaust emission figures, as well as advice on how to reduce emissions through driving technique.[261] It also gives information on what level of Vehicle Excise Duty would be paid by a new car and liability for company car tax. As we recommended earlier for safety technology, manufacturers should be required to provide information videos at the point-of-sale advising the vehicle purchaser of the environmental performance of their vehicle and how to reduce emissions.

Car maintenance sector

135. Consumers will only buy advanced technology cars if they are confident that independent and service repair facilities will be able to cope adequately with any problems that arise. A lack of trained and experienced maintenance staff can be the difference between a new technology taking off and collapsing. Lex Vehicle Leasing told us that a government department which had transferred to a fleet of LPG vehicles had since given up leasing LPG cars as a result of the maintenance difficulties and lack of experienced technicians.[262] The provision of well trained maintenance staff is made even more difficult given that there are severe recruitment shortages.[263] The Retail Motor Industry Federation gave this warning:

> If the motor industry does not put its house in order with regard to recruitment and training, then it will be faced with the serious problem of a dwindling and severely underdeveloped workforce.[264]

136. The European Commission introduced a 'Block Exemption' regulation, designed to open up the after-sales and service market by creating a level playing field between large franchise and independent repairers.[265] However the RMIF reported that difficulties remain. Many motorists still believe that it is necessary to go to the franchise dealer from which the car was bought to get repairs carried out, when in fact any garage can be used, so long as it meets the standard required.[266] The Retail Motor Industry Federation told us that an unintended consequence of the Block Exemption was that the manufacturers have imposed higher investment requirements for repairers wanting to achieve authorised

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[259] www.cleaner-drive.co.uk/

[260] www.theaa.com/

[261] http://www.vcacarfueldata.org.uk/ Launched in July 2000 and updated in June 2004.

[262] Ev 47

[263] Ev 4

[264] Ev 4

[265] Ev 4

[266] Q347

status.[267] If an independent garage wishes to become an authorised repairer for a particular manufacturer they have to meet the same investment standards as a franchise dealer, and if those costs go up dramatically some garages are priced out. We also heard that only a few manufacturers have published the technical information required by independent garages.[268] The many independents keen to begin taking advantage of possible new business opportunities still have no clear route to the information they need. **There should be an independent evaluation of how successfully the Block Exemption rules have been implemented by the industry. This should examine whether the regulation is having the desired outcome within a reasonable timeframe of its introduction.**

9 Conclusion

137. Enormous advances have been made in the design of safer and cleaner cars. Creative engineering and research into alternatives to the conventional combustion engine have been energetically pursued. We all want to benefit from the advantages of car transport while ameliorating the negative impact it has on the climate, local air quality and the people around us. The market, under appropriate regulatory frameworks, has delivered continual advances in vehicle safety and emissions.

138. The Government has shown commitment to addressing some of the negative impacts of car use, but its approach has been inconsistent and laissez-faire in places. It must do more to turn its good intentions into practice. It should make far greater use of fiscal incentives and grant programmes to influence the car market, and ensure customers understand the incentives available. The Government should do much more to raise consumer awareness of which car models are cleanest and safest and the benefits to the consumer of choosing these cars. It must support these trends with stringent regulatory regimes which continue to drive progress.

139. The Government should build on the UK's excellence in automotive design, development and manufacture with a relevant and well-funded research and development programme. The Department should encourage the strategic use of demonstration projects as a step towards commercialisation of innovative technologies. To do so is not to pick winners. Research activities should be exploited to bring the early markets to the UK. This would give us both industrial benefits and cleaner safer cars on our roads. When it comes to market incentives, however, the role of the Government should not be to single out particular types of technology for preferential support, but rather to take a strategic view and to put in place mechanisms that encourage the development of technologies which meet the objectives.

[267] Q329

[268] Ev 4

Conclusions and recommendations

Introduction

1. Many exciting technological developments have been promised for the cars of the future, and the Government has tried to encourage the use of cleaner and safer vehicle technology through the adoption of a variety of targets and incentives. We welcome this work; the challenge is to ensure that policies are effectively translated into practice. (Paragraph 2)

Industrial advantage and vehicle technology

2. While we welcome the Centre of Excellence for Low Carbon and Fuel Cell Technologies, the amount the Government intends to invest is trivial. Low carbon transport should be a major commercial opportunity for the UK. Funding for vehicle research, development and demonstration has been spread too thinly and between too many agencies. It is insufficient to safeguard the place of the UK in a global industry. (Paragraph 16)

3. The transition from the design stage to commercialisation appears to be a particular weakness in the UK. There should be more support for the commercial development of low carbon cars and the associated components industry. (Paragraph 19)

The environment and the car of the future

4. The Government has set a range of commendable targets to reduce greenhouse gas emissions from surface transport. However, it has failed to match its commitments with tough policies to achieve these goals. The introduction of stringent legislative requirements has in the past successfully achieved great improvements in vehicle technology; the Government must not be afraid to legislate. The deadline for the 2010 domestic carbon reduction target is fast approaching and we are far off track. The Department for Transport must set out exactly what action it will take to put the road transport sector back on track. (Paragraph 29)

Future fuels and technologies

5. A vehicle certification and inspection regime must be introduced to ensure the after-sales conversions to Liquefied Petroleum Gas meet the highest environmental and safety standards. We welcome the Department's proposal for certification. It should be accompanied by a strengthened MOT for gas-powered vehicles to correct poor performance from existing LPG conversions. (Paragraph 33)

6. The availability of surplus renewable energy will be vitally important for the road transport sector in its transition to low carbon or even zero carbon cars, whether or not this is a hydrogen-based system. The Government must address this supply issue with more urgency. (Paragraph 36)

7. Biofuels do not appear to be enjoying the same degree of focus and support as the Liquefied Petroleum Gas sector or the fuel cell industry, and this discrepancy should be addressed. The Department should transfer the recently published assessment of biofuels and hydrogen for transport use into action. (Paragraph 40)

8. We do not advocate that the Government funds a wholesale replacement of the national fuel infrastructure. Nonetheless the Government should develop a 'road map' for future fuel infrastructure, which determines the timescale, legislation and investment required. The industry requires a clear statement of direction. The Government should be preparing to act as a leader in the accelerated development of such a network, if necessary. The Department of Trade and Industry has yet to demonstrate sufficient leadership for us to be confident it can play this role. (Paragraph 46)

9. Hydrogen fuel cell vehicles offer the prospect of zero emission road transport, yet infrastructure, distribution and storage difficulties remain major barriers to commercial development. Demonstrations such as the fuel cell bus project are vital in developing common standards for new fuelling and infrastructure systems. We strongly support initiatives such as the use of large scale low carbon bus fleet demonstrations. Early demonstration projects of this kind should ultimately be extended to form the beginning of a "hydrogen highway", or the equivalent for other emerging fuels. (Paragraph 50)

Incentives for low carbon and alternative fuel cars

10. The Government should in future restrict itself to identifying the objectives it needs to achieve and encouraging and rewarding whichever technologies and fuels deliver against these aims, rather than attempting to "pick winners". (Paragraph 58)

11. The 2003-04 budget for PowerShift and CleanUp grants was fully allocated six months before the end of the financial year, but the Department for Transport failed to respond by increasing the budget for this year. Given the slow progress towards its environmental commitments the Department should provide extra funding for the grant scheme as a matter of urgency. Support should be available for the grant programme while it continues to be a necessary and effective incentive. (Paragraph 63)

12. We agree that the new Low Carbon Vehicle Incentive Programme should use emissions as the sole criteria for grant levels. The Government must avoid discriminating according to technology type or vehicle category and should allow the industry to determine which technologies and fuels meet the objective of the lowest emissions. (Paragraph 64)

13. The Inland Revenue should publish the proposed taxation rates for company cars for the forthcoming four years and update them on a rolling annual basis. (Paragraph 67)

14. The reformed company car tax regime has been most effective in encouraging cleaner cars. The challenge is to transfer this policy success to the private car market. At present, there are no incentives in place capable of achieving this. Moreover,

people are now opting out of the company car regime and choosing higher emitting cars in the private market. The Department for Transport and the Treasury need to create effective mechanisms in the private market to relate motoring charges to pollution more directly. (Paragraph 70)

15. Car buyers are unlikely to be influenced by graduated Vehicle Excise Duty levels if they are not aware of how the system operates. The Department for Transport should review its publicity strategy and ensure that awareness of such initiatives is improved. (Paragraph 72)

16. The difference in the level of carbon emitted from various vehicles is significant: a 4x4 can produce up to four times more carbon dioxide per mile than the most fuel-efficient small cars. The way we pay for road use may change radically in the future. However, whilst Vehicle Excise Duty continues to be part of that charge, the way it is structured should be made responsive to evolving policies. The differentials between Vehicle Excise Duty bands must be widened to ensure that the graduated system influences car purchasing decisions. Owners of cars which produce high levels of carbon should be made to pay for the environmental damage they cause. (Paragraph 74)

17. The current fuel duty incentives send out a confused message. The Alternative Fuels Framework will only be truly transparent when it is technologically-neutral and based on a calculation of the full environmental impact of each fuel. As a first step we welcome the stability which the introduction of a three-year rolling fuel duty framework will bring to the alternative fuel market, but in the longer-term the Government must provide more transparency in how duty incentives are decided. (Paragraph 79)

18. The Treasury's policies are expected to do the "heavy lifting" in terms of encouraging the use of cleaner vehicles. They have so far had limited impact due to the need to compromise between improving the environment, facing the political difficulties of increasing fuel duty on more polluting fuels, or reducing an important source of revenue. We recommend that the Department undertakes a comprehensive study to examine the role of the different driving related charges, and to identify an effective system of charges for the future. (Paragraph 81)

Vehicle safety technology

19. New vehicle safety technology has been introduced incrementally in the past, with little evaluation by Government. This laissez-faire approach must not be applied to systems which take control from the driver and which may introduce new dangers as they seek to remove old ones. The Government must ensure that new systems are fully and independently evaluated before allowing their introduction. Such monitoring should look at the overall impact on safety of a combination of different technologies. (Paragraph 92)

20. Drivers must understand how to operate the equipment in a new car. Only car retailers are currently in a position to tell car buyers how to operate advanced technology properly. They should have a legal obligation to inform customers of the

driver assistance equipment in a vehicle, and to explain the purpose, limitations, and function of the equipment. The Government should introduce a formal process for recording that a retailer has fulfilled this obligation. (Paragraph 96)

Telematics for intelligent transport systems and law enforcement

21. It is clear that aspects of vehicle technology and design are advancing ahead of associated legal, policing and driver training considerations. The Department for Transport, Home Office and Police Authorities must close this gap. It is in the interests of everyone to have liability and responsibility clarified. The Government must ensure that legislation and standards keep pace in order to protect both the industry and consumers. (Paragraph 99)

22. Congestion is forecast to get worse: we need to ensure that we get the most from the technology on offer. Vehicle and telematics technology could be used to increase the capacity of our road network. The Department for Transport should develop a technology strategy setting out what it, the Highways Agency, emergency services and local authorities need to do to guide the development of these systems. (Paragraph 109)

23. Vehicle design standards may be set at the European level, but the British Government must show leadership in pushing for design standards which remove the opportunity for vehicle crime and casualties wherever possible. Technologies which prevent dangerous driving behaviour such as speeding and drink driving are already at demonstration stage. The legislation to ensure that they are used should speedily follow. (Paragraph 116)

24. The crime reduction implications of driver and vehicle identification equipment are promising but it is clear that its widespread adoption would raise important human rights and privacy issues. Clearly defined safeguards will be needed before the technology is introduced to protect the public from its misuse. We have looked at the technology and transport aspects of the equipment available. Ultimately, Parliament will have to debate the acceptability of advanced driver and vehicle identification technologies. (Paragraph 119)

25. The number of drink-drive casualties on the UK's roads has been rising. If research demonstrates that alco-interlocks prevent re-offending we expect to see the technology introduced at the earliest opportunity. The potential for using technology to prevent repeat speeding offenders should also be explored. (Paragraph 122)

26. Data stored by vehicles is an important source of evidence which may improve the Police's understanding of the cause of serious crashes. The Department for Transport should take a lead in identifying and resolving barriers to its use. (Paragraph 123)

Consumer Awareness

27. The Government and industry must produce an improved green labelling scheme for new cars as a matter of urgency. The information is already available in other forms and there is no excuse for delay. (Paragraph 133)

Car Maintenance Sector

28. There should be an independent evaluation of how successfully the Block Exemption rules have been implemented by the industry. This should examine whether the regulation is having the desired outcome within a reasonable timeframe of its introduction. (Paragraph 136)

10 Annex - Visit Notes

A. Report of the Transport Select Committee Visit to United States 2004

Introduction

1. Those attending from the Committee were: Gwyneth Dunwoody MP (Chairman), Clive Efford MP, Louise Ellman MP, Ian Lucas MP, George Stevenson MP, Graham Stringer MP, Eve Samson (Clerk of the Committee), and Clare Maltby (Committee Specialist). The Committee arrived in Washington late on Monday 12 January 2004, missing one day of the scheduled programme, owing to a problem with the flight from London. The Committee travelled to Detroit on Tuesday 13 January, and then on to Sacramento, California, on Wednesday 14 January 2004.

Washington DC

2. Owing to the delayed arrival, the Committee missed planned meetings with Emil Frankel at the US Department of Transportation; a viewing of Georgetown University's Advanced Vehicle Development Generation II Fuel Cell bus; a round table lunch discussion with US and European car manufacturers, hosted by Craig Helsing, Vice President, BMW (US) with Doug West, Senior Vice President, Toyota, Mike Stanton, Vice President of the Alliance of Automobile Manufacturers, Gerry Roussel, Alternative Fuels Regulatory Planner, Ford. Had the Committee not been delayed, in the afternoon, it would have met with Dr Jeffrey Runge, Administrator, National Highway Traffic Safety Administration; and later with Annette Sandberg, Administrator, Federal Motor Carrier Safety Administration.

3. However, the Federal Motor Carrier Safety Administration (FMCSA) has since sent the Committee a copy of its presentation. FMCSA was established in 1999 for the purpose of reducing large truck and bus fatalities and injuries on America's highways. FMCSA explores innovative transportation research and technology. FMSCA evaluates new technologies in actual commercial service, to substantiate the performance claims of suppliers and provide additional data on reliability, durability, maintainability and life-cycle costs. Nearly 43,000 people loose their lives on US highways every year, of these, nearly 5000 are a result of crashes involving trucks.

4. The Intelligent Vehicle Initiative (IVI) is part of the larger Departmental ITS research program. The goal is to facilitate the development and deployment of driver assistance technologies. FMSCA are testing and evaluating new, cutting-edge, safety technologies. IVI technologies could reduce crashes by preventing rear-end collisions, run-off-road crashes, rollover crashes and fatigue related crashes. The higher severity of crashes made trucks an attractive platform for intelligent systems implementation. Also, evaluating new technology in field service was customary for the commercial vehicle community.

5. Many of the projects were public private partnerships between FMSCA, National Highway Traffic Safety Administration and industry which received about $4-5 million

dollars annually. There were two major IVI projects with promising near-term solutions, which included rollover prevention and rear-end collision avoidance systems. Recently, FMCSA completed a large-scale field operational test of a system called the Roll Advisor and Control System which sends in-cab advisory messages and, when necessary, takes partial control to slow the vehicle.

6. In terms of rear-end collisions, about 150 fatal crashes and 10,000 injury crashes, occur annually where a large truck "rear-ends" a passenger vehicle. A system which integrated a forward collision warning system with cruise control, to maintain a particular distance from the vehicle in front and warn the driver if the approach to the vehicle in front was too fast, was being tested (due to complete June 2004).

US Department of Energy, Washington

7. The Committee met the Department of Energy, and its Energy Efficiency and Renewable Energy team. There was a wide ranging discussion about the FreedomCAR project, energy policy and institutional / legislative arrangements between the Department of Energy and the Environmental Protection Agency. The primary focus of the FreedomCAR project was to reduce dependence on foreign oil (currently 59 per cent imported). Two-thirds of the US' oil consumption is through transport use. It was explained that although car consumption of oil was remaining steady, consumption by light trucks was increasing rapidly. These vehicles were mainly used for personal travel, however they receive favourable treatment in terms of regulation and taxes.

8. The US had a goal of hydrogen electric vehicles on the road in 20-30 years (FreedomCAR vision). The FreedomCAR Partnership was launched on 9 January 2002, and expanded to include energy companies in 2003. In January 2003, President Bush pledged $1.7 billion over five years, $1.2 billion for hydrogen fuel cells and $0.5 billion for hybrid and vehicle technology in the near term. There was joint involvement from manufacturers, fuel companies, Government, researchers, and technical teams. Advances in information are shared in the 'pre-competitive' research stage.[269] There are intellectual property clauses in all collaborations. Funding goes to universities and supply industries, rather than automotive manufacturers. The collaborative research contracts operate to a strategic plan with a specified time frame. The FreedomCAR project should advance fuel cell vehicles by 15 years. DOE had evaluated how much it would cost to bring that forward another five years. The cost rises exponentially because the research requires time regardless of budget. Ultimately fuel cells could replace the Internal Combustion Engine (ICE) in hybrid vehicles.

9. In the mid to near term the DOE were looking to renewable fuel blends and hybrid technology, as well as the use of light weight materials, for fuel economy gains. Longer term, the DOE was looking at hydrogen, and the possibility of carbon sequestration if the hydrogen is produced from carbon sources. DOE published an annual update on all of its research programmes on the web at www.eere.energy.gov.

10. DOE were looking at advanced combustion engines to improve efficiency to 60 per cent from 35 per cent over the next 5-10 years. A suite of hybrid technologies were of

[269] It is in the 'competitive' stage if a consumer would base their purchase choice on the feature.

interest, but cost is too high for broadband market entry now. In battery vehicles, the lifespan of the battery needs to be that of a car (15 years), whereas currently batteries last 7-8 years.

11. The DOE has sought to advance the commercialization of hydrogen cars to 2015 with market entry at 2020, and full realisation of the benefits by 2040. Fuel cell cars were currently 6-10 times as expensive as conventional cars even if mass produced. There are fuel infrastructure barriers. DOE has concluded that platinum is not a resource issue, although the cost is significant. Work is underway to reduce the platinum content of fuel cell membranes. The reliability and durability of fuel cells also needs improving. Development of fuel cells have taken so long (fuel cell membranes have existed since 1970s), according to DOE because they are competing against what is a very mature technology with a high level of customer satisfaction and low cost.

12. It was DOE's belief that it would be very difficult to legislate to promote fuel cell vehicles, at this stage, since costs are still so high. California's attempt to mandate an electric vehicle failed because the State legislated too soon. The DOE suggested there was not a strong consumer demand for fuel efficiency as an end in itself, because fuel was so cheap (fuel in USA was at historically low levels). Current hybrids were attractive because of their high fuel economy, low emissions, high-tech nature (early adopters) and overall 'greenness'. There was interest in the fact that hybrid vehicles can use the High Occupancy Vehicle (HOV) lanes in rush hour. The federal government vehicle fleet was mandated to purchase alternative fuel vehicles for 75 per cent of covered purchases and use alternative fuel in its alternative fuel vehicles at least 50 per cent of the time. DOE have estimated there will be 3.5 billion vehicles in 50 years time, with growth mainly in economically less developed countries. Such demand was expected to put an upward price pressure on fuel.

North American International Auto Show, Detroit

13. Chuck Fortinberry and Bill Cook, co-chairs of the Show accompanied the Committee. Jeremy Burne, an Automotive Sector Specialist with British Consulate General, Chicago also joined the Committee. There were 700 vehicles on display at the show. General Motors displayed a new technology, 'displacement on demand' which gave 7 to 12 per cent fuel efficiency, by moving from 8 to 4 cylinders. The second generation Toyota Prius was on display, and won an award for 'Car of the Show'.

General Motors, Detroit

14. The Committee met with Beth Lowry, Byron McCormick, Bob Purcell and Tayce Wakefield from General Motors (GM) – a global company with 355,000 employees. GM has taken on board a corporate social and environmental responsibility commitment, and have aimed to reduce energy consumption and waste products.

15. The GM electric hybrid system (developed by Allison, a division of GM) is being placed into diesel powered transit buses and has been on sale since 2001. It provides up to 90 per cent improvement in air emissions and up to 60 per cent improvement in fuel economy. If the top nine cities in the U.S. replaced their transit bus fleets with this system, it would save nearly 40 million gallons of diesel. Buses are the ideal hybrid application because of their 'stop-and-go' driving pattern. Seattle (King County) had purchased 201 hybrid buses, with

the additional benefit for Seattle that hybrids met its need for zero emissions in a particular tunnel. There was an additional premium cost to initial purchase, but a bus normally has a 12 year life cycle and the pay-back period for the hybrid was seven years. The US bus system was 80 per cent federally funded.

16. GM has a parallel hybrid truck in production, which gives a 10-12 per cent fuel economy improvement, and makes the vehicle a portable generator. The ICE shuts off when the vehicle is idling, allowing the electrical system to support key functions, such as air conditioning. The truck has the performance of ordinary trucks in terms of towing and acceleration.

17. To date, the experience has been that government incentives are necessary. While hybrid purchasers receive a $2000 tax deduction (equivalent to about $600 net), direct financial incentives to consumers were being supported by industry. To date, proposed incentives for hybrids in the Energy Bill had not yet been passed. GM were hopeful that hybrid incentives would be forthcoming. The driver only saved $300-400 a year in fuel costs because fuel was relatively inexpensive. The fuel economy savings were greater for buses and large vehicles. Hybrids generally deliver improved fuel economy in "stop and go" city driving but the additional weight of the hybrid system can represent a penalty for extended highway driving.

18. GM aimed to introduce 'Advanced Hybrid Systems' with 'Displacement on Demand' by 2007, which would give 30 per cent fuel economy improvements. GM were working in four markets: buses, military, fleet and retail. GM called for internationally harmonised codes for fuel cells and safety standards (for vehicles and fuelling infrastructure), to ensure interoperability and to achieve the necessary economies of scale to make these technologies economically viable. It suggested there were three issues for the US Government: (1) dependence on petrol; (2) local emissions, (3) global emissions. Fuel cells are twice as efficient as ICEs and hydrogen can be produced locally from a variety of sources (including renewables). Fuel cells could create a whole new industry and component supply industry.

19. GM has entered into a partnership with Shell and Dow Chemical (which produces millions of tonnes of hydrogen as a co-product of chemical processing each year). The Dow Chemical facility in Texas was installing GM fuel cells to use the hydrogen to power portions of its plant. Such activity would stimulate the hydrogen economy including assisting in building supplier capability.

20. GM hoped to escape the design limitations imposed by the infrastructure of the ICE and to create exciting new fuel cell vehicles, which would have broad appeal to the public. It would use drive-by-wire technology for braking and steering. Having a motor in each wheel would give independence and increase the agility and control for each tyre. GM were aiming to make fuel cell vehicles commercially viable by 2010, but faced key challenges including cost and on-board hydrogen storage technology. The four requirements they identified were: (1) internationally harmonised codes and standards; (2) hydrogen infrastructure, (3) assistance with capital investment for suppliers, OEM's and re-fuellers; and (4) consumer incentives. GM were not in favour of mandates for this technology and indicated that a number of countries might lead toward the hydrogen economy. GM had been working with several companies on the hydrogen economy, including BP, Shell, and

Johnson Matthey. Government funding for research, development and demonstration is important.

Ford Motor Company, Detroit

21. The Committee met Sir Nick Scheele, Sue Cischke and Gerard Schmidt over lunch. Sue Cischke gave an account of safety developments and goals. Ford aimed to exceed regulations on safety and use an accurate real-world database to guide vehicle research (Co-operative Crash Injury Study, CCIS). This data has assisted the development of advanced technology seatbelts. Work was also underway on pre-crash sensing technology, including vehicle height compatibility and bumper airbags. Ford sits on EU vehicle safety working groups that are looking at pedestrian protection, e-safety, active safety, occupant protection and Euro NCAP (European New Car Assessment Programme). Ford cars have consistently achieved four and five stars in Euro NCAP.

22. Nick Scheele stated that 45 per cent of Ford's European workforce is based in the UK. Ford employed 37,000 people in the UK - 15,000 at Blue Oval and 22,000 mainly at Jaguar and Land Rover. In addition, Dagenham produced around 500,000 engines a year. Ford has been a market leader for past 27 years in the UK. In 2001 Ford made a $5.5 billion loss. Europe has been a poor market recently, in comparison to USA market. Ford was planning for a recovery and has not slowed investment, in order to achieve competitiveness. There has been cost erosion in the auto sector, with the public expecting more and being prepared to pay less. Ford aimed to have electronics and software expertise in-house because it was so important to the vehicle.

23. Gerard Schmidt gave a presentation on diesel vehicles. There has been significant progress in diesel vehicles over last 15 years, with a reduction of 25 per cent in carbon dioxide per kilometre compared to a petrol vehicle, and low fuel consumption. The Dagenham plant produces 900,000 diesel engines per year. In the longer term Ford are partnering with BP to achieve a hydrogen station in the USA, in accordance with the DOE vision. We were told that fuel cell technology was quite mature but that the costs were huge. A roadmap is required by the Government to facilitate progress. Ford believed the hydrogen future was controversial, and envisaged the realistic time-frame as 2050. Ford hoped that 50 per cent of the necessary funding for the partnership would come from Washington, and that BP would contribute equally.

CALTRANS – California Department of Transportation

24. At the California Department of Transportation (Caltrans) the Committee met with Homar Noroozi, Pete Zaniewski, Lisa Kunzman, Randy Woolley, Pete Hansra, Andrew Lee, Tom West, Kris Teague, Dan Hoover, and Greg Larson. Caltrans employs 22,000 people.

25. Tom West gave a presentation on traffic operations and ITS deployment, which focused on California's need for safe and efficient mobility, without more road building. Caltrans review about 7000 collisions per year, looking at the crashworthiness of the local infrastructure, including trees. They use a co-operative approach to investigation involving the law enforcement (California Highway Patrol, CHP) and Caltrans staff, particularly

following collisions involving fatalities, when the road could be closed for up to eight hours until the coroner has finished their work.

26. Caltrans also has responsibility for the High Occupancy Vehicle lanes. The lanes have faced opposition, but in fact the HOV lanes move more people than the other lanes, because there are two or three people in each vehicle. Electric hybrid vehicles have recently been permitted to use HOV lanes.

27. Caltrans has invested $2 billion on transportation management centres (TMC). Caltrans recently undertook an inventory of all the ITS (intelligent transport systems) in use state-wide. There is a transport management centre in every major urban district. The centres help to expedite the removal of incidents where appropriate and liaise with emergency services about incident and severity, provide weather warnings, display information on the variable message signs, and put travel information out on television, internet and radio. CHP takes control at the scene of a crash, but Caltrans provides information to the media and travelling public and co-ordinates so that CHP could arrive correctly prepared. Following a collision, CHP may close the road and Caltrans has responsibility for clearing and opening the road; the police / law enforcement (CHP) decide if it is a crime scene.

28. Caltrans suggested that ITS has a place in mitigating congestion, but that alone ITS could not solve congestion problems. In cost benefit terms, the impact of ITS was favourable to big capital projects (an 8-to-1 return compared to 3-to-1 for a typical capital improvement). There have been political and institutional barriers to some aspects of ITS. Privatisation of toll roads has been a sensitive issue, because it has lead to pressure against improving neighbouring roads. In some cases the contract precluded the public agency from making future improvements to adjacent roads.

29. California has the highest vehicle ownership figures per person in the USA, and possibly the world. Caltrans has made efforts to educate its population about congestion and car use over decades with limited success. Caltrans estimated that in recent years congestion had deteriorated by as much as 25 per cent per year in the California Bay area. The level of congestion is estimated using a 'floating car' and the delay experienced, which is similar to the approach in the UK which defines congestion as the travel time experienced over and above that under 'free-flow' conditions.

30. Lisa Kunzman gave a presentation on Equipment, Technologies and Instruments. The previous Government reached a Memorandum of Understanding on a 'West Coast Governors Global Warming Initiative', to look at cutting emissions and to start to develop a hydrogen infrastructure. The Initiative plans to use the purchasing power of three States to buy hybrid vehicles. Owing to the budget deficit, Caltrans was focusing on non-funding issues like planning, policy and liability.

31. An 'Energy Station Concept' is being developed. This would provide back-up power, vehicle refuelling, and would store hydrogen to generate electricity. It would be useful for fuel cell cars in the future, and back-up power today. The Station could also store the hydrogen at low peak and sell the electricity back to the grid at high peak. One concept is to site the Stations at the Department's maintenance stations, with one located on strategic

corridors every 50-60 miles in California. The idea will hinge on private sector participation in PPPs, not currently forthcoming.

32. In 2001 Caltrans started its 'Greening the Fleet' programme to tackle smog. This was a partnership approach. Of Caltrans' 14,000 vehicle fleet, 40 per cent are diesel fuelled vehicles, 38 per cent petrol, 15 per cent alternatives, 7 per cent non-emission. The Department aimed to use ultra-low sulphur fuel, diesel exhaust retrofits and after-treatment diesel filters on heavy duty vehicles. With these efforts, it is conceivable that total particulate matter fell by as much as 25 per cent. The impact on heavy vehicles was even greater, with some achieving 85 per cent diesel PM reductions and 25 percent NOx reductions. This fleet requires the appropriate fuel infrastructure to support it.

33. Caltrans saw fuel cell vehicles as a prospect for 2010, but acknowledged that technology changes very quickly, and as such, it is not possible to choose a future vision and stick to it. For this reason, Caltrans staff cautioned against using legislation to choose a path, and recommended that legislation dealt only with the goal. The path to that goal should be determined by technology and industry.

34. Randy Woolley gave a presentation on vehicle safety research, which is mostly federally funded. In the 1990s Caltrans undertook a research programme into the 'automated highway system'. Following a successful demonstration of its feasibility in the mid-late 1990s the programme's automation focus was changed at the federal level to one of safety as the more recent Intelligent Vehicle Initiative (IVI) took over.

35. Pete Hansra gave a presentation on the Intersection Decision Support Project, funded by IVI. 27 per cent of crashes in the USA occur at intersections. Intersections with signals have a 42 per cent crash history compared to 22 per cent with no controls. In its collaborative research programme with academia, Caltrans has developed a driver decision support system which gives a 'Don't proceed' signal if there is insufficient gap. It required vehicle and infrastructure co-operation and communication, and field operational tests are planned.

Legislators in Sacramento, California

36. The Committee had lunch with Assembly member Fran Pavley, representing Los Angeles County and Ventura County; James D. Boyd, Californian Energy Commissioner; Terry Tamminen, Secretary of the California Environmental Protection Agency; V. John White, Executive Director, Center for Energy Efficiency and Renewable Technologies and Alan C. Lloyd, Chairman, Air Resources Board.

37. The wide-ranging discussion touched on the dangers of policy implementation failing to achieve desired results, such as the incentives given to manufacturers for producing alternative fuel vehicles, which in practice are run on petrol because of the lack of alternative fuel infrastructure, with no emissions benefit. Fran Pavley discussed her Bill to amend the Health and Safety Code relating to vehicular greenhouse gas emissions. Manufacturers would not be affected by the Bill until 2009. Public polls in California showed 70-80 per cent support for GHG regulations. The legislators believed the role of law was key because fuel economy incentives did not work, and stressed the importance of

giving a clear signal with lots of lead time. A report had recently been produced on vehicle fuel dependence in the USA.

38. James Boyd told us that in his view hydrogen vehicles are 20-30 years off rather than ten. The goal is to have the 2003 level of petrol use in 2030. It was suggested that the hydrogen programme and FreedomCAR was political lip-service. A specific criticism was that the boost given to the 'hydrogen vision' delayed improvements to emissions that could be taking place now and in the medium term. California aimed to have 200 hydrogen stations on the interstate highway system by 2010. California has 30 million cars on the road and 1.3 million new vehicles each year, making it a huge market. 14 billion gallons of petrol are used by vehicles in California each year. A move to very clean petrol, followed by hybrid technology and eventually fuel cell vehicles, is the vision. The price of fuel was getting higher in California at $3 per gallon.

California Fuel Cell Partnership

39. The Committee met with Catherine Dunwoody, Shannon Baxter, Tod Suckow, Matt Solomon of Ford and a representative of Daimler Chrysler. The mission of the CaFCP is to promote the commercialisation of fuel cells, and to demonstrate the vehicle technology and fuel infrastructure. CaFCP expected up to 300 fuel cell vehicles in California by 2007. See www.cafcp.org.

40. Announced in April 1999, the California Fuel Cell Partnership is a collaboration of auto companies, fuel providers, fuel cell technology companies and government agencies which aims to get fuel cell electric vehicles on the road in California. Specifically, CaFCP aims to achieve four main goals: (1) Demonstrate vehicle technology by operating and testing the vehicles under real-world conditions in California; (2) Demonstrate the viability of alternative fuel infrastructure technology, including hydrogen and methanol stations; (3) Explore the path to commercialization, from identifying potential problems to developing solutions; and (4) Increase public awareness and enhance opinion about fuel cell electric vehicles, preparing the market for commercialization.

41. The partners included: DaimlerChrysler, Ford, General Motors, Honda, Hyundai, Nissan, Toyota, Volkswagen, Ballard Power Systems, UTC Fuel Cells, BP, ExxonMobil, Shell Hydrogen, ChevronTexaco, the California Air Resources Board, the California Energy Commission, the South Coast Air Quality Management District, the U.S. Department of Energy, the U.S. Department of Transportation and the U.S. Environmental Protection Agency. CaFCP does not discuss confidential or very detailed technological information once it has reached competitive stages. CaFCP believed it was important to work towards common standards in the infrastructure, communication system and diagnostic tools.

42. The challenges of hydrogen were discussed. These included the fact that hydrogen is very light and therefore difficult to store (at minus 423 degrees Fahrenheit), the robustness of the new technology is unsure, vehicle and fuel costs are high, and public awareness is low. CaFCP has 46 vehicles on the road, including three buses, which give high visibility. CaFCP was looking to co-ordinate the evaluation information with projects in Japan and Europe, to get maximum benefit from the expensive trials. Fuel storage on the vehicle is a challenge, because it puts a restriction on driving distance. A new headquarters facility in

West Sacramento, California, housed vehicle maintenance bays, a hydrogen fuelling station and soon a methanol fuelling station. Additional satellite fuelling stations will be installed and operated in various locations in the state.

43. The value of a practical on-the-ground demonstration project was emphasised. The CaFCP has liaised with local emergency services, to train staff in how to respond to a collision involving a hydrogen vehicle.

44. Shannon Baxter of the California Air Resources Board (CARB) argued it was too early to implement significant incentives for fuel cell vehicles. At this stage federally funded research was important, and later purchase incentives would be necessary. In the USA environmental benefits and fuel economy was not a sufficient incentive to attract buyers; a performance or product benefit was necessary. Fuel cells can offer improved utility and convenience, through flexible design and the availability of auxiliary power. CARB estimated that the hydrogen vision could be around in 10-30 years.

45. Ford is looking at near-term bridge technologies, such as petrol-hybrid SUVs for summer 2004. The overlap between hydrogen ICE and hydrogen fuel cells has advantages in infrastructure terms. Hydrogen fuel cell vehicles achieve better efficiency than hydrogen ICE, and the fuel cell system has the attractiveness of simplicity and durability with few moving parts. Hydrogen production could be environmentally damaging with more carbon dioxide production than petrol. The cost of transporting the hydrogen is more an issue than the cost of production. There are plans for carbon dioxide sequestration.

46. The CaFCP explained how far fuel cell technology has advanced since 1995, in terms of reducing platinum content, however further reductions were required to allow commercialisation. CaFCP noted that although it was theoretically possible to recycle the platinum in fuel cell membranes, this had not yet been achieved in practice. Following the presentation and discussion, the Committee had test drives in a number of fuel cell cars from different companies.

California 'Partners For Advanced Transit And Highways' (PATH)

47. The Committee met with Samer Madanat, Director, Jim Misener Safety Research Programme Leader, Steve Shladover, Wei-Bin Zhang, Transit Research Programme Leader, Susan Shaheen, Travel Behaviour Research Programme Leader and Tim Lipman. After the presentations the Committee witnessed demonstrations of a 'self-parking bus' and the automatic fleet and intersection technology.

48. California PATH is administered by University of California, Berkeley, in collaboration with Caltrans. PATH is a multi-disciplinary program with staff, faculty and students from universities state-wide, and cooperative projects with private industry, state and local agencies, and non-profit institutions. PATH's mission is to develop solutions to the problems of California's surface transportation systems through cutting edge research

49. Samer Madanat gave an overview of PATH; its history and scope. The focus has moved from a very long-term horizon, to include real-world trials of technologies for use in 3 -5 years time, to address congestion and safety. From work in these two areas, other benefits are expected in air quality, energy consumption and accessibility. The centre undertakes

both technology and policy research, and follows this up with 'proof of concept testing' and validation through 'field operational tests'.

50. DOT is a key participant and helps fund PATH, but the core funding comes from Caltrans, which can direct research towards problems it needs resolving. PATH has a close relationship with the people who implement the results of the research, to maximise the practical benefit. The faculty is trying to focus on modal shift, rather than technological fix alone. PATH suggested that the 25 per cent annual growth in congestion figure may have been true for Silicon Valley during growth period a few years ago, but had since improved.

51. Jim Misener gave a presentation on safety research at PATH. Focus has been on vehicle infrastructure integration, using wireless Dedicated Short Range Communication (DSRC) technology. Potential of this communication between infrastructure and the vehicle includes dynamic route advice, weather information, and advanced warning of incidents. Vehicles could communicate with each other to pass information from one area to the vehicles behind. 'ElderTech' is technical assistance for older drivers. Such intelligent vehicle assistance risks 'unintended automation' by reducing driver attention. PATH recommended a strategy for these technologies to ensure that they were not introduced haphazard without evaluation of the overall impact.

52. Steve Shladover gave a presentation on automation research at PATH. In this Steve noted that congestion was the public's biggest concern in California. Potential advantages of automated driving included improved traffic flow dynamics, safety, reductions in both workload and tedium of driving, and fuel consumption reductions from the aerodynamic nature of lines of automated vehicles.

53. The research has established that human drivers are skilled at reading a complex and unstructured environment, anticipating the manoeuvres of others, adapting to changing conditions and avoiding crashes. Human drivers have been shown to be poor at perceiving distance and closing rates, steering and car following, diversity of response, reduced visibility. Drivers are slow to respond to unexpected events and are prone to inattention.

54. The research has also uncovered how inefficiently the current road capacity is used; at highest human efficiency only 5.5 per cent of lane capacity was used. Automation could greatly improve this level of efficiency. But there are certain barriers: (1) chicken and egg syndrome regarding vehicles and infrastructure developments; (2) liability; (3) difficulty obtaining economies of scale quickly; (4) driver training; and (5) privacy concerns. The research found that the benefits of automated trucks were greater, with reduced drag, better fuel economy and reduced emissions, as well as doubled capacity from 800 trucks an hour to 1500.

55. Steve explained that the liability for such advanced technology was covered by transferring driver insurance to the cost of the vehicle. Institutional barriers remain, however, such as the fact that a separate lane would be required for automated vehicles, and taking an existing lane out of operation would be politically difficult. The cost of building a separate lane was between $10m-50m and the costs of the automation equipment is $10,000 – 50,000.

56. Wei-Bin Zhang gave a presentation on ITS and transit (public transport) research, which was a federal and state sponsored programme. The Bus Rapid Transit (BRT) system

was comparable to rail, in terms of its appearance, 'identity' and ticketing system. The BRT system achieves 30-40 per cent time savings on normal buses, is cheaper than normal rail and boosts the local economy. The transit agencies were keen to develop collisions warning and avoidance technology for urban areas. The BRT is suitable for heavy corridors and commuter routes to schools, businesses and retail centres. The federal government paid the capital costs of the infrastructure and vehicles. Operation was funded through local tax subsidy, and fares. Government regulations required that all buses in operation are under 15 years old.

57. Tim Lipman gave a presentation on fuel cell research. This emphasised the need for links between stationary use of fuel cells to power buildings and fuel cell vehicles – with the vehicles being an offshoot of the stationary application. This co-operation would start to give economies of scale. Tim told us that no-one yet knew whether fuel cell vehicles would ever be competitive. The Department was looking at the emissions implications of hydrogen production. Natural gas is currently the most economical way of producing hydrogen. Platinum is currently $600 per ounce. Non-platinum catalysts operate at higher temperatures, and as a result, are not suitable in vehicles. To use power from the grid to produce hydrogen for fuel cell vehicles, would be more polluting than to use a normal combustion engine. Hydrogen production is a critical issue.

58. The stationary / vehicle refuelling hydrogen facilities only make business sense in places such as California where electricity is very expensive and very unreliable, and the producers would target high dependency customers, such as hospitals. The fuelling infrastructure would require Government or industry subsidy for several years. There are studies assessing whether the hydrogen facilities are an efficient use of renewable electricity. We were told that wind was a promising renewable to use because wind power occurred at night at time of low demand, so this energy could be used to produce hydrogen as a way of storing the surplus electricity.

59. Susan Shaheen gave a presentation on car sharing. She explained that post September 11th fleet insurance costs have soared by 500 per cent and as a result the car sharing market is growing. The vehicles can be used by fleets during the business day, and then be used for neighbourhood needs at other times. Among the main incentives was the access to priority parking. Car sharers experienced both cost and time savings. Studies have shown that it is necessary to recruit 15 per cent new membership per year, to make up for attrition.

Appendix A: Clean Vehicle Technology and Inward Investment Prospects for the UK

By Jeremy Burne, Automotive Sector Specialist, British Consulate General Chicago

60. The future of the UK's automotive sector is dependent on continued inward investment coupled with technological leadership. The purpose of this paper is to provide a basis for further discussion on how HMG can align interests in clean vehicle technologies with inward investment objectives.

61. The future of clean vehicle technology resides primarily in the development of powertrain variants for use with petrol, diesel and alternative fuels. Most vehicle manufacturers and suppliers see step changes moving from the internal combustion engine

(ICE) to hybrid engines (ICE or diesel combined with electric power) to hybrid fuel cells and eventually to hydrogen fuel cells. Research and development of these technologies is currently spread around the world, with no single location standing out as a centre of activity or excellence.

62. While vehicle manufacturers and suppliers work on new powertrains and related technologies, it is up to governments and economic developers to assist in the creation of the supporting infrastructure. Both Ford and GM have indicated that their related R&D activity will most likely flow to locations where infrastructure development is most advanced.

63. The UK has a number of key resources that could help position the country as the centre of excellence in clean vehicle technology:

(a) Strong academic institutions with R&D capabilities

(b) Major independent powertrain design engineering companies (some already undertaking R&D in fuel cell technology)

(c) Global energy companies such as BP and Shell

(d) Existing R&D consortia (e.g. Foresight Vehicle, Low Carbon Vehicle Partnership)

(e) Regional agencies that can coordinate and fund on a regional basis

64. A coordinated UK effort to focus these resources and package them in a meaningful way would allow HMG to approach a new set of automotive decision makers - the environmental technology leaders – within the vehicle manufacturers and suppliers. Marketing to these decision makers would hopefully encourage and expand their participation in R&D activity in the UK, and add another dimension to their existing UK investments. Targets would include vehicle manufacturers and suppliers in the US, Japan, Germany, France and Korea.

Recommendations:

(a) Develop a bespoke inward investment strategy for clean vehicle technology

(b) Seek active partners who are willing to collaborate and commit resources

(c) Automotive Sector Specialist to coordinate a working group within HMG, develop related initiatives and identify cost implications.

B. Report of the Transport Select Committee Visit to Johnson Matthey Fuel Cells

65. The Committee visited the Johnson Matthey Technology Centre at Sonning Common, Reading, on Wednesday 3 December 2003. Those attending from the Committee were: Clive Efford MP, George Stevenson MP, Eve Samson, Clerk of the Committee, Clare Maltby, Committee Specialist and Lis McCracken, Committee Secretary. The staff of Johnson Matthey who accompanied the Committee were Dr Jonathan Frost, Director,

Robert Evans, Public Affairs, James Wilkie, Development Director, and Paul Medlicott, Government Relations.

66. The Committee received an introduction to Johnson Matthey over lunch followed by a detailed presentation of the different technology routes to fuel cell powered vehicles and measures that would help speed up the introduction of low carbon vehicles. The Committee then had a brief tour of the technology centre.

67. Johnson Matthey is a speciality chemicals company. The group's principal activities are the manufacture of catalysts, pollution control systems, components for fuel cells, pharmaceutical compounds, and speciality chemicals. Johnson Matthey is a major player in the global catalysts market.

68. Johnson Matthey (JM) invests significant amounts in research and development on fuel cell technologies: about £30-40 million a year. Johnson Matthey represent one of the biggest platinum traders in the world and have developed platinum membranes for use in fuel cells. JM are interested to see the commercialisation of fuel cells.

69. JM were keen to stress that the clean vehicle technology market is driven by legislation. Step-wise movements towards tighter regulation drive constant innovation and improvements in technology. These are innovations that, in the view of JM, would not otherwise occur. JM pointed to the example of Federal Test Procedures in the USA in 1975 which set air quality requirements ahead of available technology to meet them. JM also noted that researchers and developers are usually able to achieve a better level of technology than was thought possible at the outset. In terms of government policy, Johnson Matthey stressed the need for advanced warning and the communication of a clear direction to industry. The need for suppliers and technology providers to work closely with the vehicle manufacturers was explained.

70. The issue of safety and hydrogen vehicles was raised. JM argued that although there were some safety concerns, hydrogen was in fact safer than gasoline to use and the big issue was perception.

71. JM told the Committee that fuel cells could be commercially available by the end of the decade, but noted that the main barrier is achieving the same level of reliability as currently experienced with combustion engines. The challenge to reach economies of scale was discussed. JM expressed their hope that the UK would get some commercial advantage out of the research and development that has been invested to date, and suggested that component suppliers were the UK's best hope of realising this value.

72. Johnson Matthey discussed a bid they had submitted to the DTI. The proposal would fund the joint development by five UK based companies of materials and industrial scale processes required to establish manufacture of a cost effective Membrane Electrode Assembly (MEA). None of the critical components of today's MEAs are manufactured in the UK. JM suggest that this concentration of expertise would position the UK as an attractive and competitive location for automotive original equipment manufacturers to locate their future fuel cell development and manufacturing operations.

73. Johnson Matthey invited the Committee to meet with its representatives again at a later date.

C. Report of the Transport Select Committee Visit to Transport for London

74. The Committee visited Transport for London on Wednesday 3rd March 2004. Those attending from the Committee were: Clive Efford MP, Louise Ellman MP, Ian Lucas MP, Eve Samson, Clerk of the Committee, Clare Maltby, Committee Specialist, and Philippa Carling, Inquiry Manager. The staff of Transport for London who accompanied the Committee were Jeroen Weimar, Director of Transport Policing and Enforcement, Surface Transport; Chief Superintendent Mike Humphrey, TOCU Commander; Peter Brown, Director of Traffic Management, Surface Transport; Mark Geldard, CentreComm Manager, Surface Transport; Mike Weston, Head of Operations, London Buses; Kevin Lee, Parliamentary Liaison Manger, TfL; and Helen Evans, Parliamentary Liaison Manger, TfL.

75. The Committee received an overview of TfL's objectives. We then heard presentations on transport policing and enforcement strategy, a briefing on the work of the Transport Operational Command Unit (TOCU) and ways of tackling transport-related crime and disorder. Following the presentations, the Committee had a tour of the communication centre, before taking a trip on the hydrogen fuel cell bus back to Westminster.

76. The three London buses are part of a two year trial under the CUTE project (Clean Urban Transport for Europe). BP provides the hydrogen at a temporary fuelling station in Hackney, and the fuel company is seeking permission for a permanent facility in Hornchurch.[270] BP would open this facility up to other projects.

77. The buses can travel approximately 150 km on the hydrogen gas stored onboard in nine tanks. Each of the participating cities is obtaining the gas by different means and Natural Gas is the source of the hydrogen for the London buses. Although using Natural Gas to produce hydrogen does emit carbon dioxide, we were told there was a reduction of 40 per cent compared to emissions from a diesel engine. TfL predicted it would be at least 10 years before the buses would be commercially available. TfL will also have 12 hybrid diesel vehicles by the end of 2004.

78. As part of the pilot project, the fuel cells are serviced by technicians every 80 hours and the buses have daily checks on performance and safety. TfL explained there had been some teething problems with the vehicles initially, but there is a good reaction with both drivers and passengers. The buses are reported to be slightly more 'sluggish' on the uptake than conventional buses, but smoother and quieter once running.

[270] BP has now received planning permission for a permanent fuelling station in Hornchurch which TfL hoped would be available for use later this year.

Formal minutes

The following Declarations of Interest were made:

Mrs Gwyneth Dunwoody, Member, Associated Society of Locomotive Engineers and Firemen

Mr Brian H Donohoe, Clive Efford, Mrs Louise Ellman, Mr George Stevenson, Members of Transport and General Workers' Union

Mr Ian Lucas and Mr Graham Stringer, Members of MSF Amicus

Mr Graham Stringer, Director, Centre for Local Economic Strategies

Miss Anne McIntosh, Member, RAC and interests in Shell and BP

Wednesday 13 October 2004

Members present:
Mrs Gwyneth Dunwoody, in the Chair

Mr Jeffrey M Donaldson	Mr Ian Lucas
Mr Brian H Donohoe	Miss Anne McIntosh
Clive Efford	Mr John Randall
Mrs Louise Ellman	Mr Graham Stringer

The Committee deliberated.

Draft Report (*Cars of the Future)*, proposed by the Chairman, brought up and read.

Ordered, That the draft Report be read a second time, paragraph by paragraph.

Paragraphs 1 to 138 read and agreed to.

Resolved, That the Report be the Seventeenth Report of the Committee to the House.

Ordered, That the Chairman do make the Report to the House.

Ordered, That the provisions of Standing Order No. 134 (Select committee (reports)) be applied to the Report.

Ordered, That the Appendices to the Minutes of Evidence taken before the Committee be reported to the House.

[Adjourned till Wednesday 27 October at 2.30pm

Witnesses

Wednesday 11 February 2004

Mr Paul Everitt, Head of Communications, Economics and Policy, The Society of Motoring and Manufacturers and Traders

Mr James Rosenstein, Vice President, Toyota Motor Europe

Mr Robert Browett, Head of Government & Public Affairs (London Office) PSA Peugeot Citroen

Mr Nick J Owen, Senior Manager, Technology, Ricardo Consulting Engineers

Ms Julie Foley, Senior Research Fellow, Sustainability Team, ippr

Mr Malcolm Fergusson, Institute for European Environmental Policy

Mr John Mumford, Vice President UK Region, BP Oil UK BP Plc and **Mr Malcolm Watson,** Technical Director, UK Petroleum Industry Association

Wednesday 25 February 2004

Mr Gerard Gornall, Associate Director, Acumen Team, Lex Vehicle Leasing and **Mr Nick Addison**, Product Manager, LUL

Mr Robert Ledger, Head of Telelmatics and **Mr Douglas Vallgren**, Telematics Marketing Manager, Norwich Union

Mr John Parker, Head of General Insurance, **Mr Barry Smith,** Fortis - Chief Executive and Chairman of ABI Motor Committee and **Mr Andrew Miller,** Motor Insurance Repair and Research Centre, Thatcham, Director of Research - Association of British Insurers

Mr Matthew Carrington, Retail Motor Industry (RMI) Chief Executive and **Mr Stephen Ramsay,** Managing Director of ReMIT

Mr Rob Gifford, Executive Director and **Mr Julian Hill**, Member of PACTS Vehicle Design Working Party, Parliamentary Advisory Council for Transport Safety (PACTS)

Professor Oliver Carsten, Leeds University

Professor Mike McDonald, Southampton University

Superintendent Jim Hammond, Sussex Police, Deputy Chair, ACPO ITS Working Group

Wednesday 3 March 2004

Rt Hon Jacqui Smith, Minister for Industry and the Regions and Deputy Minister for Women and Equality, **Mr Ashley Roberts,** Deputy Director of Automotive Unit**, Mr Robert Saunders,** Head of Downstream Oil, **Mrs Bronwen Northmore,** Director of Coal and Hydrogen Energy Economy and **Mr Duncan Corrie,** Policy Co-ordinator and Regulation Team, Department of Trade and Industry

Wednesday 10 March 2004

Mr Phillip Sellwood, Chief Executive and **Mr Richard Tarboton,** Head of Business Unit Transport Energy, Energy Saving Trust

Mr Robert Evans, Chairman Low Carbon Vehicle Partnership Steering Group**, Mr Graham Smith,** Chairman and **Mr John Wood,** Vice Chairman Low Carbon Vehicle Partnership

Mr David Jamieson MP, Parliamentary Under-Secretary of State**, Malcolm Fendick,** Head of Transport Environment and Taxation Division and **Eric Sampson,** Head of Vehicle Technology and Standards Division, Department for Transport

Mr John Healy MP, Economic Secretary and **Mr Dan Edwards,** Policy Advisor on Transport Taxes, HM Treasury

List of written evidence

01 Zeta Controls Limited
02 Council to Protect Rural England
03 Johnson Matthey Fuel Cells
04 Retail Motor Industry Federation
05 Stephen Plowden
06 Toyota Environment and Cars
07 Professor Chris Wright and Professor Barry Curtis
08 Professor P S Hall and I R Harris
09 Menard Engineering Limited
10 TNO Inro
11 PACTS
12 LP Gas Association
13 The IEE
14 Freight Transport Association
15 AA Motoring Trust
16 Zero-m
17 Sustrans
18 EADS Astrium
19 3M
20 Engineering and Physical Sciences Research Council
21 Institution of Civil Engineers
22 Department for Transport
23 Royal Academy of Engineering
24 RAC Foundation for Motoring
25 The Slower Speeds Initiative
26 Colin Treleven
27 Pentagon Glass-Tech
28 Councillor Niall Walker
29 C S Brindley
30 Smart Moves Limited
31 Carplus
32 Energy Saving Trust
33 Norwich Union
34 RoadPeace
35 Cyclists' Public Affairs Group

36 Ricardo UK
37 Environmental Transport Association
38 Royal Society for the Prevention of Accidents
39 QinetiQs
40 Low Carbon Vehicle Partnership
41 Cargill
42 Intelligent Transport Society for the United Kingdom
43 The Society of Motor Manufacturers and Traders Limited
44 UK Petroleum Industry
45 Professor Oliver Carsten, University of Leeds
46 ippr
47 Lex Vehicle Licensing
48 IEEP
49 PSA Peugeot Citroën
50 Association of British Insurers
51 Calor Gas
52 Professor Mike McDonald
53 Transport for London
54 ACPO
55 HM Treasury

Reports from the Transport Committee since 2002

Session 2003–04

First Report	Traffic Management Bill	HC 144
Second Report	The Departmental Annual Report	HC 249
Third Report	The Regulation of Licensed Taxis and Private Hire Vehicle Services in the UK	HC 215-I
Fourth Report	Transport Committee Annual Report 2002-03	HC 317
Fifth Report	The Office of Fair Trading's Response to the Third Report of the Committee: The Regulation of Licensed Taxis and Private Hire Vehicle Services in the UK	HC 418
Sixth Report	Disabled People's Access to Transport	HC 439
Seventh Report	The Future of the Railway	HC 145-I
Eighth Report	School Transport	HC 318-I
Ninth Report	Navigational Hazards and the Energy Bill	HC 555
Tenth Report	The Work of the Vehicle Operating Services Agency and The Vehicle Certification Agency	HC 250
Eleventh Report	National Rail Enquiry Service	HC 580
Twelfth Report	British Transport Police	HC 488
Thirteenth Report	The Rail Regulator's Last Consultations	HC 805
Fourteenth Report	The Work of the Maritime and Coastguard Agency	HC 500
Fifteenth Report	Financial Protection for Air Travellers	HC 806-I
Sixteenth Report	Traffic Law and its Enforcement	HC 105-I, II

Session 2002–03

First Report	Urban Charging Schemes	HC 390-I
Second Report	Transport Committee: Annual Report 2002	HC 410
Third Report	Jam Tomorrow?: The Multi Modal Study Investment Plans	HC 38-I
Fourth Report	Railways in the North of England	HC 782-I
Fifth Report	Local Roads and Pathways	HC 407-I
Sixth Report	Aviation	HC 454-I
Seventh Report	Overcrowding on Public Transport	HC 201-I
Eighth Report	The Work of the Highways Agency	HC 453
Ninth Report	Ports	HC 783-I
First Special Report	Government and Office of Fair Trading Responses to the Seventeenth Report of the Transport, Local Government and the Regions Committee, The Bus Industry	HC 97
Second Special Report	Government Response to the Committee's Fourth Report, Railways in the North of England	HC 1212

Session 2001-02

First Special Report	The Attendance of a Minister from HM Treasury before the Transport, Local Government and The Regions Committee	HC 771
Second Special Report	Government Response to the to the Fifth Report of the Transport, Local Government and the Regions Committee, Session 2001-02, European Transport White Paper	HC 1285
Third Special Report	Government Response to the Eighteenth Report of the Transport, Local Government and the Regions Committee, Session 2001-02, National Air Traffic Services Finances	HC 1305