Cutting carbon from road transport; lessons from the first decade of focused UK policy

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Abstract

This paper presents a study commissioned by the Low Carbon Vehicle Partnership (LowCVP) and completed by E4tech and the Centre for Automotive Industry Research (CAIR) at Cardiff Business School, published in July 2014. The study aimed to review the impacts of a low carbon policy focus on UK automotive investment, growth and jobs.

It included a broad industry survey, supplemented by in depth interviews with senior executives from motor and energy industries, government representatives and other stakeholder groups. The study sought to reveal whether a consistent and sustained policy approach to cutting carbon dioxide emissions from a specific sector can produce both 'green' results and growth. It sought to examine the extent to which progress in the road transport sector can be seen as an exemplar for policy towards other sectors of the UK economy where progress has been less encouraging.

In the early 2000s, the UK car industry was in a state of decline. Factory closures were commonplace, innovation was minimal, and the supply chain had become hollowed out. Environmental regulations were seen as a threat in some quarters. Since 2003, UK investments in the low carbon automotive sector have amounted to about £40 bn, a figure which matches increases in the turnover of the sector, also accompanied by a 10 % increase in UK exports from the sector over the last 10 years.

Background to the Study

The UK's Coalition Government came to power in May 2010 with Conservative leader and new Prime Minister David Cameron promising that his would be the 'greenest government ever'. By the end of 2013, however, it was becoming clear that maintaining an environment policy focus was increasingly under pressure from more immediate economic priorities and the 'austerity agenda'. Moreover, a rise in scepticism about the causes and effects of climate change and, in particular, a nationalist party (UKIP) surging in support and assertively hostile to 'green' policies was heightening pressure on the Government to slow down or reverse measures designed to decarbonise the UK economy.

As engaged participants, the Low Carbon Vehicle Partnership (LowCVP) was aware that just a decade ago the UK automotive sector was in state of decline and a continuation of this trend was seen as inevitable in many circles. Factory and company closures were commonplace, innovation levels were modest, the UK supply chain had become 'hollowed out', and environmental regulations were seen as a threat by the industry. The 'reactive era' of the early 2000s, when automotive policy was preoccupied with closures and restructuring, started to change with the report of the Automotive Innovation and Growth Team (AIGT) in 2002 which stated "we believe that the (automotive) industry can have a long term future in the UK provided that industry and Government work together". The agenda set out by the AIGT included improving efficiency in manufacturing, supporting commercialisation of technologies and tackling environmental challenges through a multi-stakeholder group.

The last recommendation was taken forward with the establishment of the Low Carbon Vehicle Partnership (LowCVP) in

2003 which, constituted with a uniquely wide range of stakeholders, began to create a bridge between industry, government and green groups with a view to reconciling commercial and policy pressures with environmental imperatives.

In the last few years the UK motor industry has been going through a highly successful period in terms of growth in production, turnover and exports, and industrial success has been achieved hand-in-hand with the most rapid progress in UK automotive history in vehicle efficiency and CO_2 emissions. Indeed, measured at the tailpipe, CO_2 emissions from the average new car sold in the UK has fallen by over 25 % in the last ten years. (SMMT, 2014).

To what extent, though, have these two success stories been linked? Could the cumulative impact of a consistent policy emphasis on environmental achievement and 'green growth' have provided the foundations for a renaissance of the UK automotive sector?

At the very least, the prima facie evidence showed that economic success and environmental progress can occur in tandem in a major industrial sector.

The LowCVP sits at the nexus between government, the automotive industry and other key environmental policy stakeholders, so set out to understand the answers.

The LowCVP commissioned strategic consultancy E4tech and Cardiff Business School's Centre for Automotive Industry Research (CAIR) to address these questions objectively, drawing upon a wide range of evidence.

The study sought to establish if there has been a causal link between policies that favour low carbon vehicles and the rising levels of UK automotive investment. Evidence was gathered via a broad industry survey, supported by interviews with senior executives, and extensive desk research. Together these provided a rich evidence base from which several clear messages emerged.

Study objectives and method

The objectives of the study were to provide a comprehensive evidence base on low carbon investment in the UK automotive sector, and to use this to examine whether a causal link could be found between a consistently supportive policy and the apparent increase in the rate of low carbon investment in automotive and related production, research and development – including in the supply chain – over the last decade. The findings were used to provide high level recommendations for future policy.

Most observers agree that the UK has a number of low carbon vehicle policies, and that the UK automotive sector has enjoyed a substantial renaissance in recent years, including low carbon vehicle technology and manufacturing. However, establishing a causal link between policy and investment in low carbon vehicles is extremely complex.

Complicating issues identified by the researchers included:

- Diversity of policies.
- Diversity of investments.
- Diversity of stakeholders.
- Diversity of reasons for investing.
- Diversity of technology solutions.
- Consistency/quality of data.
- Confidentiality.

It was also necessary to demonstrate a causal link, a counterfactual, contrasting or baseline case to attempt to identify outcomes in the absence of an active, environment-focused UK industrial policy.

In order, as far as possible, to develop balanced causation analysis a triangulated approach was used. Multiple sources of both primary and secondary evidence were gathered. These included a widespread call for evidence, and a series of stakeholder interviews, as well as the development of a policy database and an investment database.

INVESTMENTS DATABASE

The researchers developed a low carbon investment database for the study to provide complementary evidence in order to track low carbon and related investments in the UK over the past decade. The database was created using publicly available secondary data, and validated and expanded by feedback from the call for evidence (see below) and structured interviews.

Construction of the database was achieved via published, referenced sources (e.g. press reports; press releases), and where possible cross-checked against other sources, with a focus on the major players such as the OEMs from the industry side and Innovate UK (formerly the Technology Strategy Board) from the government side. Wherever possible the research sought multiple sources for each investment, though it is not always possible to ensure that stated spending announcements are the same as actual outcome spending.

STAKEHOLDER SURVEY – CALL FOR EVIDENCE

The UK's automotive sector stakeholder landscape is complex, with many actors of varying size and function. As the main objective of the study was to explore the relationship between low carbon policy and (subsequent) investment decisions, the inclusion of as many and varying stakeholders as possible was important. A call for evidence was issued by the LowCVP and other partners as a public invitation and run as an online survey. This decreased the risk of selectivity, increased the exposure to as many stakeholders as possible, and allowed different views – both between and within organisations – to be expressed.

The questionnaire was designed to allow respondents to quantitatively score the impact of a range of policies and policy-driven initiatives on their UK investments (across various elements of the value chain) over the past decade. A qualitative section also allowed respondents the opportunity to discuss their answers and communicate their opinions on the impact of policy on their investments. The questionnaire categorised approximately 50 policies to cover 12 broad areas of UK-specific policy and asked for qualitative scores and commentary.

STAKEHOLDER INTERVIEWS

Stakeholder interviews were conducted with senior representatives of 14 prominent organisations, representing industry and government. These interviews explored details of significant investments – including their size and timing – as well as investigating the organisation's perspective on the investment(s), reasons for selecting the UK for the investment, positive and

negative links to UK policy, and the role of that policy versus more widely applicable EU & global legislation.

Together these sources of evidence provided not only a large volume of information, but also a high quality of evidence. Further, the triangulation provided an important means to identify and substantiate the conclusions – supplying the threads that tie this story together.

POLICIES TIMELINE

The policies used to provide detail in the call for evidence were expanded and used to develop policy timelines, alongside other sources of automotive-specific information. The purpose was to provide an illustration of the temporal link between policy and policy-supported initiatives and corresponding changes in macro data – for example investment in R&D, vehicle sales, or vehicle emissions – over time.

Study findings

STRUCTURE OF THE UK AUTOMOTIVE INDUSTRY

For its size the UK has an especially rich mix of vehicle producers comprising (at end-2013) seven mainstream car manufacturers, seven commercial vehicle manufacturers, nine bus and coach manufacturers, eight premium and sports-car manufacturers, more than 100 specialist and niche manufacturers, eight out of the eleven F1 teams, and 19 R&D and design centres (SMMT, 2014).

The leading car manufacturer is Nissan, with just over half a million cars in 2013. Other landing brands in 2013 included Land Rover (340,000 units); Toyota (179,000 units); MINI (174,000 units) and Honda (138,000 units). The commercial vehicle segment is dominated numerically by Vauxhall (43,000 units) with DAF as the major heavy truck manufacturer (15,400 units). The sector has a great deal of diversity compared with other major automotive manufacturing countries, which lends it greater resilience.

The auto sector is very significant to the overall UK economy and, of course, particularly important to specific locations. Overall, the SMMT (2014) estimates the UK automotive industry in 2013 accounted for over 700,000 jobs of which over 160,000 were directly employed in manufacturing and 38,500 employed in motor sport. With an estimated turnover of over £60 billion, the UK automotive sector produced over £12 billion in value added to the economy and exports worth over £30 billion. (While around 77 % of vehicles are exported, the value of exports per unit is lower than product sold domestically.)

EMERGENCE OF LOW CARBON POLICIES

UK low carbon policies have emerged strongly in the past 10 years; indeed, the UK is generally perceived to have been one of the more proactive counties in terms of the development of policies to tackle climate change. This policy focus led to the passage of the seminal 2008 Climate Change Act, the first national legislation in the world to set out legally binding targets for the reduction of greenhouse gas emissions. Other policies have been underpinned by the Climate Change Act, and have helped to send a clear message of commitment to the development of low carbon technologies.

In the automotive sector, these have included taxes providing low carbon incentives (company car tax, vehicle excise duty and fuel tax); the provision of innovation and investment support (via Innovate UK and other funding organisations) and, latterly, national grant and subsidy programmes (such as Plug-In Car/Van Grants, Plugged-In Places programme).

The UK Government established several new bodies and structures to help facilitate the development of a more coordinated industrial policy with a central focus on cutting carbon emissions. These have included:

- Automotive Innovation and Growth Team (2002) which challenged the view of the automotive sector as a sunset industry.
- LowCVP (2003) which provides a focal point for stakeholder engagement, including NGOs, academics, road users and others, as well as industry and government, on low carbon vehicle policy issues and wider stakeholder engagement.
- Technology Strategy Board (latterly known as Innovate UK) (2007) and the Advanced Propulsion Centre (2013) which provide consistent support for innovation.
- New Automotive Innovation and Growth Team (2009) defined the industry's way forward.
- Automotive Council (2009) became the focal point for industry – government dialogue.
- Office for Low Emission Vehicles (OLEV) (2009) and Green Bus Fund (2009) create market conditions for low carbon vehicle uptake.
- Regional Development Agencies and, latterly, Local Enterprise Partnerships support automotive innovation and manufacturing at local level.

The study says that the formation of the LowCVP in 2003, arising out of the work done by the Automotive Innovation and Growth Team (AIGT) (2002), can in retrospect be seen as an important moment for the UK automotive sector, providing a means for stakeholders to work together to contribute to numerous low carbon vehicle policies, structures and initiatives. The Stern Review (2006), King Review (2007) and the Climate Change Act itself put CO_2 reduction into law, building a sense of stability in climate change policy with a strong bearing on subsequent UK road transport sector policies.

For example, the Green Bus Fund (GBF), running for the last five years, has provided £100 million investment into the UK automotive industry and bus operators receive a further incentive from an additional Bus Service Operators Grant (BSOG) rate for low emission buses. The UK is now one of the leading adopters of low carbon buses with most of the vehicles being introduced made locally.

Other policies have focused on the development of infrastructure for low carbon fuels, including those designed to promote the development of a national recharging infrastructure for electric vehicles and to encourage the introduction of biofuels and other low carbon liquid and gaseous fuels.

Full details of the UK low carbon policy environment are provided in the study.

With investment in low carbon technology development and production apparently strong in the UK over the last decade,

the average test cycle emissions of new cars sold has been reduced by over a quarter in the same period.

Transport in the UK contributes approximately 23 % to overall greenhouse gas emissions annually (DECC, 2014), and investment in low carbon vehicles is therefore vital to reducing emissions and meeting national and international targets.

Car drivers have also benefited as average new vehicle fuel economy has increased by more than 25 % in the last ten years (and by over 40 % since 2000), improved efficiency helping to moderate the overall cost of living increase. (SMMT, 2014.)

The study call for evidence had a very positive response rate – receiving 107 fully completed questionnaires containing some 35,000 words. The respondents were mostly director or CEO-level, or equivalent, and represented a fairly balanced cross-section of the industry.

The researchers found evidence that the changing relationship between government and the automotive industry has been pivotal for the transformation of the sector overall. Respondents spoke of the fundamental change since the 'reactive era' of the early 2000s when automotive policy was preoccupied with closures and restructuring. Several years later the tide had already begun to turn but challenges to the industry were exacerbated by the economic crisis which hit the global automotive industry with force in 2008–10.

The UK's response included a proactive focus on support for the automotive industry, notably in areas where the UK had a technological basis for competitive advantage, such as powertrain engineering. Several government-supported entities were established and continue to play a key role in the automotive industry. The report authors heard ringing endorsement for the Automotive Council in particular, and many were also grateful for the role played by the Technology Strategy Board and, latterly, the Advanced Propulsion Centre.

The call for evidence and stakeholder interviews found that low carbon vehicle policies have had a strong influence on UK R&D investment in particular – for example 72 % of respondents said UK grant programmes for low carbon vehicles had been influential in their R&D investments. Other initiatives also emerged and are acknowledged to have provided strong market pull for low carbon investment, notably the Office for Low Emission Vehicles (for cars and vans) and the Department for Transport's (DfT) support for low carbon buses. However, the primacy of the EU's regulations for new passenger car CO_2 has been critical in providing, a 'level playing field' and long term certainty across the whole industry.

The researchers found that investment decisions are taken on the basis of an assessment of risk and reward, and that policy confidence is a vital part of reducing risk, especially for the automotive industry with long product development times requiring large capital commitments.

Numerous illustrations emerged of how confidence is a result of cumulative effects rather than single policies, with increasingly positive results. In R&D the availability of multi-stage grant programmes has encouraged innovators to start their journey with confidence that they will continue to be supported, if technically viable. In vehicle deployment, the Office for Low Emission Vehicles' (OLEV) long term commitments to low carbon vehicle support is valuable for investors. In manufacturing, senior industry figures reported that collective and cumulative policy measures reinforced the overall confidence that UK Government provides.

In addition to cumulative policy effects, respondents referred to the confidence derived from having a clear channel for dialogue with Government (via the Automotive Council, LowCVP and others). Furthermore, importance was attached to the 'intellectual supply chain' that is being developed in the UK, ensuring that ideas can be turned into products through an ecosystem of companies and organisations. Finally, respondents pointed to the UK's membership of the European Union as being vital for confidence and policy stability.

UK AUTOMOTIVE SUCCESS

The study identified several major achievements in the automotive sector which have occurred over the last ten years, despite a global recession and strong competitive pressures, leading to benefits for companies, drivers and the nation, including:

- UK auto manufacturing sector turnover rose from £46.3 bn in 2003 to £64.1 bn in 2013. (See Figure 3.)
- Rapid recovery in new car production following the 2009 global financial crisis, reaching 1.5 million units in 2013, having fallen to below 1 million in 2009. Production is now almost back to pre-recession levels. (SMMT 2012, 2013, 2014.)
- Exports account for 77 % of UK car production, up from 70 % a decade ago, and volumes reached a record 1.2 million units in 2012 and remained at this level in 2013. (SMMT 2012, 2013, 2014.)
- Major capacity expansions, new model programmes and reinvestments by BMW, Ford, Honda, Jaguar Land Rover, Nissan, Toyota and Vauxhall, outweighing declines in other firms.
- Productivity per worker up 45 % from 2003 to 2013 (SMMT, 2014).
- 291 unique low carbon investments by 85 different companies were catalogued for the period 2003–2013.
- Confirmed value of £17.6 bn in low carbon investments (approx. £40 bn total by extrapolation).
- Average new car tailpipe CO_2 emissions have fallen by 25 % to below the threshold of 130 g/km, ahead of the EU-mandated timetable. (SMMT, 2014.)
- Average official new car fuel economy has risen from 42.2 mpg (2003) to 56.3 mpg (2013), reducing costs for motorists. (SMMT, 2014.)
- Between 2002 and 2012 household consumption of vehicle fuel fell 18 % per head. (DECC, 2014.)
- Rapid uptake of low carbon buses led to over 1,500 in service by 2013.

The low carbon investment database produced for the study, through which some of the statistics cited above were calculated, was created using published, referenced sources (e.g. press reports; press releases) and, where possible, cross-checked against other sources, with a focus on the major players such as the OEMs from the industry side and the Technology Strategy Board from the government side. Wherever possible the research sought multiple sources for each investment. (Though,

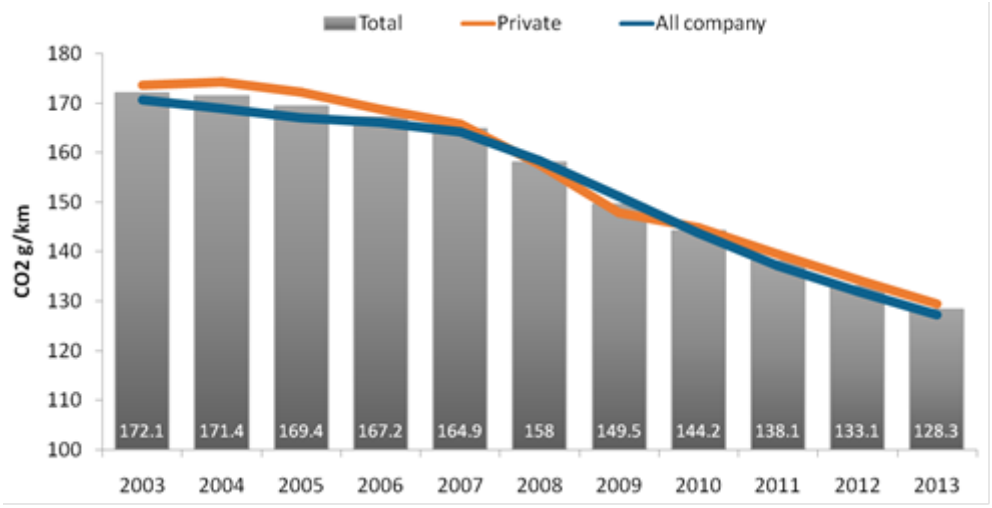

Figure 1. UK new car CO_2 emissions from 2003 to 2013 (SMMT, 2014).

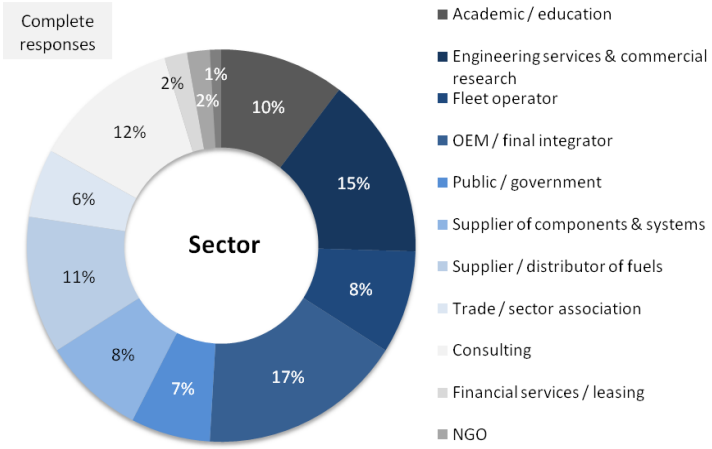

Figure 2. Call for evidence responses by sector.

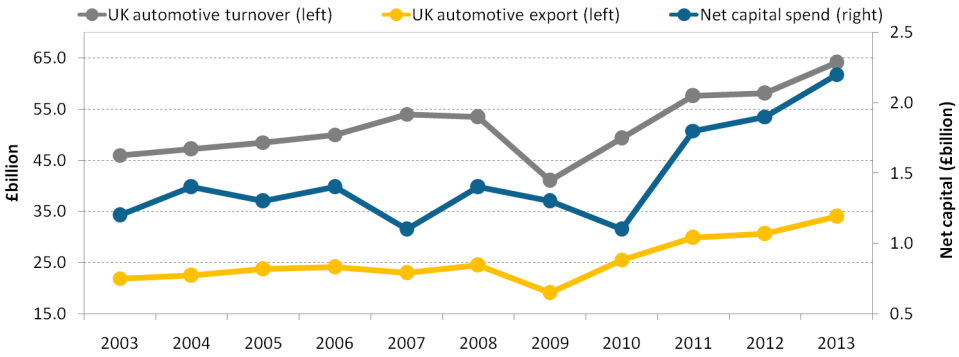

Figure 3. Key indicators of UK automotive sector performance 2003–2013.

the study notes, it is not always possible to ensure that stated spending announcements are the same as actual outcome spending.)

Over the last decade, the UK automotive industry has seen rising investment in products, in technologies and in new production facilities. The researchers found evidence that this investment has in part arisen from the perception that the UK is favourable as a location due to a range of factors such as labour flexibility, access to the EU market, low rates of corporate tax, and related matters (see e.g. Holweg et al., 2009; KPMG, 2014). The significance of continued trading relationships with the European Union was a clear message that emerged from the interviews with key stakeholders, resonating with the findings from KPMG (2014).

Conclusions

The research, based on stakeholder feedback and interviews, found that from all parts of the automotive industry – whether it be the mainstream manufacturing sector or low-volume niche specialists, suppliers or contract engineers, engine plants or motorsports operations – there has been a palpable sense of a dramatic shift into a vibrant, confident and revitalised industry in the UK over the last decade, and this despite the global economic recession of 2008/9 from which much of the industry in the European Union is still struggling to escape.

Underpinning this resurgence has been a new era of industry–government relations through the Automotive Council, formed in 2009. This has enabled industry to speak with a common voice, and government to support industry in their common objectives of creating a compelling investment proposition and supporting low carbon opportunities. Complementing this, the LowCVP has mediated a wider debate beyond the specific interests of government and automotive industry to encompass fuel suppliers, fleet operators, consumers, NGOs, academics and others with an interest in future mobility. The seeds for cooperation were sown over a decade ago, allowing the industry to respond effectively to the economic crisis and maintain course despite changes of Government.

In addition, the introduction of binding regulations on new car average CO_2 emissions in the European Union (EU) (2009) provided the Europe-wide certainty for harmonised change for cars (and vans from 2011), while the longer-term policy stability of the Climate Change Act (2008), King Review (2007, 2008) and Stern Review (2006) should not be underestimated in setting the direction of travel.

A strong level of cumulative UK investment was identified by the authors, albeit with some unevenness caused by large investment announcements. Considering investments in R&D and manufacturing for lower and ultra -low carbon vehicles, 291 unique investments by companies were catalogued for the period 2003–2013. These investments were made by 85 different companies with a confirmed total of £17.6 billion. By extrapolation, the true value of investments is possibly of the order of £40 billion because the database only contains definite values for around 40 % of the identified investments, and does not include wider multiplier impacts in the supply chain.

Cumulative investments have risen strongly towards the latter part of this study, suggesting that funding and policy structures have gained increasing traction over time.

Future recommendations

The study authors drew together the findings and made a number of recommendations for policymakers, which are summarised here:

- Automotive policy frameworks are mostly working well, in particular due to the sense of urgency as well as consistency of policy, which should be maintained.
- Despite other priorities (eg autonomous vehicles), low carbon must remain a vital area of focus.
- Strong emphasis should be placed on the transition from low carbon technology development to manufacturing.
- There are other automotive sector challenges which need to be addressed (eg the 'hollowed out' UK supply chain).
- Attracting further inward investment, especially from component suppliers, would increase UK resilience.
- There's a need to focus on future skills requirements throughout the supply chain. These are already being addressed in some cases but focus needs to be maintained and strengthened.

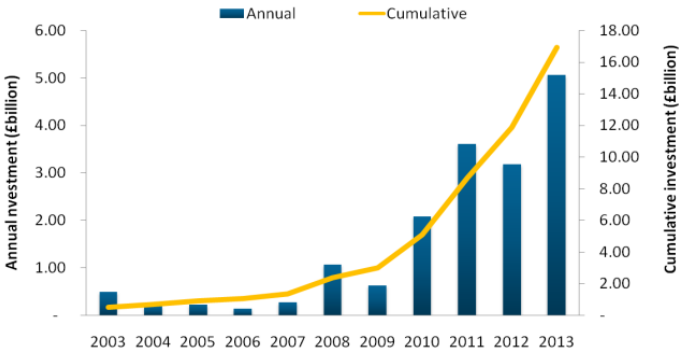

Figure 4. Low carbon investments by year.

- Low carbon policies need closer alignment with air quality issues.
- A clear framework is required for heavy vehicle efficiency measurement and incentives.
- EU regulations play a key role in harmonising future vehicle CO_2 (and air quality) performance requirements and the UK should exert a strong influence.
- Build confidence for the low carbon fuels sector: this does not currently benefit from the same clarity of outlook as automotive thanks to the Automotive Council and LowCVP roadmaps.
- A partnership between Government and stakeholders, ideally with an EU perspective, to define the long term outlook for fuels would be valued by the fuels and vehicles industries.

The study found that the initiatives which emerged from the decline of the UK automotive sector and the economic crisis have proved to be largely successful and should be built upon. However, there is a risk that the new structures will subsequently prove vulnerable if the sense of urgency that led to their creation declines. This vulnerability may be to unexpected events (new technologies, competitors or economic conditions perhaps), or to becoming less flexible and relevant over time.

Much of the low carbon innovation that has occurred in recent years in the UK is approaching technological maturity, but is still some way from manufacturing maturity. To gain maximum value this journey needs to be pursued to the end with appropriate support, thus ensuring that benefits accrue primarily in the domestic market.

Several respondents to the interviews and call for evidence noted that skills are becoming a challenge for the further development of the UK automotive sector. This relates not just to highly-skilled university-level graduates, but also to the future technicians for whom apprenticeships and other training are needed. The industry, government and relevant skills bodies have already recognised the need to work closely together (for example via the SMMT and Automotive Council) including the low carbon vehicle areas, to ensure that the UK's prospects are not hampered by skills shortages.

The authors said that the contribution of low carbon policies to relieving air quality concerns has been underplayed. Urban air quality is a growing area of concern for many cities across Europe, with many episodes in which 'safe' levels of pollutants are exceeded. In some instances the balance between CO_2 and air quality needs to be better managed, and many products and processes can be beneficial on both fronts.

EU policy plays an important role in harmonising vehicle CO_2 emissions targets, as well as providing funding for research. Active UK participation in shaping these agendas is important in view of the strength of other automotive interests within the EU.

This report identifies many things that have gone right, as well as some that have gone wrong. However, it is not a manifesto for complacency as the journey has really only just begun. The challenges of decarbonising road transport are enormous, especially as the UK seeks to capture a growing share of the industrial opportunities that this presents.

Much work is still required to develop low carbon vehicles and technologies, and especially to manufacture them in the UK and deliver them to market. Government and industry, through partnership, have made an important start on the journey. Continuing dialogue, support and action is required to ensure that UK industry can deliver upon future targets and build both a vibrant and sustainable industry and vehicle fleet.

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Endnote

The LowCVP, which was established in 2003, is a public-private partnership working to accelerate a sustainable shift to lower carbon vehicles and fuels and create opportunities for UK business. Around 180 organisations are engaged from diverse backgrounds including automotive and fuel supply chains, vehicle users, academics, environment groups and others. The Partnership became a not-for-profit company limited by guarantee in April 2009.

The LowCVP plays a key role in helping government to deliver its low carbon transport strategy. The objective of the strategy is to ensure that the UK takes a leading role in the global shift towards low carbon transport.