SMMT
DRIVING THE
MOTOR INDUSTRY

2019 **UK AUTOMOTIVE SUSTAINABILITY** REPORT

20TH EDITION – 2018 DATA

20 YEARS OF BALANCING ENVIRONMENTAL IMPACTS

WITH SOCIAL RESPONSIBILITY AND ECONOMIC PROGRESS

Automotive is one of the UK's most valuable sectors, contributing billions to the economy and supporting hundreds of thousands of livelihoods, and sustainability lies at the heart of everything it does. From reducing the emissions from both production processes and products, to investing in training and development for its staff, the sector seeks to ensure it is leading the way in sustainability. This latest report reviews 20 years of sustainable development, highlighting the importance industry places on balancing profitability and output with social and environmental responsibilities.

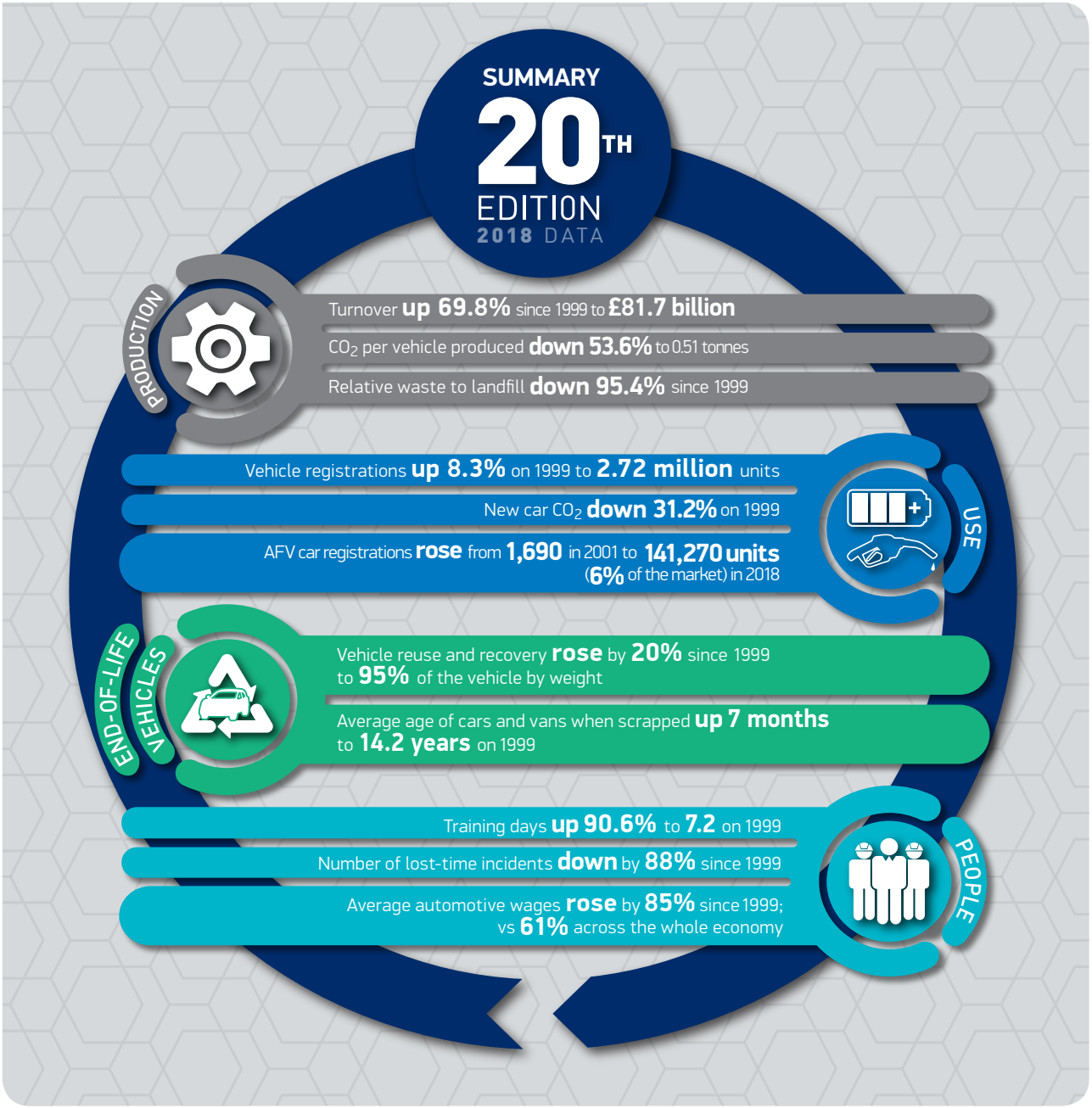
The sector has much to be proud of and this is evidenced in the advancements it has made since the turn of the millennium. Turnover has risen 69.8% since 1999, up from £47.9 billion to £81.7 billion in 2018, while productivity increased by a very significant 208%, with every employee on average today producing £100,900 worth of output. Meanwhile, average automotive wages rose by 85% over the period compared with 61% across wider manufacturing. Automotive manufacturing workers are now some of the UK's highest earners, with an average salary of £41,800, 40% higher than the national average.

While progress has been substantial, the past two decades have not been without challenges. Regulatory development, rapid technological change and the global financial crisis resulted in plant closures, including the loss of some manufacturing brands, and an overall decline in UK production. And the obstacles aren't behind us. The global automotive industry is facing fundamental changes: technological, commercial and environmental, as well as escalating trade tensions and, in the UK, ongoing uncertainty surrounding Brexit.

UK Automotive's environmental performance, however, has continually improved over the period with the sector outperforming the EU average. Since the publication of the first Sustainability Report in 1999, average CO2 emissions per vehicle produced has fallen -31.2%; energy use -43.3%; water use -14.9%; and waste to landfill -95.4%. In fact, a third of report signatories sent zero waste to landfill in 2018. The energy saved between 1999 and 2018 was enough to power 9.5 million households for a year, while the water saved is equal to the annual usage from 327,000 homes.

Over the coming years, the speed of technological innovation will outstrip that already experienced in the sector, bringing huge opportunities to position the UK as a centre of excellence for the development and roll out of future vehicles. However, to achieve this, we need to ensure any future relationship with the EU assures our competitiveness, delivering frictionless trade and an environment for investment. We are on the cusp of a transport revolution and the UK Automotive industry is set to be one of the world's driving forces behind the change.

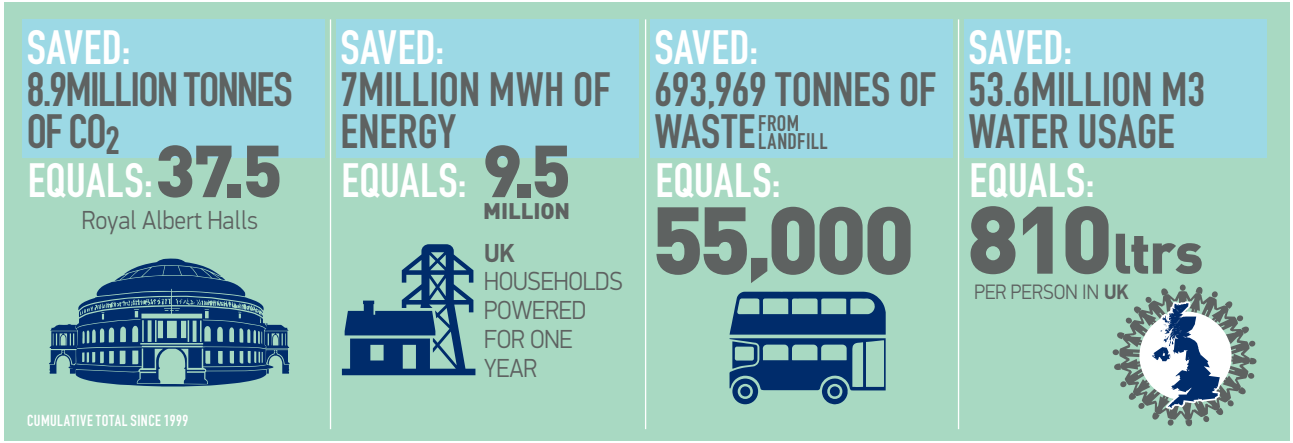
Mike Hawes Chief Executive
The Society of Motor Manufacturers and Traders (SMMT)



SUMMARY: KEY PERFORMANCE INDICATORS (KPIs)

		Units	2017	2018	% change 2018 on 2017	1999	% change 2018 on 1999
AS	Number of signatories		27	27	0.0%	11	145.5%
ECONOMIC PERFORMANCE							
WI	Automotive manufacturing sector turnover *	(£ billion)	81.5	81.7	0.3%	48.1	69.8%
	Expenditure on business R&D *	(£ billion)	3.60	3.75	4.0%	0.9	333.4%
	Total number of cars and CVs produced	(million)	1.75	1.604	-8.3%	1.8	-11.6%
	Total new car and CV registrations	(million)	2.90	2.72	-6.1%	2.5	8.3%
AS	Signatories' combined turnover	(£ billion)	75.7	76.9	1.5%	21.0	266%
VMs	Total number of vehicles produced	(million)	1.75	1.60	-8.6%	1.6	1.9%
ENVIRONMENTAL PERFORMANCE							
	Production inputs						
AS	Total combined energy use	(GWh)	4,596	4,299	-6.5%	7,013	-38.7%
VMs	Energy used per vehicle produced	(MWh/unit)	2.12	2.21	4.2%	3.9	-43.3%
AS	Total combined water use	(000m3)	5,031	5,182	3.0%	6,090	-14.9%
VMs	Water use per vehicle produced	(m3/unit)	2.3	2.8	21.5%	5.3	-47.8%
	Material outputs						
AS	Total combined CO_2 equivalents	(tonnes)	1,212,290	997,215	-17.7%	2,182,926	-54.3%
VMs	CO_2 equivalents per vehicle produced	(tonnes/unit)	0.56	0.51	-8.1%	1.1	-53.6%
	Volatile Organic Compounds emissions (cars)	(g/m2)	34.6	33.5	-3.3%	55.0	-39.1%
	Volatile Organic Compounds emissions (vans)	(g/m2)	49.7	41.8	-15.9%	59.0	-29.2%
AS	Total combined waste to landfill	(tonnes)	4,045	3,738	-7.6%	80,399	-95.4%
VMs	Waste to landfill per vehicle produced	(kg/unit)	1.3	1.4	10.8%	40.3	-96.6%
	Vehicle use						
AC	Average new car CO_2 emissions	(g/km)	121.0	124.5	2.9%	181.0	-31.2%
SOCIAL PERFORMANCE							
WI	Number of jobs dependent on the sector**		831,000	823,000	-1.0%	907,000	-9.3%
AS	Combined number of employees		112,110	108,182	-3.5%	95,214	13.6%
	Number of lost-time incidents per 1000 employees		1.9	1.6	-14.8%	13.4	-88.2%
	Number of training days per employee		4.4	7.2	65.4%	3.8	90.6%
	Share of women employed by signatories	(%)	11.8	11.4	-3.3%		N/A

AC All car registrations in the UK **AS** All Signatories **WI** Whole Industry data **VMs** Vehicle Manufacturers signatories **CV** Commercial Vehicles **CO_2** Carbon Dioxide



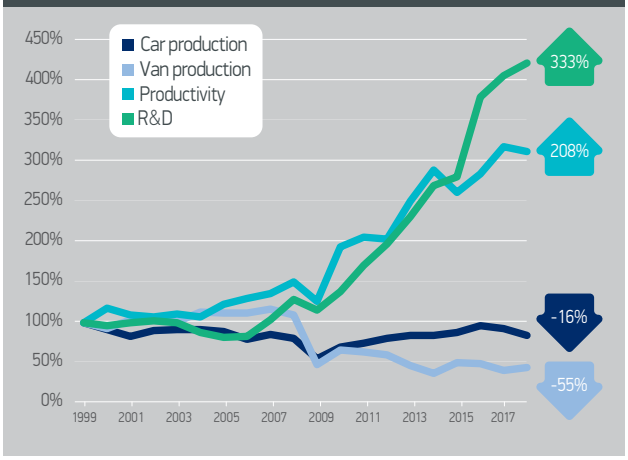
NOTE

Calculated as the difference between theoretical consumption; using the year 2000 vehicle production efficiency and the actual figures.
Please note the annual figures also include resources used to produce engine and battery, some of which are exported.

20 YEARS OF SUSTAINABLE DEVELOPMENT

The UK automotive industry has made significant progress since 1999, when this report was first published. In the past 20 years, the UK has established itself as a key location for the global automotive industry, with strong growth in UK automotive productivity, huge investment in R&D, an increase in engine production and the development of new specialist vehicle manufacturers. Those 20 years have also witnessed plant closures, the loss of some major manufacturing brands and an overall decline in vehicle output. This mixed picture is set in the context of rapid regulatory development in all aspects of vehicle production and use, huge technological change, as well as shifting global markets and seismic economic challenges. Today, the challenge for a sustainable and competitive UK automotive manufacturing base comes from the huge technological developments in production method, as well as the products, and the context of economic disruption due to uncertainty around Brexit.

CHART 1 | CHANGES IN CAR AND VAN PRODUCTION, PRODUCTIVITY AND R&D INVESTMENT SINCE 1999



*Engine production not included, as SMMT data only available from 2009. Since then, volumes have increased by 32% to 2.7million units.

KEY DEVELOPMENTS OVER 20 YEARS

1999

2000
End of Life Vehicles Directive – producer responsibility for ELV introduced

2001
Climate Change Agreement – impact on energy reductions initiatives

2002
Ford car plant closure

2003
First London Congestion Charge scheme – affected uptake of ULEVs

2004

2005
EU Emission Trading Scheme – impact on energy reductions initiatives **MG Rover plant closure**

2006
PSA plant closure

2007
Pedestrian Protection Regulation / Financial crisis

2008
New Car CO_2 Directive / Scrappage incentive scheme
Whole vehicle type approval extended to all vehicles / LDV plant closed

2009

2010
First Plug-in Car grant (Driving uptake of ULEVs) /
New Van CO_2 Directive / McLaren Automotive started production

2011

2012
VED linked to CO_2 – driven uptake of ULEVs /
Ford van plant closed

2013

2014
JLR engine plant opened / Modern Slavery Act came into force

2015

2016
Brexit Vote – business and investment certainty impacted

2017
Gender pay gap reporting / 3rd Industrial strategy /
Road to Zero / LEVC started production / McLaren Technology Centre opened / Clean growth Strategy

2018

ECONOMIC

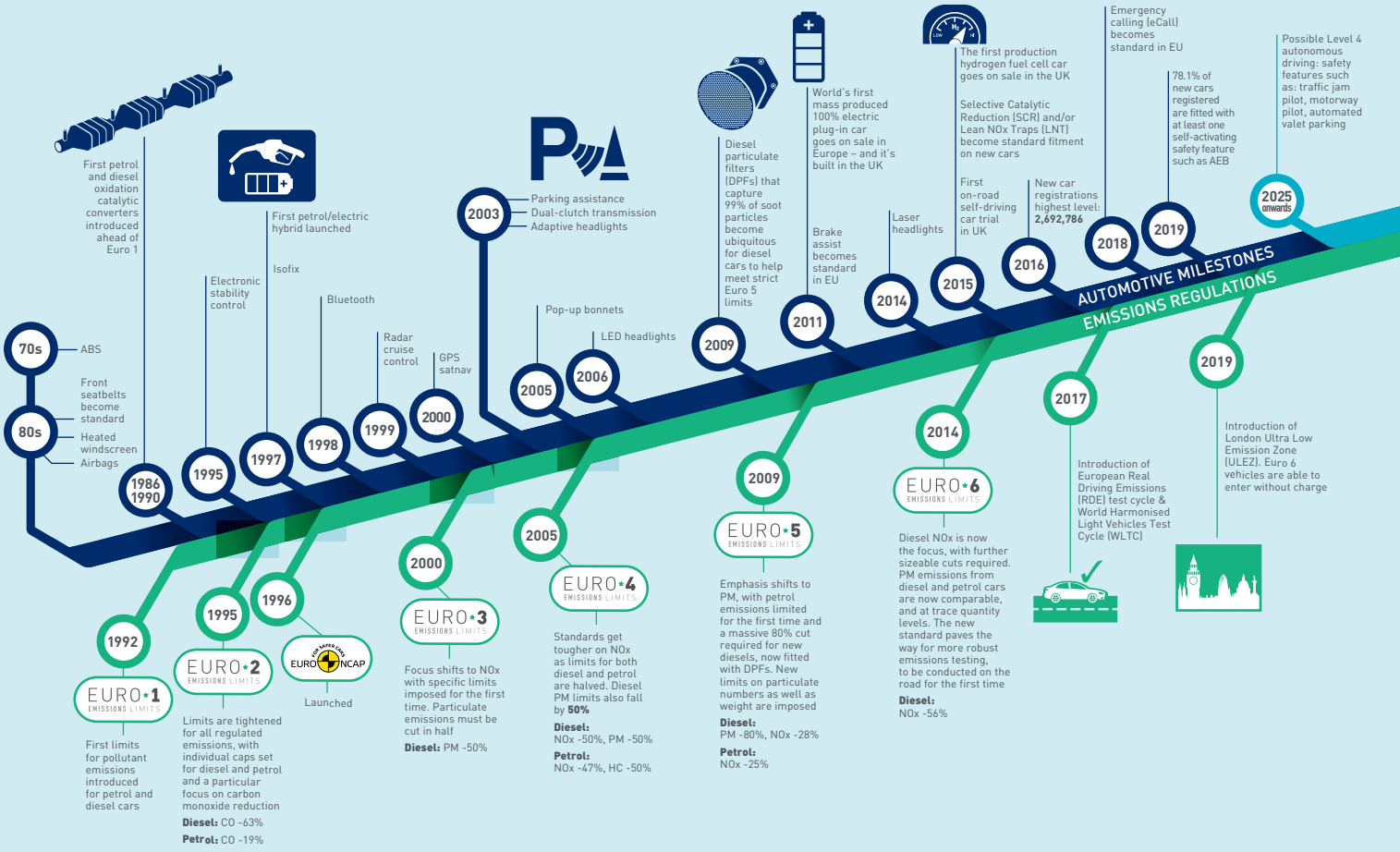
ENVIRONMENTAL

SOCIAL

20 YEARS OF SUSTAINABLE DEVELOPMENT

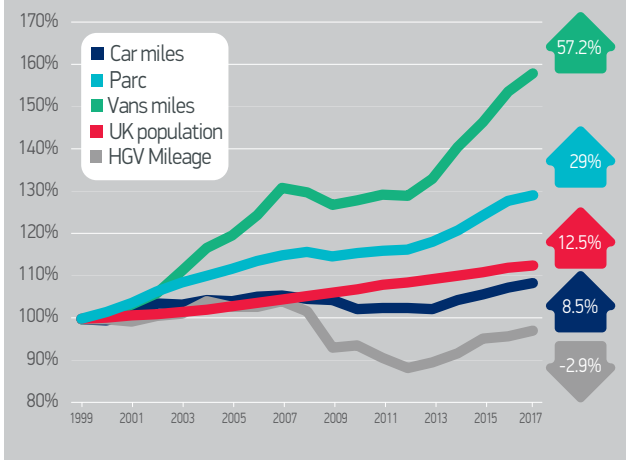
The industry has made great progress in the past 20 years, addressing air quality and other production emissions, investing in ever safer technologies, delivering tangible benefits to consumers, all while addressing its environmental impact and delivering growth for the sector and wider economy.

TECHNOLOGY TIMELINE 1970s TO 2025



Since the first publication of the Sustainability Report in 1999, the number and type of vehicles in use in the UK (the 'parc') has changed. UK population growth and economic developments have led to more, heavier, safer vehicles, driving more miles. And despite this, the UK has seen a reduction in emissions and continuous development of ever cleaner products.

CHART 2 | VEHICLE USAGE, PARC AND POPULATION GROWTH



Since 1999, annual car and van mileage has increased by **8.5%** and **57.3%** respectively, while the population grew by **12.5%** and the motor parc by **29%**. Only heavy goods vehicles mileage recorded a fall, dropping **2.9%**.

20 YEARS OF SUSTAINABLE DEVELOPMENT

Over the past 20 years, all segments have recorded significant CO_2 emissions improvements, with the biggest drops recorded in luxury saloon and multi purpose vehicles. These savings were achieved despite the weight of vehicles increasing significantly, due to safety and customer requirements. Since 2008, vehicle weight increased by 18% on average (between 8% and 28% depending on segment). The average weight of vehicles is expected to increase further in the future due to increased volumes of battery electric vehicles (BEVs).

CHART 3 | CAR PARC BY EURO STANDARDS

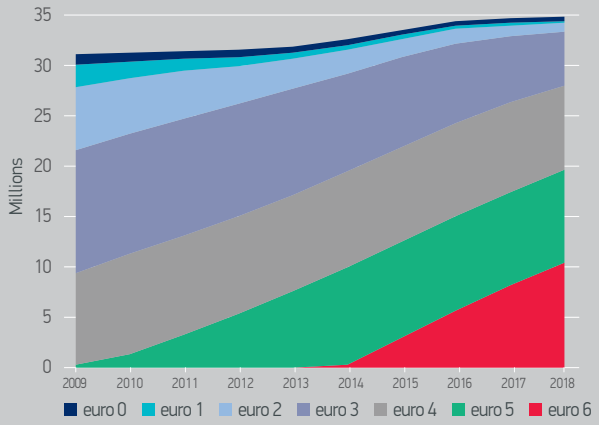
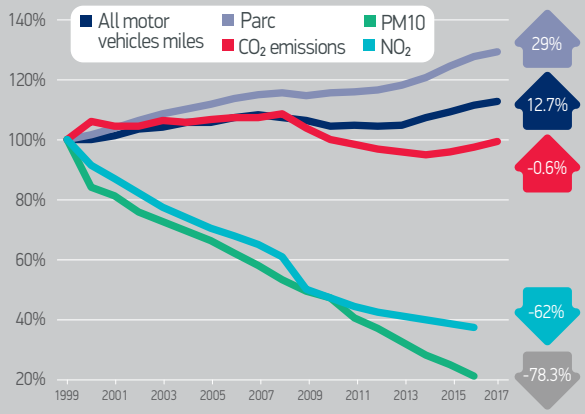


CHART 4 | ROAD TRAFFIC AND EMISSIONS OF CO_2, NO_2 AND PM10 FROM ROAD TRANSPORT



YOUNG PEOPLE DRIVE LESS

There are fewer young adults in Great Britain with driving lessons than in the early 1990s. The peak for 17-20 year-olds licence holding occurred in **1992/94** at **44%** (55% men and 38% women) before starting a downward trend, reaching **30%** in **2017**.[2]

CHART 5 | WEIGHT % INCREASE 2008 VS 2018 BY SEGMENT

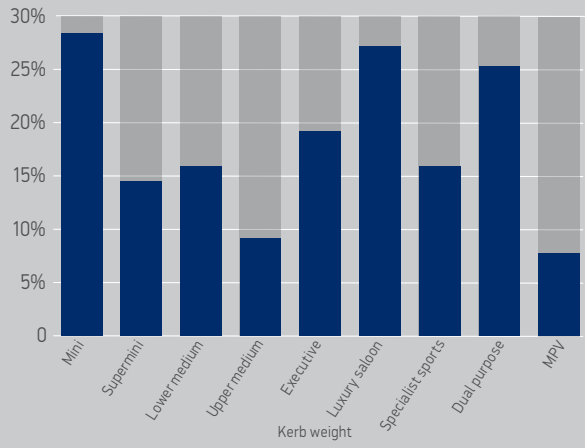
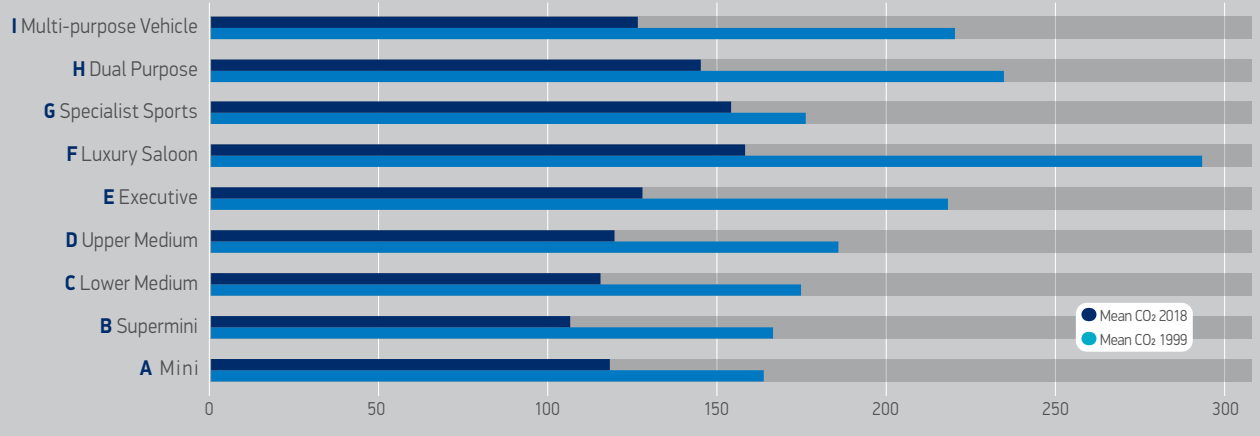


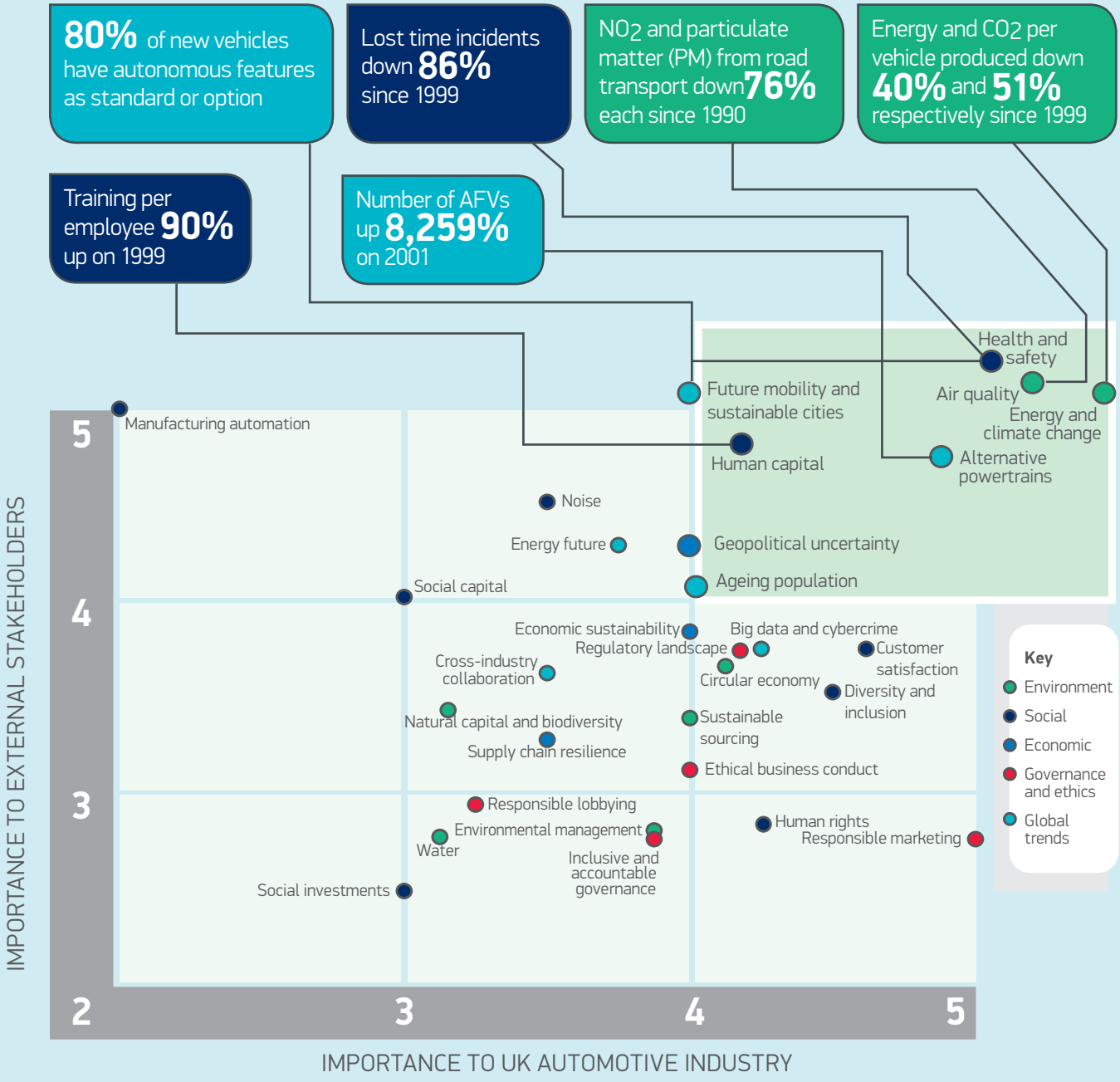
CHART 6 | MEAN CO_2 1999 VS 2018 BY SEGMENT



20 YEARS OF SUSTAINABLE DEVELOPMENT

The sustainability of the industry and its priorities have broadened over the course of the last 20 years. Its priorities now include all air pollutants, new mobility and social trends e.g. ageing population. These changes were evidenced in a 2017 materiality assessment carried out by SMMT, which was designed to track the relative importance of specific environmental, social, governance and other issues to the automotive industry and its stakeholders. The chart below shows the progress made against the priority issues identified.

2017 MATERIALITY ASSESSMENT



▶ Over the past two decades, the UK automotive industry has undergone huge transformation and growth, successfully managing to balance environmental impact with social responsibility and economic progress. Such agility and responsiveness has helped the industry to thrive, with vehicles becoming the UK's most exported product. To ensure future growth, inward investment needs to be secured to deliver continued improvement, for example with the digitalisation of both production processes and vehicles. For the UK to remain a front-runner in the global future mobility race and in the transformation to autonomous connected electric shared (ACES) vehicles, the automotive industry needs a stable and competitive economy to boost confidence and aid long-term planning.

PRODUCTION

PERFORMANCE

- Vehicle output and productivity down 8.3% and 2% respectively on 2017
- Energy per vehicle up 10.1% with CO_2 down 3.3% on the previous year.
- Relative and absolute water use up 21.5% and 3% respectively.
- Small volume manufacturers continued to see impressive growth

REASONS

- Weaker domestic and global demand, notably in the EU and China
- WLTP impact on vehicle supply due to delays in the approval process
- Reduced demand for diesel cars and engines
- Continued investment in increasing efficiency

FUTURE CHALLENGES/OPPORTUNITIES

- Attracting further inward investment
- Transition to Autonomous Connected Electric Shared (ACES) vehicles
- Ongoing uncertainty over the UK's future relationship with the EU and other key markets
- Exchange rate volatility impacting the input costs and hence profitability

UK AUTOMOTIVE PRODUCTION OUTPUT

Since 1999, car production in the UK has gone through significant change. That year, a record 1.8 million cars were produced, following the build-up of output at the Japanese-owned plants. However, by 2006 a number of prominent manufacturers had ceased manufacturing in the UK. Production output experienced a sustained period of growth after the global financial crisis – moving from fewer than a million cars in 2009 to 1.72 million units in 2016, following strong volume growth at Nissan in Sunderland and at premium vehicle manufacturer Jaguar Land Rover. Output has since edged downwards, and in 2018 fell 9.1% on 2017 levels to 1,519,440 units. This followed weaker demand in both the UK and the EU, in particular for diesel cars, as well as supply issues caused by the switch to WLTP type-approved vehicles. Other previously expanding global markets, notably China, also slowed in 2018.

The importance of export markets has increased in recent years. In 2018, 81.5% of cars produced in the UK were destined for international markets – the third highest level on record. Compare this to exports in 1999, which accounted for 63.9% of output, over 70% in 2004 and 80%, for the first time, in 2011. It is worth noting that the EU accounts for more than half of all UK exports.

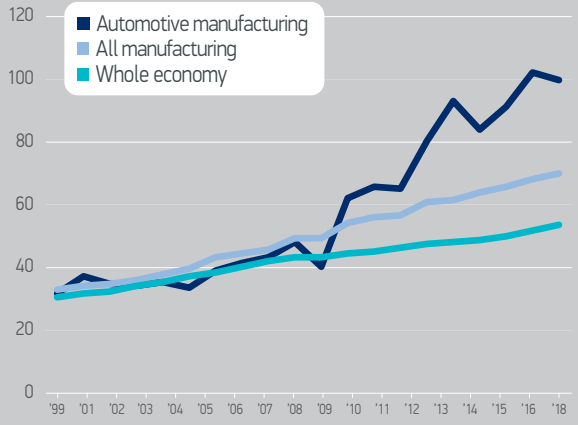
The recent decline in output is expected to continue due to global economic and political uncertainty, most notably Brexit and hostile trading conditions. Output is expected to drop by 5-10% through 2019, but this could be greater if the UK leaves the EU without a deal and the sector becomes subject to export tariffs, which would make its products less competitive. Global trade tensions are also high and the industry could be subject to further fiscal penalties in key markets.

For commercial vehicles (CV), production rose 8.5% in 2018 to 84,888 units. CV production had been around the 200,000 unit level per year between 1999 and 2008, but with the scaling back and eventual closing of the Ford Transit plant, as well as LDV closing down in 2009 and Vauxhall Astravan production ceasing in 2013, UK production has declined sharply. In 2018, growth was stable across all the UK's remaining producers, with the now PSA Group-owned IBC plant in Luton accounting for almost three-quarters of output. Again, exports account for much of the UK's CV output (60%), with the EU the main destination.

PRODUCTIVITY, VALUE ADDED

UK automotive manufacturing productivity outstripped broader manufacturing and the whole economy by a factor of 1.9 and 2.8 respectively. Automotive output per job growth between 1999 and 2018 was 208%, all manufacturing 108% and whole economy 74%. According to the Office for National Statistics (ONS), productivity in automotive manufacturing tripled over the past two decades, moving from £32,000 to £100,900 worth of output per job. However, in 2018, due to the fall in output, automotive manufacturing productivity dropped by 2%.

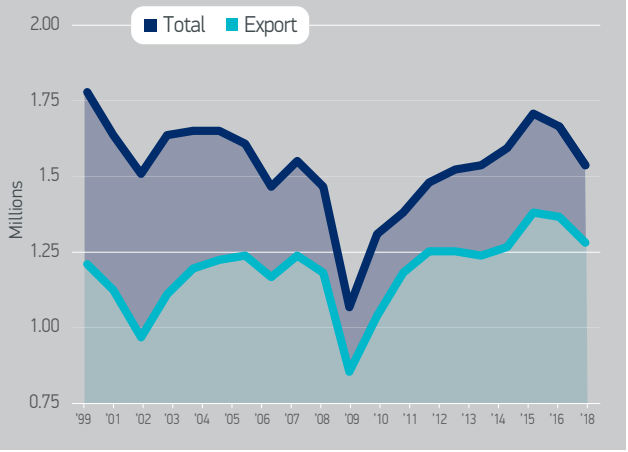
CHART 7 | OUTPUT PER JOB (GVA, CURRENT PRICE) – £ '000s



TURNOVER

SMMT estimates (based on ONS data) that UK automotive manufacturing sector turnover almost doubled over the past two decades, from £48 billion to £82 billion. In 2018, it is

CHART 8 | UK CAR PRODUCTION



estimated to have increased by 0.3%. This rise is likely due to an increase in sales volumes of higher value products, such as premium and sport/luxury products taking an increase share of UK production. SMMT estimates that the value added for this turnover was £18.6 billion. Signatories reported £76.9 billion in turnover (signatory activities go beyond manufacturing), representing an increase of 2.8% on the previous year.

LONDON ELECTRIC VEHICLE COMPANY'S NEW MANUFACTURING FACILITY

In 2018, London Electric Vehicle Company (LEVC) started production of the UK's first car plant dedicated solely to the production of range-extended electric vehicles.

The new state-of-the-art vehicle plant in Ansty, Warwickshire, is where the world's first purpose-built, mass-market electric taxi and electric light commercial van will be built. When at full capacity the plant will be able to build more than 20,000 vehicles per year.

The £325 million investment and expansion of the new site and the next-generation London taxi and LCV helped create more than 1,000 new jobs, including 200 engineers and 30 apprenticeships. In addition, 1,500 currently registered new taxis operating in London are able to save 14,580 tons of CO_2 per year.

INVESTMENT

Annual R&D expenditure across the automotive industry in the UK was around £1 billion per annum until 2009, after which it started to rise significantly. In 2018 this growth levelled off, but still recorded an increase to £3.75 billion. This was driven by increased demand for developing low carbon technologies and more advanced manufacturing processes. The UK was one of the first to make ultra-low emission vehicles, but to remain at the forefront of this technology development, and the transition to ACES vehicles, it needs the right regulatory and economic conditions to ensure a low carbon future

DIGITALISATION OF MANUFACTURING

With the arrival of the fourth industrial revolution, new digital technology solutions such as predictive analytics, visualisation tools and advanced robotics, are optimising the way industries operate. The automotive industry has embraced this new era and is working towards more digitalised manufacturing processes, research and development in connected and autonomous vehicles, providing ever more digital products and services across the whole value chain. OEMs are leading the way in process automation and application of the newest technologies; however, in order to meet customer demands, the whole industry, including suppliers, needs to embark on this journey. There are significant opportunities for SMEs to gain from digitalisation, but they are likely to require additional support and guidance in order to do so.

BREXIT

Uncertainty regarding the UK's future trading relationship with the European Union, as well as global trading partners with whom the UK currently enjoys preferential trading relationship by virtue of its EU membership, is negatively impacting investor confidence. Inward investment has fallen -46.5%, while 50% of automotive companies report that their operations have suffered because of the current uncertainty. The Automotive Council's International Competitiveness Report demonstrates that, having previously viewed political stability as one of the UK's strengths, international investors now identify it as a weakness. If the confidence of international investors is to return, the current uncertainty regarding the UK's withdrawal from the European Union must end, and the UK secure a future trading relationship with the European Union that delivers frictionless trade.

ENVIRONMENTAL PERFORMANCE

▶ Over the past 20 years, the UK automotive sector has become one of the most efficient in Europe, if not globally. Manufacturers' strict internal efficiency targets and competition between plants for new model production contracts have driven resource efficiency to new heights. Manufacturing processes are continuously refined to provide optimum performance, getting close to the limits of current technology. Nowadays, production volumes and weather conditions, which affect space-heating requirements, influence year-on-year performance. This means any significant efficiency improvements are more likely to come as a result of a technological step change, for example the exclusive use of decarbonised electricity, biomass or hydrogen, which will require external support from service providers, suppliers and government.

ENERGY USE

Since 1999, automotive manufacturers have invested heavily in reducing energy use at production sites and offices, and as a result, have reduced average energy consumption per vehicle produced by 43.3%.

Contrary to this trend, however, 2018 saw a 4.2% increase in energy consumed per vehicle (see graph, below). This is directly linked with production volumes falling by 8.6%. When demand and production volumes fall, most areas and associated energy sources need to remain operational, which means fewer vehicles produced per for the same energy consumption.

Furthermore, some signatories reported installing additional casting equipment, which was run in tandem with the existing equipment during commissioning; hence the increase in energy usage.

Nevertheless, UK manufacturers stand out when compared with the European automotive average energy efficiency, outperforming it every year; except for 2009, just after the economic crash, when production volumes were exceptionally low.

It should be noted that the above figures include the energy used for engines, batteries and powertrains, some of which are exported. In 2018 engine production was down by 5.9% at 2.56 million, compared to the previous year.

RENEWABLE ENERGY

The automotive industry has a long-standing commitment to deliver energy efficiency and decarbonisation. The amount of renewable energy produced locally by vehicle manufacturers is increasing year on year; reaching 65GWh in 2018; a 50.8% increase on the previous year[1]. In 2018, renewable energy production accounted for 2% of total energy and 4.4% of electricity used by those with renewable energy production[2].

CHART 10 | SIGNATORIES' RENEWABLE ENERGY PRODUCTION (MWh)

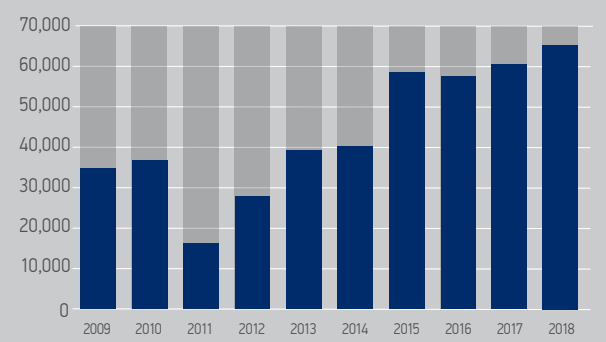
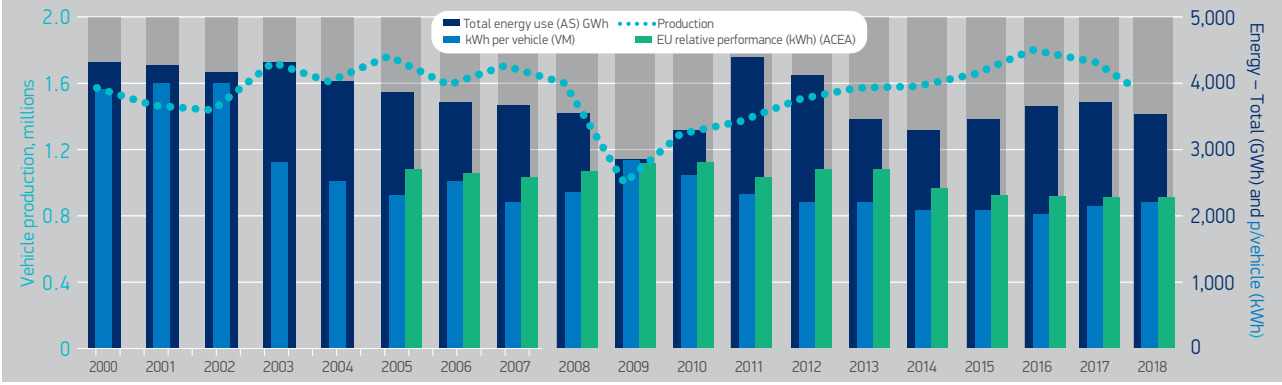


CHART 9 | ENERGY USAGE vs PRODUCTION



SCIENCE BASED TARGETS

Science based targets (SBTs) are set targets in line with the level of decarbonisation required to keep the global temperature increase below 2°C, compared with pre-industrial temperatures. Since 2015, the following companies have committed to SBTs covering their global operations: Daimler AG, Honda Motor Company, Michelin, Nissan, Group PSA, Renault and Toyota.

In 2018, the Science Based Targets initiative published a set of technical resources to support corporate target setting for transport activities.

[1]Some figures were corrected for 2017, due to billing error.
[2]The above figure includes usage of renewable energy produced at one site adjacent to a signatory's production facility of which it has exclusive use.

BENTLEY'S LONG-TERM COMMITMENT TO ENVIRONMENT EXCELLENCE

Twenty years ago, Bentley Motors was the first UK automotive manufacturer to achieve the ISO 14001 environmental management standard and has held this standard longer than anyone else in the automotive sector, achieving reaccreditation in 2017. Additionally, also in 2017, the company was reaccredited with the ISO 50001 energy management standard.

Today, 100% of Bentley's electricity is generated by either solar panels or purchased as certified green energy. More than 30,000 solar panels provide up to 40% of on-site electricity. This includes 20,000 solar roof panels installed in 2013 covering 3.45 hectares. In 2018, the Bentley site saw the completion of the UK's largest solar panel car port system, comprising 2.7MW, and a further 10,000 panels covering 1,400 car parking spaces.

Bentley continues to focus on managing its manufacturing footprint while also re-prioritising its model plan and accelerating its journey towards electrification, with hybrid or electric versions of all Bentley models by 2025.

MICHELIN'S ENERGY EFFICIENCY GAINS

To further reduce its environmental footprint, Michelin's Stoke-on-Trent plant made a number of significant technical improvements in 2017/18.

The warehouse facility, measuring 53,000m2, received a heating system upgrade from an old gas boiler to a Mini Combined Heat and Power (CHP) plant, which consumes the same amount of gas to provide low temperature hot water heating and generates 900 kWh electricity whenever the heating is on, providing 75% of the site's requirements. Also, a modified Hydraulic Pump Pack now runs on a single pump instead of a dual pump, saving 163,200 kWh per year. A fixed compressor motor was also replaced for one using less power, saving an additional 40,000 kWh per year.

Finally, three old boilers were replaced with two new modern ones and the stand-by boiler was optimised providing additional savings of 264,260 kWh per year.

CO_2

Over the past 20 years, the industry has achieved a 53.6% reduction in relative CO_2. Thanks to the ongoing decarbonisation of the National Grid, official electricity conversion factors are revised annually to reflect the increasing share of renewable sources. In 2018, green energy made up 46.5% of all electricity used. The renewable content of such energy depends on individual contracts. Some manufacturers require their energy supplier to provide them with Renewable Energy Guarantees of Origin (REGO) certificates, which guarantees that their energy purchased comes from renewable sources.

This trend has helped the decarbonisation of automotive production, with electricity accounting for 46.6% of energy use for automotive manufacturing.

Despite a drop in production volumes, CO_2 per vehicle produced dropped in 2018 by 3.3% to 0.54 tonnes on the previous year. The UK also performs well against the EU, with average relative CO_2 emissions shown in the graph below.

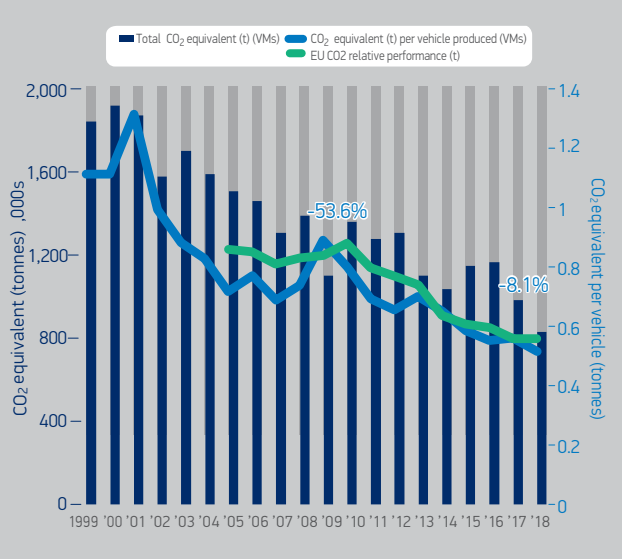
HOW THE CO_2 REDUCTION HAS BEEN ACHIEVED

- Installation of combined heat and power (CHP), where turbines combust natural gas to simultaneously generate electricity and recover what would otherwise be wasted heat. CHP can reach 90% efficiency, whereas conventional electricity generation converts only 30% of fuel into usable energy
- Increased volume of power generated by wind turbines, on-site or local solar panels and green energy used
- Switching from using electricity to gas, which has a lower emission factor
- Building insulation reduced space heating needed
- Eliminating heat loss during non-production periods

CARBON EMISSIONS SHIFTING FROM VEHICLE USE TO PRODUCTION PHASE

The increasing number of alternatively fuelled vehicles is likely to cause a shift in the carbon footprint of the industry, with the greater emphasis on the production phase. Please see the challenges box on page 14.

CHART 11 | VM CO_2 PRODUCTION: TOTAL AND PER



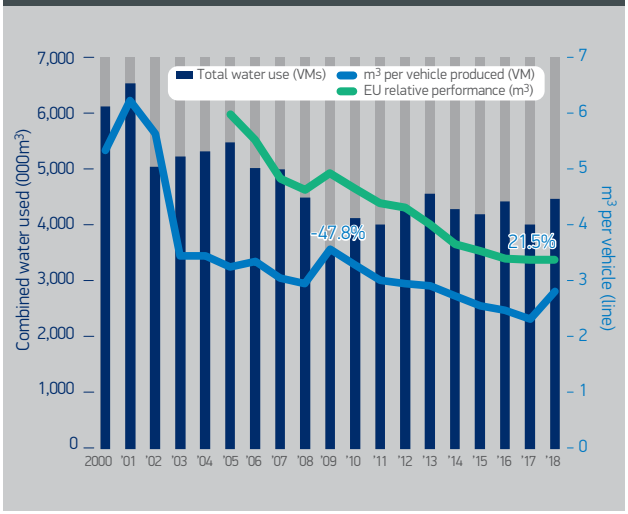
WATER

Since 2000, long-term investments in water-efficient technologies and gradual adjustment of procedures have made it possible to reduce water use per vehicle by 47.7% and absolute volumes by 27%.

In 2018 water use per vehicle produced increased by 21.5%, reaching 2.8m3 per vehicle. This increase in relative and absolute water volumes was caused by some additional activities undertaken by signatories, including the commissioning of a new paint finishing line, a new water filtration system and a new high-pressure die-casting machine.

However, the 2018 figures are 20.8% better than the European average of 3.34m3 per vehicle produced, as reported in 2017.

CHART 12 | VMs TOTAL WATER USE AND ON A PER VEHICLE BASIS



ACTIONS TO REDUCE WATER USE

- Rinse waters in the paint shop are cascaded in reverse so the dirtiest water is used for the first rinse and so on. This minimises fresh water usage and ensures that only the strongest effluent is discharged to the on-site effluent treatment plant
- Review of chemical dosing regime in painting processes helped to optimise water usage.
- Real time detection of leaks allows efficient water system repairs
- Adjustment to water testing regime for the finished vehicle to minimise water loss through evaporation

STANDARDS AND REPORTING

85% of the signatories' 48 manufacturing sites in the UK are certified to ISO 14001 or EMAS environmental management standards. Also five companies (Bentley, Honda, Leyland, Schaeffler and Toyota) hold ISO 50001- an energy management system certification. Many sites also hold ISO 9001 and ISO 18001 certification. In addition, 18 out of 28 signatories produce an annual sustainability report and 64% produce an environmental report. Half of signatories declared that they have their corporate efficiency targets set at a company or group level.

WASTE

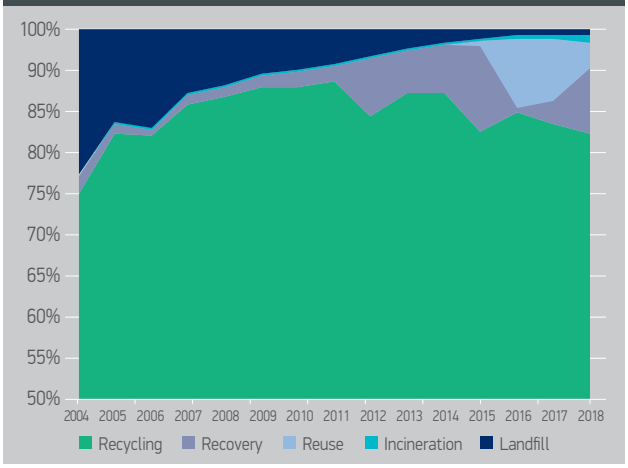
Between 1999 and 2018, the industry achieved a 95% reduction in landfill waste per vehicle produced. This was delivered by a holistic approach to the vehicle life cycle and successful application of the waste hierarchy approach - prevent, reduce, reuse, recycle and recover- in production processes. The introduction of the landfill tax in 1996 also contributed to this achievement.

In 2018, the absolute quantity of waste going to landfill from vehicle production plants increased by 10.8% on 2017, reaching 1.39 kg per vehicle produced. This is due to some buildings being decommissioned and therefore demolished leading to some waste e.g. asbestos going to landfill and changes in the ways waste is calculated and reported.

The amount of waste sent to landfill remained up on 2017, an increase from 0.7 to 0.8% of all waste produced. In 2018, 86% of waste was recycled, a 1.6% drop on the previous year. The recovery, including energy recovery rate, increased from 3% to 9.1% year-on-year, with the reuse rate down to 3.5%, a decline of 5 percentage points.

Incineration now represents only 0.8% of waste treatment, with the overall amount of waste arising falling by 6.1% on 2017 figures.

CHART 13 | VEHICLE MANUFACTURERS' WASTE – RECYCLED, RECOVERED, REUSE INCINERATION AND TO LANDFILL



IN 2018, THE FOLLOWING OEM SIGNATORIES SENT ZERO WASTE TO LANDFILL: Aston Martin, Ford, GM Vauxhall, Honda, Jagual Land Rover , Leyland Trucks, Toyota Motor Manufacturing UK, Unipart and Volkswagen.

WASTE TO LANDFILL REDUCTION TECHNIQUES

- Volume of sludge from paintshops sent to landfill has been minimised by reducing the amount of water it contains and creating a dried residue, which can be used in the production of cement
- Utilisation of high calorific hazardous waste, such as paint sealer for thermal treatment with energy recovery.
- Foundry sand is being sent to construction companies for road fill
- Coolant is being cleaned and processed on site to enable its re-use, reducing the need for transportation of waste coolant and reduced volume of new coolant brought in

VOLATILE ORGANIC COMPOUNDS (VOCS)

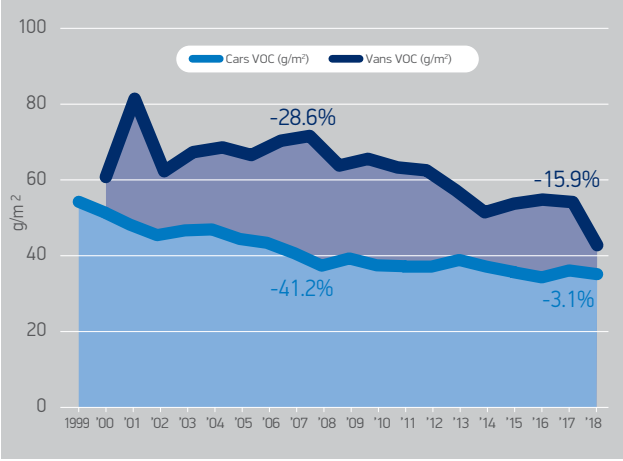
VOC (solvent) emissions from vehicle painting operations are considered one of the key environmental impacts of vehicle manufacturing. VOCs are a precursor to the formation of ground level ozone and photochemical smog.

During the past two decades, vehicle manufacturers have invested heavily in new painting equipment, while continuing to refine their own processes to improve performance.

In 2018, VOCs reached 33.5g/m2 from cars and 41.8g/m2 from vans, a year-on year decline of 15.9% and 3.1% respectively. Since 1999, VOCs from painting dropped by 28.6% for cars and 41.2% for vans.

The recent consumer trend for 'two-tone' (where two paint colours are used) vehicles makes reducing VOC emissions more challenging, as this means less opportunity for efficient batches of vehicles in a single colour and, therefore, more flushing of solvent between colours.

CHART 14 | VM VOC EMISSIONS: CARS AND VANS



CHALLENGES

- Painting processes are one of the most energy intensive, accounting for about 50% of energy used by an average assembly plant. They are also one of the most tightly regulated and monitored, usually being the main element of vehicle manufacturing plant, which are subject to Environmental Permitting. The requirements of Environmental Permits have always been challenging. However, with the stipulation of more stringent emission levels in the anticipated Best Available Technic (BAT) Conclusions document the challenge will intensify, and may impact on a site's ability to compete in the future
- Installation of VOC abatement equipment can be a relatively quick solution, but can also be undesirable in the long run. For instance, additional energy is required to run the abatement plant and this is an 'end of pipe' remedy rather than minimising VOCs at source in the paint
- Reducing VOC emissions has had an adverse effect on energy consumption. For instance, moving to water-based paints requires longer drying times, so more energy and more space is needed to install drying ovens

CLOSING THE LOOP

To consume fewer raw materials, in line with the circular economy principles, all vehicle manufacturers are already using secondary material such as recycled metals, glass, cotton, cardboard and plastic. However, the level of their use depends on the material meeting a variety of required parameters. These include technical specification, safety requirements, consistent quality, supply certainty and cost. All secondary materials used need to fulfil the same requirements as virgin materials.

THE CHALLENGE OF USING SECONDARY MATERIALS

Parts containing recycled content often differ visually to parts made with virgin material, so their use in vehicle surface applications is limited for aesthetic requirements, for example engine covers, insulation, which limits their increased use.

Some parts made from recycled material need to be reinforced to reach the same properties, therefore are heavier than those made form virgin sources, which adds to the vehicle weight and consequently leads to increased emissions.

Many recyclers are batch based, meaning they cannot guarantee larger industrial quantities of material to the same standard.

Secondary materials are often derived from products put on the market several years ago, using materials which are not necessarily used currently due to the availability of improved materials which are able to fulfil the latest technical requirements and contribute to vehicle light weighting.

The potential restriction on content of certain substances, such as lead and flame retardants, might hinder the use of some secondary materials in new products.

Suppliers charge a premium for materials that include recycled content, which makes the business case for using such materials more difficult.

FOCUS: SMALL VOLUME MANUFACTURERS

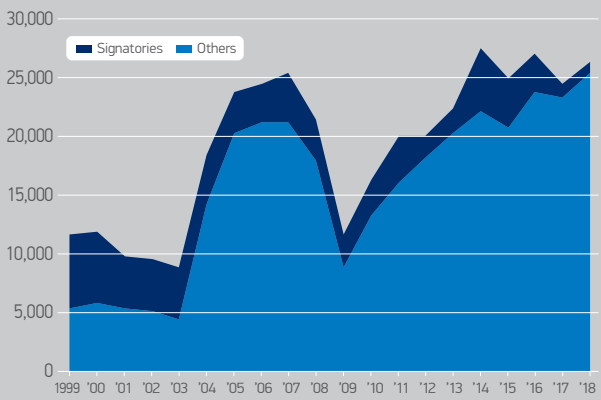
The UK has the largest number of specialist or small volume (SVM) car manufacturers in the world, including globally iconic brands such as Aston Martin, Bentley, Lotus, McLaren and Rolls Royce. The sector has grown by 130% over the past 20 years, moving from an annual production output of below 12,000 cars, to well over 26,000, based on SMMT's production survey. In SMMT's 2017 report, the SVM sector had a turnover of just below £4bn, employed well over 10,000 people and exported around two-thirds of its products, to markets as diverse as the EU, US, China, Japan and the Gulf States. In all, there are more than 60 specialist car companies in the UK – our survey includes around 10, mainly the largest ones.

During this period the likes of Aston Martin, Bentley and Rolls Royce have seen output rise almost tenfold, following the introduction of broader model ranges. Stalwarts such as Morgan and Caterham have maintained their production volumes and McLaren entered the road car market during this period. However, other companies, such as Lotus, have seen output fall, and some others have been lost altogether.

The outlook for this segment is positive though, with many brands announcing growth plans on the back of new investment and new model offerings. LEVC began building the electric taxi in 2018, Aston Martin will begin production of cars at the new St Athans plant in Wales with a focus on electric models, and TVR is due to produce cars in Wales by 2020. Lotus, under new owner Geely, is also expected to see output recover.

In addition to the sector's economic contribution, the low volume brands have also provided innovative new technologies, born from their roots in motorsport, most notably aerodynamics, light-weighting and highly efficient powertrains. Typically, they also employ a highly specialised and skilled workforce.

CHART 15 | LOW VOLUME CAR MANUFACTURERS PRODUCTION



CHALLENGES

- Some small volume manufacturers are smaller than their suppliers, hence they encounter problems with influencing standards. One signatory reported that only 30% of their suppliers had signed up to their supply chain guide on responsible sourcing
- Concerns over global tensions and tariffs particularly impact producers with global outreach

ALL SVM SIGNATORIES HAVE ISO 14001 ACCREDITATION

KPIS

SVM signatories once again defied the overall production decline in the sector in 2018, increasing output by 26.5% year on year. Importantly, those increased volumes only translated into increased absolute energy usage, while the remaining KPIs improved. This remarkable performance proves that SVM's innovative nature in their products is also visible in their production performance.

TABLE 1	Units	2017	2018	% change 2018 on 2017
ECONOMIC PERFORMANCE				
Production		9,897	12,523	26.5%
ENVIRONMENTAL PERFORMANCE				
Production inputs				
Total combined energy use	(MWh)	93,570,329	106,906,571	14.3%*
Energy used per vehicle produced	(MWh/unit)	9,454.4	8,536.8	-9.7%
Total combined water use	(000m3)	120	85	-29.1%
Water use per vehicle produced	(m3/unit)	12.2	6.8	-44.0%
Material outputs				
Total combined CO_2 equivalents	(tonnes)	25,629	25,069	-2.2%
CO_2 equivalents per vehicle produced	(tonnes/unit)	2.59	2.00	-22.7%
Total combined waste to landfill	(tonnes)	119	119	-0.2%
Waste to landfill per vehicle produced	(kg/unit)	12.0	9.5	-21.1%

*This is still lower than expected, taking into account the increase of production volumes.

FOCUS: AUTOMOTIVE SUPPLY CHAIN

A close collaboration between vehicle manufacturers and their supply chain is vital to the success of the industry as a whole. This interdependency has been brought into focus when considering the potential impacts of Brexit on 'just-in-time' manufacturing and the repercussions for the broader value chain.

Vehicles are becoming more complex, resulting in an ever-expanding supply chain and entering new markets beyond more traditional, established routes. As a result, the whole industry is working together to ensure that the materials that go into vehicles have been sourced responsibly.

50% OF SIGNATORIES HAVE MINIMUM ENVIRONMENTAL STANDARDS REQUIREMENTS IN THEIR SUPPLY CHAIN, WHICH COULD INCLUDE ISO 14001.

64% ENGAGE WITH SUPPLIERS TO IMPROVE EFFICIENCY;

25% MONITOR CARBON MILES.

IMPROVED EFFICIENCY

Over the years, vehicle manufacturers have worked closely with their suppliers to reduce lead times, integrate delivery systems and achieve 100% 'on-time' delivery. Re-usable and dedicated packaging has also been introduced to reduce damage and handling times. A demand-pull system was implemented to ensure that orders are placed strictly according to consumption, to minimise lead times. Other improvements include:

- a new set of collection routes and frequencies
- a consolidation of various docks in Europe
- a move to mixed inbound loads to major offload points reducing the number of inbound trucks
- increased part count per container to improve trailer utilisation
- expanded use of sequenced parts loading to enable an increase in the number of direct deliveries from local suppliers and reduced local warehousing
- reduced outer packaging dimensions to increase the number of items per payload, to reduce the number of journeys.
- provision of facility to fill up and wash vehicles on site to reduce mileage
- using open transporters to transport more vehicles in one journey

SUPPLY CHAIN KPIS

In 2018, the number of supply chain signatories remained stable, with 10 companies representing a wide range of activities, ranging from component production to freight and remanufacturing.

In 2018, the activity level, defined as weight of product produced, dropped by 10.6% year-on-year. All remaining absolute and relative metrics improved to a much higher level than the overall production decline.

TABLE 2 | SUPPLY CHAIN PRODUCERS' ECONOMIC AND ENVIRONMENTAL PERFORMANCE

		2012	2017	2018	% change 2018 on 2012	% change 2018 on 2017
ECONOMIC PERFORMANCE						
Output (weight of product produced)	(tonnes)	401,922	522,692	467,245	16.3%	-10.6%
ENVIRONMENTAL PERFORMANCE						
Production inputs						
Total combined energy use (reporting weight)	(GWh)	628.6	386.1	305.0	-51.5%	-21.01%
Energy used/output (per tonne shipped)	(MWh/tonne)	1.56	0.74	0.65	-58.3%	-11.6%
Total combined water use (reporting weight)	($000m^3$)	777	503	377	-51.4%	-24.9%
Water use/output (per tonne shipped)	(m^3/tonne)	1.93	0.96	0.81	-58.2%	-16.0%
Material outputs						
Total combined CO_2 equivalents (reporting weight)	(tonnes)	207,995	98,044	68,420	-67.1%	-30.2%
CO_2 equivalents/output (per tonne shipped)	(tonnes/tonne)	0.52	0.19	0.15	-71.7%	-21.9%
Total combined waste to landfill (reporting weight)	(tonnes)	1,826	666	466	-74.5%	-30.1%
Waste to landfill/output (per tonne shipped)	(kg/tonne)	4.5	1.27	1.00	-78.1%	-21.8%

Data from logistics companies is not included in the table above to focus on producers of automotive components and so enable per unit of output comparisons).* GKN driveline was not able to provide the 2018 data due to restructuring, hence it is excluded from the 2017 and 2018 data comparison this year.
The activity level is currently expressed in weight of product produced to reflect on the wide ranging business operations activities performed by supply chain signatories. However due to light weighting of parts the metric might need to be revised. The number of units processes dropped in 2018 by fell 2.3% on 2017.

UK SUPPLY CHAIN

Over the past 20 years, the value of the automotive sector as a whole has grown in real terms and the UK has become more integrated and more dependent upon suppliers across the EU. Net trade with the EU for parts and components has grown from around £2billion to more than £6billion. Suppliers have continued to invest in the UK alongside the vehicle manufacturers, helping keep the UK supply chain competitive. The results of these investments and competitiveness gains have been seen in an increase in local content from 36% in 2011 to 44% in 2017. Output across the sector, including the supply chain, has also increased in terms of productivity per capita too.

2018 was one of the most challenging years in recent times for the UK automotive supply chain. New vehicle manufacturing was down over the course of the year by 8.3%, having a big impact on demand for UK manufactured components.

Similarly, a drop in European demand for diesel vehicles and issues related to the introduction of WLTP testing have impacted UK part suppliers

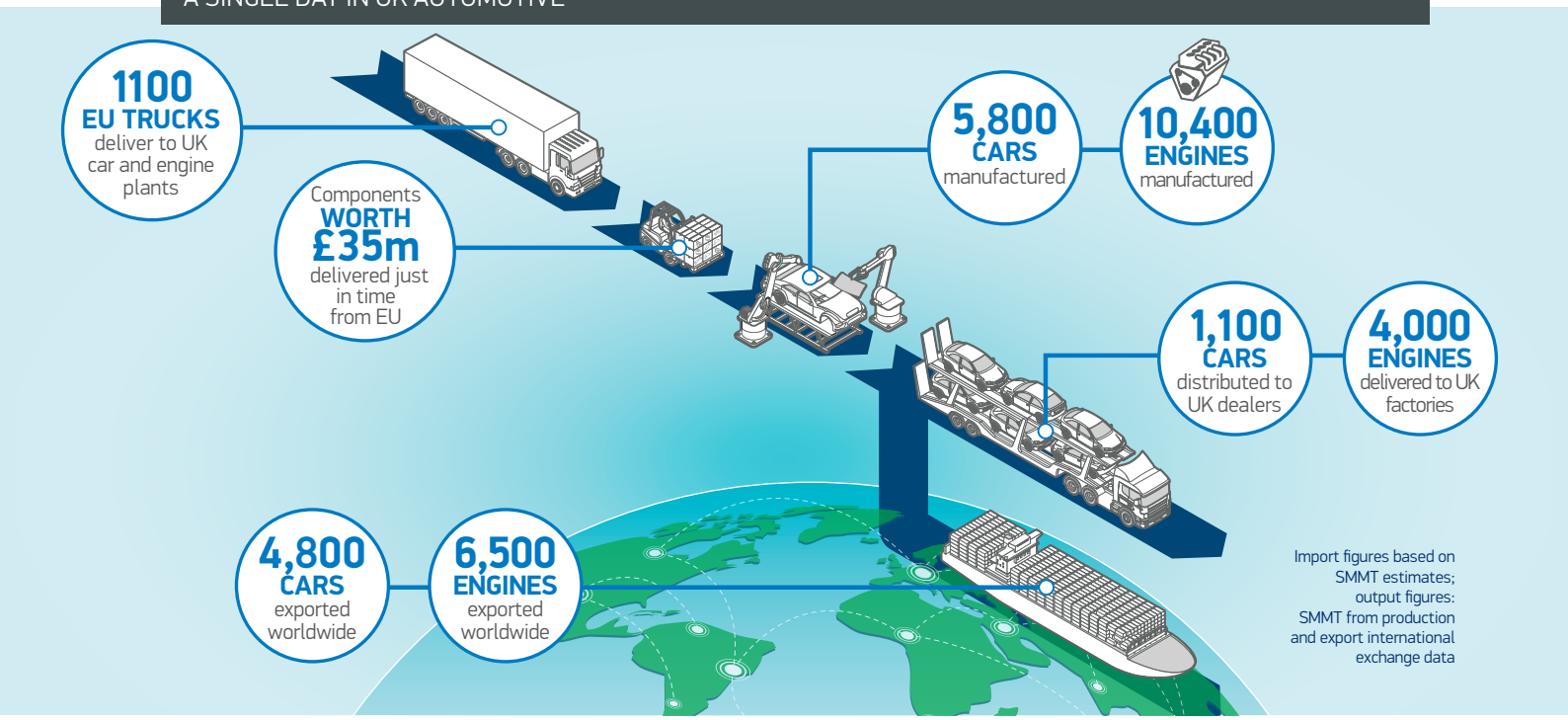
Added to this is the significant impact created by the uncertainty of Brexit. Investment across the industry has fallen 50% from 2017. Money that would have been invested in competitiveness has instead been diverted to mitigate the risk of a no-deal scenario, through stockpiling, warehousing or new customs and inventory management systems.

In spite of this, there are still a number of exciting growth areas and significant opportunities for the UK automotive supply chain.

A transition to an electrified powertrain presents opportunities in a number of commodity areas with no established supply base. With the opportunities around battery manufacture has come a business case for a UK gigafactory. A future where everything from lithium powder processing through to battery management system manufacture could be done in the UK is now a very real prospect.

Beyond batteries, similar opportunities lie in the areas of power electronics and electric machines. A UK supply chain that designs, develops and manufactures everything from

A SINGLE DAY IN UK AUTOMOTIVE



CHALLENGE

- As consumer demands change, vehicle manufacturers will be under increasing pressure to deliver unique user experiences through the application of suppliers' technologies. UK suppliers need to continue to invest in the design, development and manufacture of leading edge technology in the key growth segments of electrification, connectivity and autonomy

IN 2018, THE FOLLOWING SUPPLY CHAIN SIGNATORIES SENT ZERO WASTE TO LANDFILL:
Autoelectro, Michelin and Unipart.

rotors and stators, through to windings, inverters and high voltage chargers would greatly benefit the UK economy in a post-Brexit world, particularly in the face of a potential decline in conventional ICE manufacturing.

As part of the Automotive Sector strategy, SMMT has developed the National Manufacturing Competitiveness Levels (NMCL) programme. This has been designed to support companies looking to improve their competitiveness. Through skills development, the programme will help companies to develop and diversify their products for the future. SMMT also supports companies looking to capitalise on these opportunities by changing established mechanisms, such as its 'Meet the Buyer' event and the SMMT Automotive Supplier Finder, both of which help match purchasing organisations with UK capabilities, to better reflect the changes across the automotive sector.

The landscape for the automotive supply chain is changing rapidly. While these are challenging times, there are also many opportunities arising and SMMT will work to support the UK supply base in moving to an increasingly autonomous, connected, electrified and shared future.

ETHICAL AND SUSTAINABLE SOURCING

As more, new technologies enter the market, the automotive industry has an obligation to ensure that the materials it uses are sourced ethically and sustainably. Drive Sustainability (DS) was created as a partnership between 10 automotive companies (BMW Group, Daimler AG, Ford, Honda, Jaguar Land Rover, Scania CV AB, Toyota Motor Europe, Volkswagen Group, Volvo Cars and Volvo Group) and is facilitated by CSR Europe. The partnership was founded to positively influence the automotive supply chain by promoting a common approach within the industry and by supporting the integration of sustainability into procurement processes.

DS has a set of common guidelines - the Guiding Principles – that outline expectations for suppliers on key responsibilities including business ethics, working conditions, human rights and environmental matters. Based on these guidelines, DS has developed a number of tools and resources, including a self-assessment questionnaire, training services, and local networks.

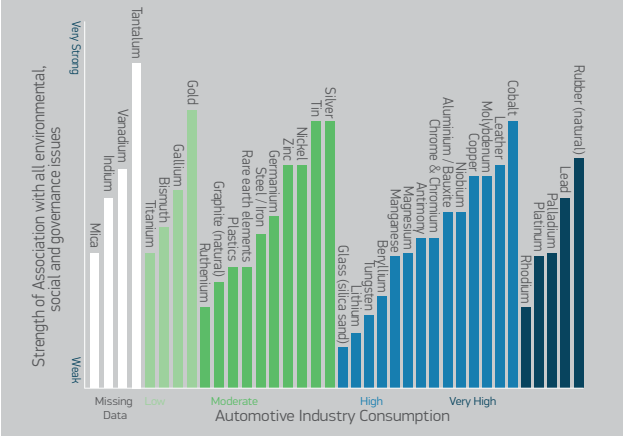
In 2017, DS announced the establishment of its Raw Materials Observatory, which aims to develop a common approach to understanding and assessing impacts, risks, and opportunities for positive action within the material supply chains of the automotive industry.

Building on the creation of the Observatory, in 2018 the Drive Sustainability initiative teamed up with the Responsible Minerals Initiative (RMI) to develop a new study 'Material Change' examining responsible sourcing of materials in the automotive and electronics industries. This study represents the first deliverable of the Raw Materials Observatory for Drive Sustainability's partners and is setting the basis for future collaboration to enhance sustainability in the automotive supply chain.

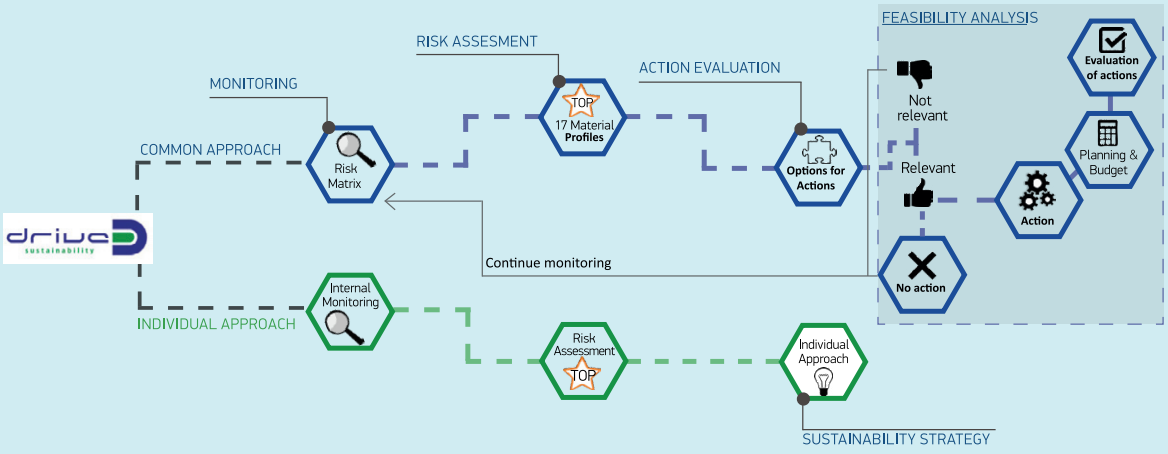
The report contains heat maps, charts and material profiles, which can be used to help identify risks and impacts in material supply chains and to look for potential opportunities for collective actions to address environmental and social issues.

To help companies take a first-step in their own prioritisation processes, the report shows the 37 materials according to their level of consumption and their strength of association with environmental, social and governance (ESG) issues.

CHART 16 | RATINGS OF MATERIALS BY INDUSTRY % OF TOTAL GLOBAL CONSUMPTION AND ASSOCIATION WITH ALL ESG ISSUES



DRIVE SUSTAINABILITY'S RAW MATERIALS OBSERVATORY



SINCE 2013, DRIVE SUSTAINABILITY TRAINED 2,200 SUPPLIERS IN 12 COUNTRIES, TO HELP UNDERSTAND THE AUTOMOTIVE GUIDING PRINCIPLES.

PEOPLE

Employees are the backbone of any organisation and it is no different in the automotive industry, with competition and pace both high. Its success is reliant on its highly skilled and flexible workforce. To ensure its future viability, the industry is upskilling, developing apprenticeships and boosting the take-up of automotive careers, especially for those working on new technologies in production and product development. The industry is also working with the UK Government on the skills element of the automotive sector deal, which was agreed and launched in 2018.

EMPLOYMENT

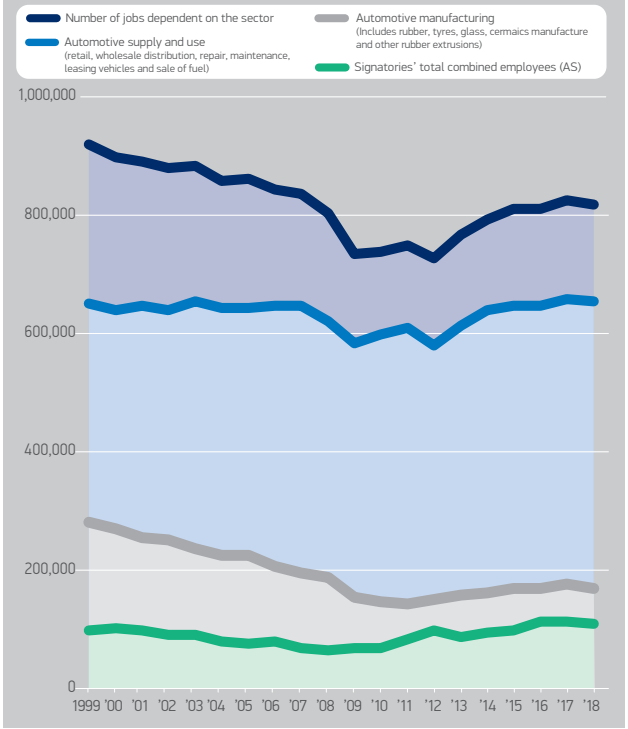
Since 1999, the number of jobs dependent on the sector has fallen by 9.3%. This was mainly influenced by a 39.8% decrease in automotive manufacturing and the supply chain, caused by a change in composition of vehicle manufacturers and transformation to more efficient automated production processes.

The number of jobs dependent on the automotive sector in 2018 decreased by 1% to 823,000, with direct employment in automotive manufacturing jobs dropping by 3.5% to 168,000.

Signatories' reported total employment declined in 2018 by 3.5% to 108,182 employees on the previous year. The drop was strongly influenced by job cuts at one of the largest signatories to the report. The share of agency workers has dropped too, down from 17.4% in 2017 to 16.6% in 2018. It is highly likely that the uncertainty caused by Brexit has played a significant part in this decline.

The number of women employed by the signatories dropped from 11.8% in 2017 to 11.4% in 2018. Also this year, 20 signatories reported on the age profile of new employees. Out of 13,300 new employees in 2018, 35.6% of new individual companies' intake was below 30 years of age, 50.1% between 30-50 and 14.3% above 50.

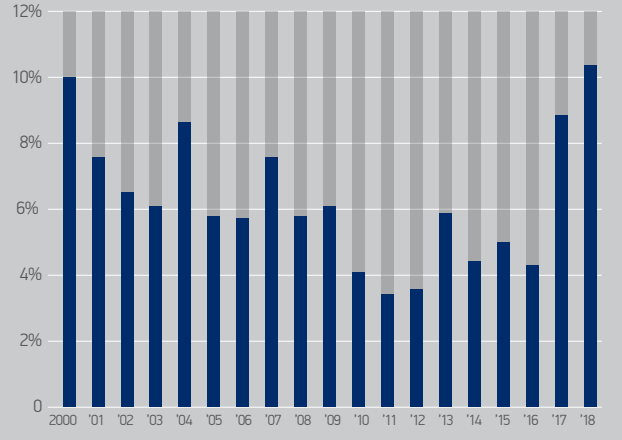
CHART 17 | AUTOMOTIVE EMPLOYMENT



STAFF TURNOVER

The UK average employee turnover rate is approximately 15% a year, although this varies drastically between industries. Signatories' staff turnover has been fluctuating over the years, although never going above 10%. In 2018, staff turnover increased to 9.1% from 8.4% in 2017. This is still relatively low considering the current uncertain economic climate and the 3.5% drop in overall employment. This is evidence that the automotive sector remains an attractive place to work.

CHART 18 | % STAFF TURNOVER



CHARITABLE DONATIONS

In 2018, signatories reported cash donations to charities of more than £11.9 million, up 40% on 2017. In addition, signatories made other contributions worth almost £3 million, up from £0.5 million in 2017. Signatories additionally reported giving in excess of 133,000 hours of employees' time to local causes, down 27% on 2017.

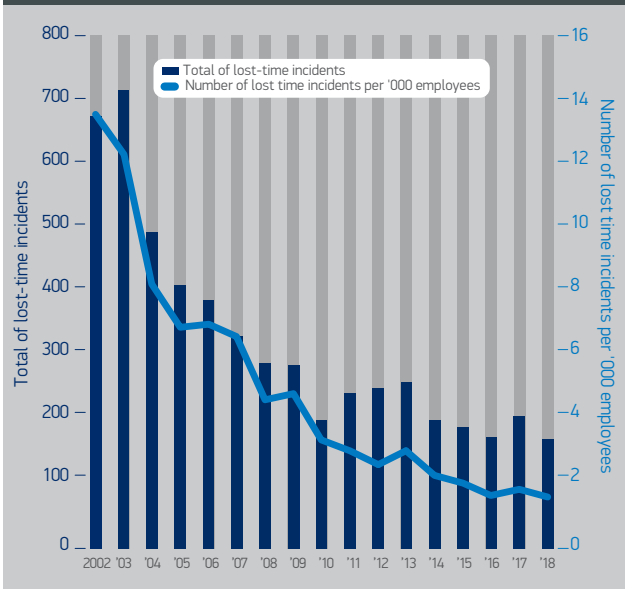
INPUT INTO LOCAL COMMUNITIES

According to the Office for National Statistics, each direct job in automotive manufacturing creates 1.68 indirect jobs in the wider economy, e.g. in companies supplying components, materials and services. Also, since 1999 the average wage paid by vehicle manufacturers increased from £22,600 to £41,800 in 2018, an 85% increase overall and 26% above the rate of inflation. By comparison, wages in the broader manufacturing sector only rose by 65% over this period and across the whole economy by 61%.

HEALTH & SAFETY

The health and safety of its employees is one of the industry's top priorities. This is demonstrated by the significant amount of training given to job induction and accident prevention. Consequently, the number of incidents per employee has dropped by 88% since 2002. In 2018, the number of lost time incidents decreased by 14.8% on 2017 to 1.6 per 1,000 employees.

CHART 19 | LOST TIME ACCIDENTS



TRAINING

With the fast pace of technological developments, to remain competitive the industry and its employees need to keep up to date with any new developments. This seems to be well-understood by signatories as the number of formal training days per employee reported by signatories increased in 2018 by 61%, from 4.4 to 7.1 days. This is in addition to informal training such as e-training, 'gate to great' coaching, daily coaching, toolbox talks and shadowing, which is not officially measured. Signatories also reported their staff achieving 2,700 nationally recognised qualifications.

In 2018, more than 1,000 new apprentices were taken on which represents a 40% increase on 2017, while 1,600 apprentices recruited in previous years were retained by signatories, up 47% on the year before. In addition, 230 apprentices/trainees moved into permanent employment within their organisations in 2018.

THE NISSAN SKILLS FOUNDATION

The Nissan Skills Foundation (NSF), launched in 2014, is designed to encourage young people to take up Science, Technology, Engineering and Mathematics (STEM) subjects, and generate excitement about careers in industry by offering an insight into the world of advanced manufacturing and engineering. Raising interest in STEM subjects while children are at primary school, means that when they join secondary school they have an awareness that STEM subjects are important for a future career in industry.

The NSF re-engages with students when choosing GCSE options, helping guide them to the relevant subjects and continues to engage with them throughout later education years, including sixth form, university and college. At its pilot launch, the NSF had two products (Monozukuri caravan (primary) and Industrial cadets (year 9)) and engaged with 135 students and four schools. Nissan now run 11+ formal sessions as well as career fairs and engagement days. The Foundation now engages with 8,500 students per year and more than 170 different schools. By July 2018 Nissan had engaged with 36,000 students since its launch. The sessions are free to all schools and have running costs circa £200,000 per annum.

FUTURE SKILLS

Access to skills and skills development remain significant issues for the automotive sector and the industry is currently working towards building a skills element to the automotive industrial strategy. Despite high levels of productivity, the sector faces a historic skills gap, which has been expedited further by the impact of new and emerging technologies. The pace and extent of this change is already beginning to be reflected in the diverging skills requirements of automotive employers. The rise of autonomous, connected and electric (ACE) vehicles has created the demand for skills never before needed in the sector, such as cyber security engineers or chemists, but without eradicating the need for the traditional manufacturing skill-set. The Automotive Council's Skills Working Group continues to strive to determine how government and industry can work together to address these challenges so that the UK can reap the benefits afforded by new technologies.

GENDER PAY GAP

According to the Office of National Statistics, on average in 2018, men in the UK workforce and manufacturing overall were paid 17.9% and 20.3% more than women respectively, based on median hourly earnings.

By contrast, the gender pay gap for 22 signatories to this report covered by the obligation was a more modest 6.7% (median).

However, the gender pay gap in UK automotive manufacturing (including SMEs) is close to that in manufacturing overall, with men paid 22.8% more than women. More needs to be done and industry continues to work to address this issue.

AUTOMOTIVE COUNCIL DIVERSITY AND INCLUSION WORKING GROUP

The Automotive Council, which is made up of senior figures from across industry and government, launched a new working group in 2018 to focus on diversity and inclusivity.

The Diversity and Inclusion Working Group aims to:

- Lead collective efforts to improve diversity and inclusion within the Automotive sector
- Support Automotive Council members in their diversity and inclusion work by providing baseline data and sharing best practice recommendations

The initial focus of the group will be on gender diversity, before extending to ethnicity and sexual orientation. The group meets monthly to first identify best practice and then make recommendations for next steps to the Automotive Council.

FORD DRIVES CAMPAIGN TO TRANSFORM MENTAL HEALTH AWARENESS

In 2018, Ford joined with Time to Change to "break the silence on mental health" and launched a national public awareness campaign, Elephant in the Transit, which encourages people to speak more openly about mental health and to find safe, non-confrontational spaces to talk. Around one in four people in the UK experiences mental health problems and, as the first automotive manufacturer to sign the Time to Change Employer Pledge, Ford is committed to deliver actions aimed at promoting mental health awareness in the workplace and increasing the mental health support available to employees. Partnering with Mental Health First Aid England, Ford provides courses and resources that equips participants with skills that are not only beneficial in the workplace, but in their personal lives too.

Over the course of the past 20 years, vehicle manufacturers have taken the lead in developing new powertrain technologies that are cleaner, more efficient and more accessible to consumers in global markets.
Public concerns about air quality, energy security and greenhouse gas emissions are growing. This, coupled with increasingly stringent emissions regulations, changing trends in car ownership and urbanisation has helped drive the industry's commitment to produce ultra-low emission vehicles (ULEVs). It has led to a range of different solutions, including hybrid electric vehicles (HEV), plug-in hybrid electric vehicles (PHEV) and the introduction of zero-emission tailpipe vehicles such as battery electric vehicles (BEV) and hydrogen fuel cell electric vehicles (FCEV). This changing landscape presents important opportunities for the UK, both to grow its economy and to protect the environment.

USE

PERFORMANCE

- UK new car registrations fell 6.8% in 2018, with a decline in all segments except dual purpose.
- AFV registrations accounted for 6.2% of the market, BEV registrations were still only 0.7% of the market.
- Average CO_2 emissions increased by 2.9% to 124.5g/km.

REASONS

- Customer shift to larger vehicles, which tend to have higher CO_2.
- Declining diesel volumes, segment shift and the move to WLTP
- WLTP, the new stringent test cycle, shows higher CO_2 values than historic NEDC.
- Growing range of AFVs and availability of charging infrastructure.
- Increased distance driven.

FUTURE CHALLENGES/OPPORTUNITIES

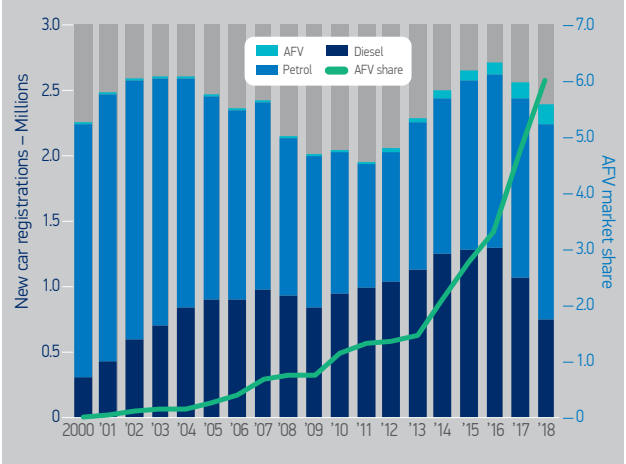
- Work with government and consumers to help deliver the ULEV uptake ambition levels, set out in the Road to Zero strategy.
- Reduction and removal of the Plug-in Car Grant may adversely impact sales.
- Engagement with local authorities on improving local air quality.
- Lack of confidence in refuelling infrastructure.

NEW VEHICLE REGISTRATIONS

The UK new car market declined for the second consecutive year in 2018, following six years of growth. The market fell 6.8% to 2.37 million units registered. Despite the overall decline, the market remained the second biggest in the EU, behind Germany.

Demand fell across all vehicle segments, bar the dual purpose category, which grew by 9.1%. This segment represents 21.2% of the overall market. Despite registrations of Superminis and Lower Medium cars falling by 2.5% and 9.4% respectively, these smaller vehicles remain the most popular, with a combined 58.7% market share

CHART 20 | NEW CAR REGISTRATIONS AND FUEL



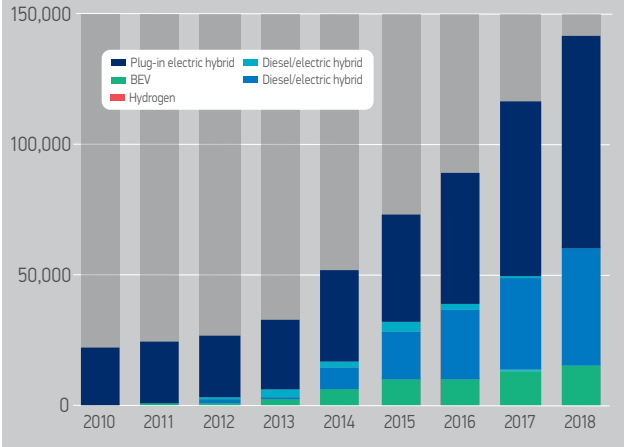
The AFV market continued to see growth, with just over 141,000 units registered in 2018, equating to a 20.9% uplift on 2017. This represents the sector's highest annual market share of 6%. Petrol electric hybrids remained the most popular, up 21.3% to 81,156 units. Plug-in hybrids also recorded a 24.9% uplift over the year. However, the removal of the Plug-in Car Grant for plug-in hybrids has meant a decline in this part of the market in the last quarter of 2018. Battery electric cars grew

CHART 21 | UK NEW CAR AND LCV REGISTRATIONS

13.8% in the year but, with just 15,474 registered, they still make up only 0.7% of the market.

While petrol registrations grew by 8.7%, diesel registrations declined by 29.6%, with the volume loss equivalent to some 180% of the

CHART 22 | AFV REGISTRATIONS



overall market's decline. Anti-diesel rhetoric and fiscal measures have resulted in a slowdown in fleet renewal for this segment.

The new light commercial vehicle (LCV) market declined in 2018 by 1.3%, with more than 357,000 units registered. The new heavy goods vehicle (HGV) market declined by 4.3%, with just over 43,000 trucks registered.

CHALLENGE

- Promoting the uptake of alternatively fuelled vehicles (AFVs) is one of the biggest challenges. Additional production costs and high upfront investment in innovative technologies results in a higher showroom price, which can deter potential customers. In addition, it is vital for the industry to ensure that the government supports the implementation of demand measures and appropriate fuelling infrastructure.

NEW CAR CO_2

Average new car CO_2 emissions in the UK rose for a second consecutive year in 2018, by 2.9%, from 121.0g/km to 124.5g/km. This is despite huge investment by manufacturers to deliver ever more efficient cars, with the average new or updated model emitting 8.3% less CO_2 than the previous model. The reasons for this increase in fleet average CO_2 are threefold: segment shift to heavier vehicles, the move away from diesel and the introduction of the new Worldwide Harmonised Light Vehicle Test Procedure (WLTP).

Diesels are, on average, 15-20% more efficient than petrol equivalents and have an important role to play in addressing climate change. Under the Euro 6 emissions standard, diesel cars are the cleanest in history. Nitrogen oxides (NOx) and particulate matter (PM) emissions have been cut significantly in recent years, thanks to sophisticated exhaust after-treatments and advanced engine design. Anti-diesel rhetoric has caused consumers to move away from diesels or hold on to their older, more polluting vehicles. Consumer demand for heavier vehicles, has added to the increase.

WLTP is a more comprehensive and rigorous test procedure than the previous New European Driving Cycle (NEDC) and is designed to give consumers more representative data regarding the fuel consumption and CO_2 emissions of their vehicle. The new test takes almost 50% longer to complete, covers twice the distance and is undertaken at a 46.5% higher average speed. This change means that for the vast majority of vehicles, the WLTP CO_2 emissions value is higher than under the old NEDC, which impacts upon the new car fleet average CO_2.

Despite these challenges, manufacturers are still delivering lower CO_2 emitting models and data shows that new models introduced in 2018 emitted, on average, 8.3% lower CO_2 levels than the models they replaced. Overall performance for 2018 is 31.2% below the 2000 level. The rate of progress in reducing average new car CO_2 emissions had already been moderating ahead of the first rise in 2017.

WORLDWIDE HARMONISED LIGHT VEHICLE TEST PROCEDURE

WLTP: How the new lab test shapes up

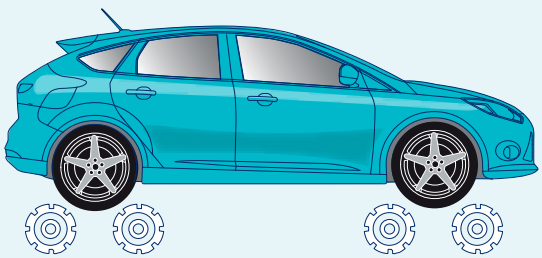
Key features

Test Cycle
3 different test cycles depending on the power-to-weight class of the vehicles

Road Type
4 phases to represent: urban, city, A road and motorway

Influence of optional equipment
CO_2 values will take into account the weight and effects on aerodynamics of optional equipment such as air conditioning, tyres etc.

CO_2 and Fuel consumption
Consumption measurements will now be closer to what drivers experience on the road



Test measures

Duration:
30 minutes

Distance:
14.4 miles

Speeds:
28.9 mph average,
81.3 mph maximum

Gears:
Different gear shift points depending on vehicle

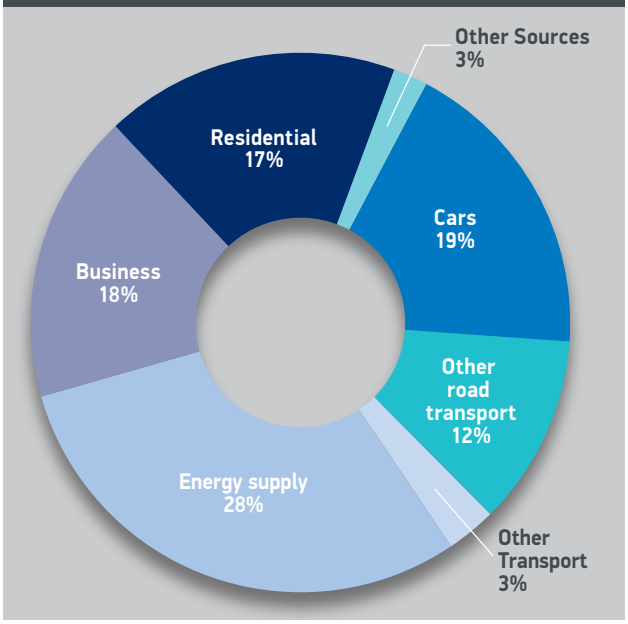
Temp:
14-23°C test temperatures

TRANSPORT CO_2 PERFORMANCE

Overall UK CO_2 emissions have fallen by 37% since 1990, to 373 million tonnes of CO_2 equivalent (Mt CO_2e) in 2017. This decrease was mainly due to a large decrease in the use of coal for electricity generation.

Transport was the largest source of CO_2 emissions (27%) in 2017 for the second successive year. The majority of emissions from transport were from road transport but remained at the same level as in 2016 (124.6 Mt CO_2e), despite a small increase in road traffic. Cars accounted for 61% of all road transport emissions in 2017. Heavy Commercial Vehicles were the second largest source at 18%, with LCVs closely behind at 17%.
Due to continued growth in distance travelled, transport CO_2 peaked in 2007 at 8.5% above 1990 levels. Reductions after this have been driven by improvements in new car fuel efficiency and lower traffic growth.

CHART 23 | CO_2 EMISSIONS BY SOURCE 2017



CHALLENGE IN BALANCING CO_2 REDUCTIONS

- Light-weighting vs safety requirements
- Balancing supply and demand
- Five-year product development cycle
- Consumer demand for additional equipment such as air conditioning etc
- Reducing PM and NOx emissions in conjunction with CO_2
- Shift of political focus from CO_2 to air quality

PEUGEOT SOLVES COMMUTER'S 'LAST MILE' PROBLEMS

In 2018, Peugeot launched an integrated car and electric bike mobility solution, the new Peugeot 5008 SUV and the eF01 Electric Bike.

The aluminium-framed eF01 electric bike weighs just 18.6kg, is fitted with a battery and a motor with enough charge for a journey of 18-25 miles and give will riders a top speed of 12.5mph.

Peugeot's fold-away electric bike integrates into the boot space with a mobile charging dock, giving commuters a solution to that final stretch of their journey.

TECHNOLOGICAL SOLUTIONS

- Engine downsizing – reduces weight and CO_2
- New technologies (e.g. hybrids, plug-in hybrids, hydrogen cars, electric cars)
- Improved aerodynamics
- Low rolling resistance tyres
- Energy recovering brakes
- Biofuels
- Lightweighting
- More efficient cooling and heating
- Driver aids: gear shift indicators, tyre pressure monitoring systems, optimised transmissions
- Stop start

In December 2018, European proposals were agreed for future targets on reducing CO_2 emissions from new cars and vans post-2021. In 2025, a 15% reduction for cars and vans will be required and in 2030, the target is a 37.5% reduction for cars and 31% for vans. In light of Brexit, the UK government is considering what approach it will take to setting reduction targets once the UK is no longer part of these Regulations.

UK SALES OF TOYOTA & LEXUS HYBRIDS REACH 375,000

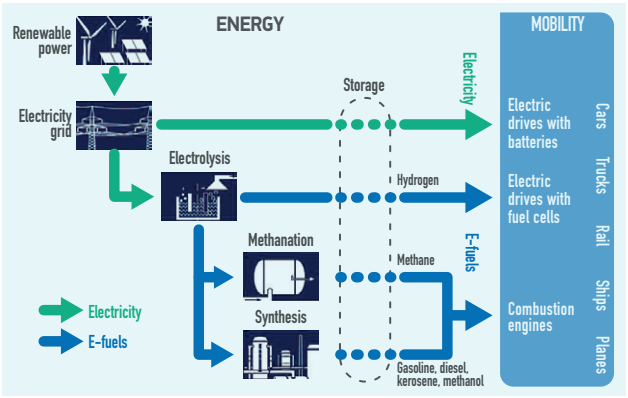
By the close of 2018, UK sales of Toyota hybrid models surpassed 250,000 since the Prius was first released in the UK in 2000. Today there are eight Toyota hybrid models on sale.

Lexus, with sales now above 100,000, was the first luxury brand to offer customers hybrid power, in the form of the RX 400h, introduced to Britain in 2005. Twelve years later and hybrid models make up almost 99% of all Lexus UK sales, with nine different versions available.

Toyota's cumulative worldwide hybrid vehicle sales passed the 12 million mark in 2018. The company's hybrid technology was first deployed in the Coaster Hybrid EV coach in August 1997, followed in December the same year by the original Prius, the world's first mass-produced hybrid passenger car. There are currently 33 different Toyota and Lexus hybrid models worldwide and the technology is available to customers in more than 90 countries and regions.

ALTERNATIVE FUELS

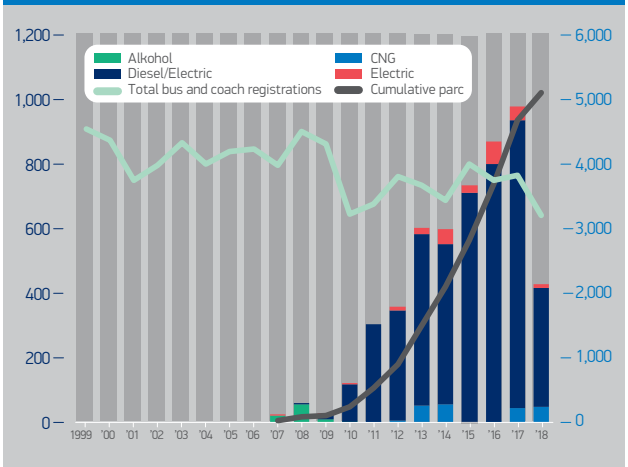
The industry invests billions in developing new technologies for vehicles coming to market now, in order to minimise their environmental impact. However, it takes time for the existing vehicle fleet to renew. As such, the latest generation of technologies will take some time to achieve the necessary market penetration needed to dramatically reduce the carbon and air quality emissions of the entire parc.



For this reason, the automotive and fuels industries are together making significant investments in alternative fuels for the existing fleet of internal combustion engine vehicles. E-fuels are generated exclusively with renewable energy. Hydrogen is produced using renewable electricity and then combined with carbon dioxide to form a hydrocarbon with zero net greenhouse gas emissions. Unlike biofuels, e-fuels do not compete with food production. Due to their similarities with fossil fuels, they can be used as "drop-in"; that is, they can be used in the same infrastructure and vehicles as current fuels. These fuels, often referred to as Power-to-Liquid (PtL) or Power-to-Gas (PtG) fuels, are being researched by several manufacturers in partnership with the fuels industry. However, for the time being, production of synthetic fuels remains a complex and costly process.

Alternative fuels for use in a modified internal combustion engine, such as compressed natural gas (CNG) and liquid petroleum gas (LPG) have been in use for decades, however the technology continues to evolve. Development is now underway for newer products, such as dimethyl ether (DME), which is a clean-burning, non-toxic, potentially renewable fuel. Its high cetane value (55-60) and quiet combustion, as well as its inexpensive fuelling system, could make it an excellent, inexpensive diesel alternative. For more information, see https://www.aboutdme.org/index.asp.

CHART 24 | BUS AND COACH REGISTRATIONS



BUS AND COACH

The market for alternatively fuelled (AF) buses and coaches started to develop in 1999, with 19 LPG buses registered. But the numbers of AF buses only began to grow from 2007.

New bus and coach demand has remained relatively steady over the past two decades, governed by scheduled fleet replacement cycles. However, a 16.2% decline was seen in 2018, with 3,213 vehicles joining UK roads, the lowest level recorded in 20 years. This is most likely due to cuts to routes and local authorities opting for minibuses as a cheaper alternative.

This decline is also visible in alternatively fuelled bus registrations which dropped year-on-year by 56.4%, to 427 units. Many operators are not able to invest in ultra-low emission buses because of the infrastructure required at depots. They are also waiting for Clean Air Zone (CAZ) details to be finalised before making purchasing decisions.

Since 2008, alternative fuelled buses have saved 626,136tonnes CO_2e

OPTARE CELEBRATES 25 YEARS OF ELECTRIC BUS INNOVATION

Optare is a pioneer in electric bus technology and deployment. In 1993, The company trialled an electric version of the Metrorider midibus, which subsequently entered service on Jersey and Islay. In 2009, it launched an 80 kWh Electric Solo EV demonstrator, winning the CILT Environmental improvement award. Optare had fleets of both Solo and Versa electric models in operation by 2012. The Versa Electric Bus won the SMMT Award for Automotive Innovation and excellence in technology at the National Transport Awards in 2012 and 2013 respectively. In 2014 a number of Metrocity electric buses began operation in London, including the first all-electric TfL route in London (312) serving the South Croydon area. All of these vehicles remain in service today. Over the past five years, Optare's EV fleet in the UK has grown to more than 120 vehicles, circa 40% of the UK electric bus parc. Optare buses are capable of more than 150 miles range in winter on a single charge thanks to its lightweight design.

ELECTRIC VEHICLES INFRASTRUCTURE

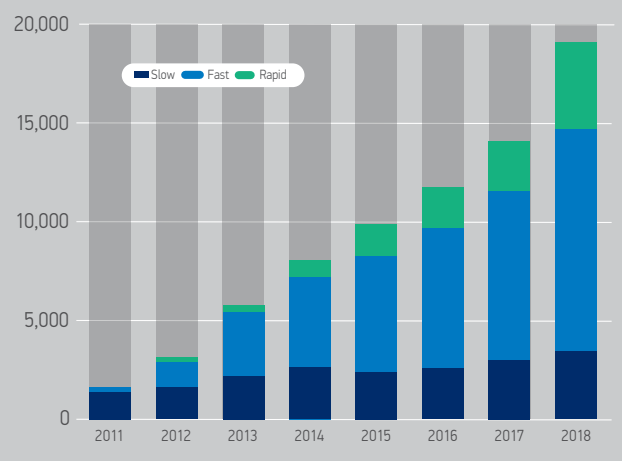
The UK's public EV network is continuously expanding, reaching nearly 23,000 charging connectors in mid-May 2019. This represents a 1,500% increase from 2011, when only 1,359 connectors were installed. The UK network is already one of the largest in Europe; while our network of rapid chargers, with just under 5,000 connectors in mid-May 2019, is the largest. However, more needs to be done to overcome the barriers of infrastructure Adequacy, range Anxiety and product Affordability (known as the 3A barriers) to EV adoption.

If the government's ambitions in the Road to Zero Strategy are to be achieved, the number of charging points, based on the simple principle of the right types in the right places, will need to be ramped up significantly to give consumers the confidence to adopt EVs. To ensure they are as convenient and as accessible as possible, there must be an optimal mix of public charging points in various locations so that a wide range of use cases are covered.

These include:

- At service stations on motorways and other main trunk roads – 96% of motorway services already have rapid chargers.
- Destinations such as hotels, restaurants, leisure parks, station parking.
- Shopping centres, retail parks, high street and public carparks.
- Businesses and workplaces.

CHART 25 | CHARGING CONNECTORS BY TYPE, 2011–2018

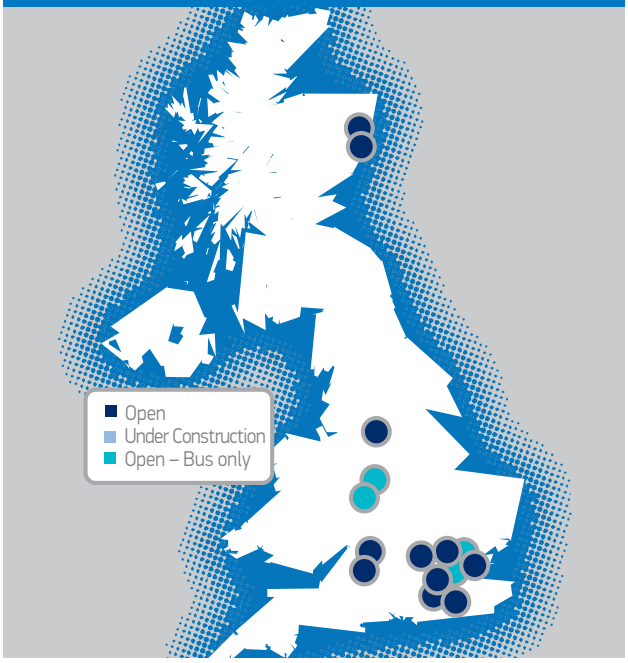


Source: Zap-Map

HYDROGEN INFRASTRUCTURE

Hydrogen fuel cell applications have been successfully deployed and shown to lower whole life costs and emissions in different applications, such as buses and heavy goods vehicles. Hydrogen buses, cars and forklifts are commercially available today, and the next few years are likely to see the introduction of more vehicle types including trucks, vans and trains. Additional segments such as smaller cars and minibuses are expected to follow. In the UK, hydrogen FCEVs have been deployed in commercial operation since 2011 when Transport for London (via its contractor Tower Transit) started operation of ten zero-emission hydrogen fuel cell buses. This is the longest-running hydrogen bus fleet in the world, having covered more than one million emission-free miles. Aberdeen started operation of 10 hydrogen buses in 2015. By the end of 2018, more than 120 fuel cell cars, scooters and vans were in operation with fleet owners in both the public and private sectors. Examples of users include the Metropolitan Police,

CHART 26 | HYDROGEN REFUELLING STATIONS



which took delivery of 21 Toyota Mirai, creating the world's first hydrogen-powered emergency response fleet, and with plans to take 60 more. Green Tomato Cars, meanwhile, operates a private hire fleet of 27 Toyota Mirai, and both Toyota Mirai and Hyundai ix35 SUVs are used by Aberdeen City Council in its car club.

AIR QUALITY

The automotive industry is committed to improving air quality and reducing CO_2 emissions, and has invested billions of pounds in the engineering of clean technologies. It is now producing the cleanest vehicles in history.

Air pollution is caused mainly by the burning of fossil fuels for energy generation and transport, and from industrial emissions. Increased evidence and a greater understanding of the health effects of air pollution have led to policy decisions that seek to reduce emissions. In the UK, this has been further accelerated by the legal case taken by environmental lawyers Client Earth against the government for what they deem is inadequate action to improve air quality.

Data provided by Defra in 2016 showed that nitrogen dioxide (NO_2) and particulate matter (PM) emissions from road transport decreased by 76%, for each pollutant since 1990. With the introduction of the latest Euro 6 emissions standard in new vehicles (2015), and the continued increase in alternative fuelled vehicle registrations, these will decrease even further.

The greatest contribution to particulate pollution is derived from industrial sources and combustion in residential, public, commercial and agricultural sectors. Road transport was responsible for 32% of NO_2 and 11% of PM emissions in the UK during 2017. This is a reduction from 49% and 12% respectively over the previous year.

With road transport being the single highest contributor to UK NO_2 overall emissions, the industry recognises the need for continued improvement. This is being delivered through vehicle technology supported by the introduction of a new, more stringent vehicle emissions test. In addition to continued emissions reductions from the internal combustion engine (ICE), vehicle manufacturers have designed and developed ultra-low and zero emission vehicles. Registrations of alternatively fuelled vehicle (AFV's) continue to grow each year. However, these still only make up 1.8% of the total number of vehicles in use (parc).

In July 2017, the UK government published its plan for tackling NO_2 at the roadside, which includes requirements for a number of cities across the UK to implement clean air zones (CAZ).

CHART 27 | NITROGEN DIOXIDE EMISSIONS 1999-2016

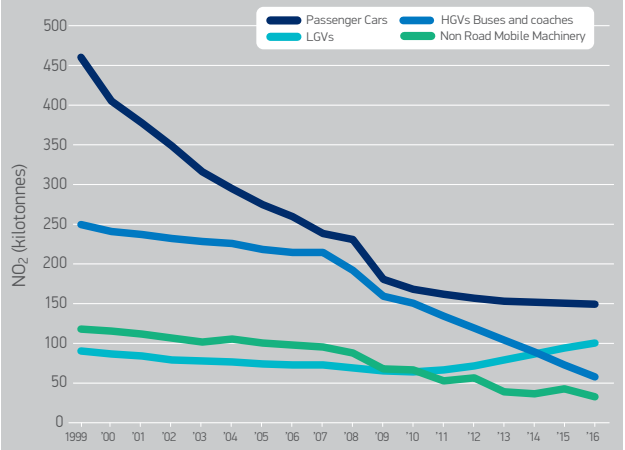
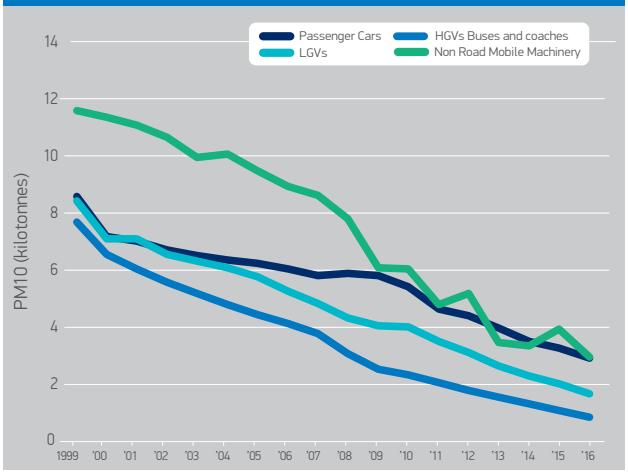


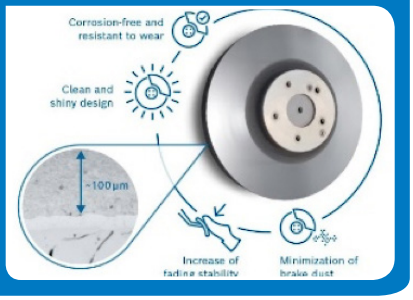
CHART 28 | PARTICULATE MATTER EMISSIONS 1999-2016



Thanks to massive manufacturer investment, all new vehicles sold today comply with the minimum CAZ requirements of euro 4/IV for petrol and euro 6/VI for diesel vehicles and do not currently face any penalty charges anywhere in the UK. However, local authorities may choose to implement more stringent emissions criteria for some vehicle types if they deem it necessary. As these plans are still emerging, there is growing uncertainty amongst consumers about which vehicle to purchase. This has contributed to a decline in the vehicle market and older vehicles remaining on the road for much longer than they would have done otherwise, thus delaying air quality improvements.

BOSCH'S BRAKE DISC REDUCES BRAKE DUST AND IMPROVES THE AIR QUALITY

In 2018 Bosch introduced to the market a brake disc (iDisc) with tungsten carbide coating which reduces brake dust by 90%, compared with a conventional brake disc. This has resulted in the improvement of air quality in cities. The iDisc is much more resistant to wear and has almost the same braking power as a comparable ceramic product. Depending on the coating thickness, the iDisc lasts twice as long as a normal brake disc. The iDisc also improves safety – especially when several braking manoeuvres are performed in succession.



CHALLENGE

- Consumers and businesses still require incentives and confidence to aid the transition from internal combustion engine (ICE) vehicles to full battery electric vehicles (BEV). With this technology still in its infancy, some cases, particularly for commercial ones, it is not feasible yet for most to operate a complete fleet of BEVs.
- It is essential that a coordinated approach to improving air quality is taken by both local and national policymakers in partnership with industry. This will allow us to find complementary solutions to improving air quality and reducing carbon emissions from all sectors.
- In the short to medium term, this will include the latest petrol and diesel fuelled vehicles, hybrids and plug-in hybrids, alongside full battery electric vehicles and AFVs, and industry looks for a technology-neutral approach to enable the market and consumers to decide which solutions best suit their needs.

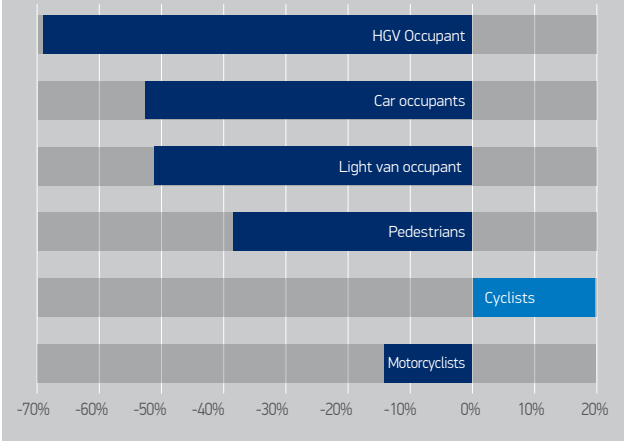
ROAD AND VEHICLE SAFETY

Vehicle safety is one of the automotive industry's key priorities. However, road safety cannot be improved solely through vehicle design and technology; it requires close cooperation between the vehicle manufacturers, government and all road users to deliver long lasting safety improvements. Over the past 20 years, such cooperation has resulted in much safer roads. However, some areas are much more difficult to address e.g. vulnerable road users such as cyclists. Manufacturers have developed solutions such as blind spot cameras, blind spot detection systems, HGV Direct Vision panoramic cabs and Collision Avoidance Systems for vulnerable road users. There remains plenty of work required in this area, by all key stakeholders, to ensure a holistic approach to road safety.

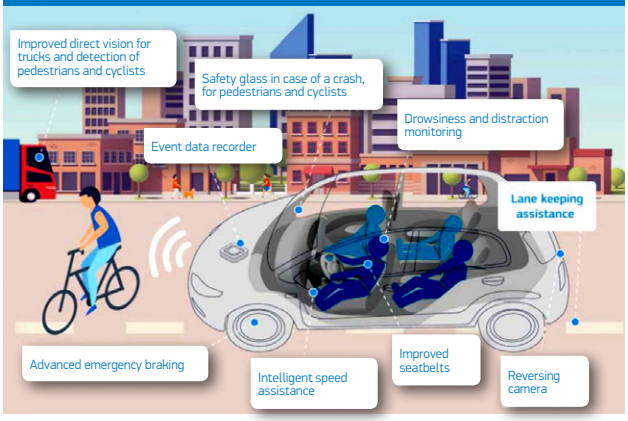
VEHICLE SAFETY

Over the years, vehicle manufacturers have invested heavily in

CHART 29 | CHANGE IN NUMBER OF KILLED AND SERIOUSLY INJURED BY ROAD USER TYPE (1999 vs 2017)



NEW SAFETY FEATURES IN YOUR CAR



active and passive safety features. In the last decade, the focus on safety has moved from occupant protection during a crash to the prevention of accidents using active safety systems as well as the protection of vulnerable road users, such as pedestrians and cyclists.

CHALLENGE

- The introduction timing for some of the General Vehicle Safety proposals are tough, given the need for development timing of new technologies and the time needed for the introduction to the vehicle production itself.

In 2018, a new European Commission proposal on General Vehicle Safety was adopted as part of the 3rd Mobility Package. It focuses on regulatory requirements for new accident avoidance systems and improved active and passive safety measures, both for occupant protection and pedestrian and cyclist protection. It introduces regulations that are intended to cover all categories of vehicles and to pave the way to connected and automated driving.

Examples of features to be introduced:

- Advanced emergency braking (cars/vans)
- Drowsiness and attention detection / monitoring
- Distraction recognition / prevention
- Intelligent speed assistance (through non-intrusive haptic feedback)
- Lane keeping assist (emergency lane keeping system that intervenes only in case of an imminent threat such as leaving the road, or leaving the lane into oncoming traffic)
- Vulnerable road user detection and warning on front and side of vehicle (trucks and buses)
- Vulnerable road user improved direct vision from driver's position (trucks and buses)

It can be expected that the increasing introduction of connected and autonomous systems in vehicles, and their ability to be able to interact with information from road traffic information, will further enhance the development and refinement of active and passive safety systems. This will assist in the continued drive to further reduce motor vehicle accidents.

The story of ELVs over the past two decades is certainly one of success and it continues to strive for improvements, working with government and stakeholders to ensure this responsibility is fulfilled. At the same time, the industry appreciates that the UK waste regulation needs to evolve and be refined. This was also recognised in the government's Resource and Waste Strategy, published in 2018, which announced a revision of the ELV regulations in 2021. This is a great opportunity to ensure that circular economy principles are embedded in the regulation by enabling products to be kept in use for as long as practicably possible before being responsibly disposed of.

END-OF-LIFE VEHICLES (ELVS)

PERFORMANCE

- In 2016 the industry met the target for 95% of a vehicle (by weight) to be recovered.

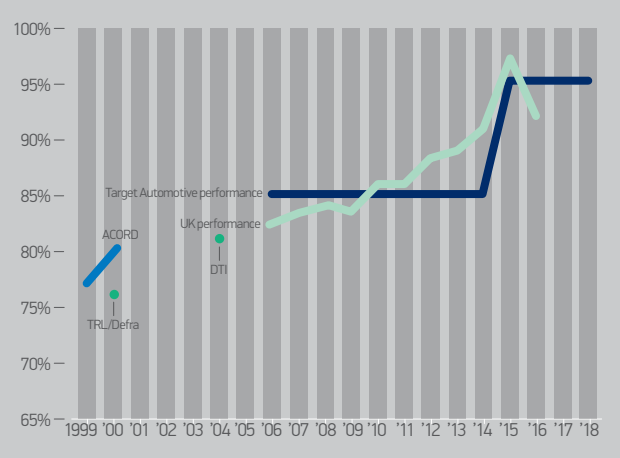
REASONS

- Working closely with automotive service providers and other stakeholders

FUTURE CHALLENGES/OPPORTUNITIES

- Tightening vehicle deregistration
- Lack of enforcement preventing a level playing field.
- Suitable secondary materials availability

CHART 30 | ELV REUSE AND RECOVERY SINCE 1999



NOTES TO THE GRAPH: The 2006- 2016 data is the most reliable and is officially reported by the UK government to the European Commission. For instance in 2000, different sources put the recovery rate at different levels. The Automotive Consortium on Recycling and Disposal (ACORD), comprised representatives of the vehicle manufacturing, dismantling, salvage and shredding industries. Its role has been assumed by the Defra ELV Consultation Group (previously lead by the Department for Business, Innovation and Skills). Defra also commissioned the consultants TRL to assess recovery rates in 2000. DTI (now the Department for Business, Innovation and Skills) made its own assessment of the recovery rate in 2004.

PRODUCER RESPONSIBILITY

In 2000, 224,000 cars were abandoned in England and this rose to a peak of 292,000 in 2002-03 as the value of metal fell. By 2005-06 that number had more than halved and it has continued to fall dramatically since then.

To address abandonment, as well as improve environmental standards at sites processing end of life cars and light vans, the ELV Directive 2000/53/EC was adopted in September 2000. The Directive also requires producers to manufacture new vehicles without hazardous substances (in particular lead, mercury, cadmium and hexavalent chromium), and promotes the reuse, recyclability and recovery of end of life vehicles.

The Directive was implemented in the UK through regulations in 2003 and 2005.The UK regulations ensure agreements are in place to facilitate the acceptance of all qualifying end-of-life vehicles at authorised treatment facilities (ATFs), at no cost to the last owner and with a Certificate of Destruction (CoD) issued.

The storage and treatment of end-of-life vehicles is also subject to strict control. ATFs carrying out processing

CHALLENGE

While the ELV situation has improved enormously since 1999, some issues are yet to be resolved.

- Because processing ELVs is a profitable business, there are a substantial number of unlicensed operators capturing ELVs for the value of their parts and metal. Their operations are likely to put the environment at risk, with site infrastructure, depollution and recycling activity being at a lower standard than at legitimate sites. They also divert business from legitimate operators who made large investments to achieve the 95% target, creating an unfair playing field.
- A vehicle should be removed from a registered keeper/ DVLA's record only when it is sold on or a Certificate of Destruction (COD) is issued. However, in many cases, the due diligence is not performed resulting in vehicles being sent to illegal operators
- Many ATFs, which process ELVs correctly and issue CoDs, send depolluted ELV to processors, which are not able to provide sufficient evidence to comply with the ELV regulation requirements. This affects the UK ability to meet the ELV target.
- While there are no official figures, industry analysis has shown that every year there is a large percentage of ELVs, believed to have reached end-of-life that are unaccounted for. It is likely that they have been exported or unofficially scrapped.

-operations must depollute vehicles removing components that may cause an environmental risk during the shredding process. Where practical, priority is given to the reuse and recycling of vehicle components (such as batteries, tyres and oil).

The Directive also set a target for reuse, recycling and recovery of vehicles and their components of 85% of the total weight of the vehicle by 2006, which increased to 95% in 2015.

WEIGHTS AND RECYCLING/RECOVERY TARGETS

The UK Government conducted a shredder trial in 2015 to establish the average weight and metal content of vehicles being scrapped. This is used to assist with the ELV reporting to the European Commission. As part of the test, 400 ELVs were collected in the UK and inspected, weighed and then depolluted. The average weight of an ELV in the sample was found to be 1,130kg, up from 971kg established during the UK 2005 shredder trial, while the metal content was unchanged at 75%. The results of the trial have been adopted for the UK reporting protocol, which means that the submission of evidence for an additional 159kg of material per vehicle is required to meet the target from 2016 onwards.

When economically feasible, all ATFs remove components for resale or for specific material stream recycling e.g bumpers, engines and gearboxes. Ultimately, the remaining vehicle is sent to a shredder where it will be reduced to small pieces and separated into material streams, including metals and plastics, for onward recycling or energy recovery.

Since 2006, vehicle manufacturers' authorised networks achieved the 85% recovery target, an increase of 10% since 1998, and they have met the 95% target since 2015, while the UK so far only met the ELV target from 2011 to 2015.

To achieve the target, the automotive industry's partners have made significant investments, which include:

- a £150m gasification facility in Oldbury, near Birmingham which will generate 40MW of green electricity and divert over 500,000t shredder residue per annum from landfill.
- a Shredder Waste Advanced Processing Plant (SWAPP) to separate the non-metallic fractions from the equivalent of about 800,000 cars a year.

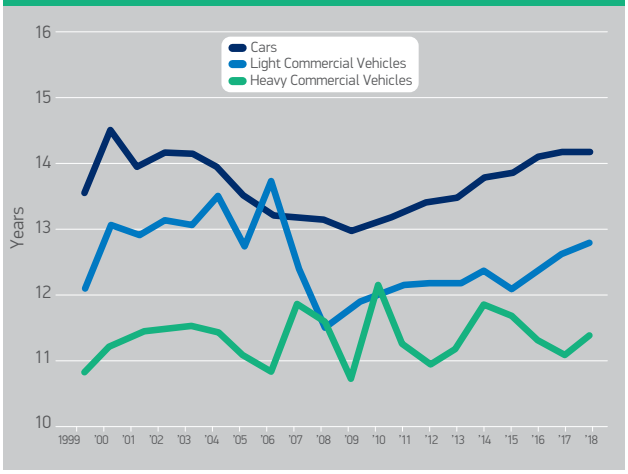
RECYCLABILITY

The reusability, recyclability, and recoverability (RRR) Directive on type approval of vehicles came into force in December 2005 and requires cars and light vans, newly introduced to the market after December 2008 to be 85% reusable and/or recyclable and 95% reusable/recoverable by mass. Consequently, recyclability has been an integral part of the new model planning process for many years now.

AVERAGE VEHICLE AGE AT SCRAPPAGE

Due to the robust and durable design and manufacture of modern vehicles, most are scrapped for economic reasons.

CHART 31 | AVERAGE AGE AT SCRAPPAGE



very different function which shapes the length of their life. Cars and vans have a relatively stable average life, which is mostly affected by the economic climate and actvities such as the 2009 scrappage scheme. An HCV's end of life age is very much linked to fleet replacement cycles as is clearly visible on the graph above.

EV BATTERIES

When the Waste Battery and Accumulators Regulations came into UK law in 2009, both government and industry had limited knowledge about what the future held for high voltage batteries. The UK Government's 2018 Resource and Waste Strategy announced that the regulation would be updated in 2020, to bring it in line with the lastest developments in battery technologies and their lifecycle.

It has been 18 years since the first mass-produced lithium-ion batteries entered the UK market and still the volumes of these batteries reaching their end of life is rather limited. One of the contributing factors to this trend, are manufacturers' efforts, in line with circular economy principes, to keep those batteries in use for as long as possible by utilising remanufacturing, reuse or second life applications, for example as energy storage.

The industry uses the International Dismantling Information System (IDIS) to facilitate safe removal of batteries from vehicles. Vehicle manufacturers also publish the waste battery take-back information on their websites. Please see SMMT webpage for details: www.smmt.co.uk/industry-topics/environment/battery-recycling/

The International Dismantling Information System (IDIS) is a comprehensive, free and easy-to-use system that supplies practical information on pre-treatment, safety related issues like airbag deployment and handling of High Voltage (HV) batteries and potentially recyclable parts. Its development started in 1991, long before any ELV directive came into force and is now available in 39 countries and in 30 different languages. IDIS continues to develop and improve and now covers currently 2700 different models and variants from 70 car brands. www.idis2.com/

FOCUS: REMANUFACTURING

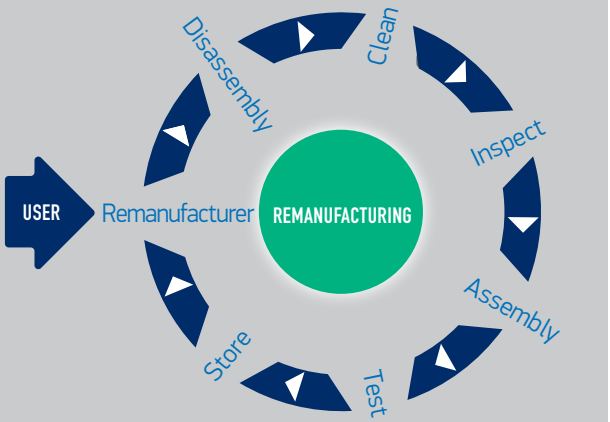
Remanufacturing is the process of returning a used product to at least its original performance with a warranty that is equivalent to or better than that of the newly manufactured product. From a customer viewpoint, the remanufactured product can be considered the same as a new product.

Remanufacturing has a long history in the UK, across the whole range of industrial sectors. In most cases, remanufacturing companies have grown in response to a business opportunity that also brings significant environmental benefits. With a recent shift in the current 'linear economic model' to a more 'circular approach', remanufacturing has an ever growing opportunity to become the key component of this change.

Some products, such as machinery and engines, lend themselves more naturally to remanufacturing, under certain conditions, such as when:

- the product has a high value
- the product is durable
- the product is designed for ease of disassembly
- the product is leased or delivered as a service instead of hardware.

REMANUFACTURING CYCLE



THE ECONOMIC OPPORTUNITY AND JOBS CREATION

Estimates suggest that the value of remanufacturing in the UK is £2.4 billion, with the potential to increase to £5.6 billion.The UK has the capability to make more of its remanufacturing potential, with the opportunity to boost the economy, increase skills and create jobs.

THE ENVIRONMENTAL OPPORTUNITY

Remanufacturing typically uses 85% less energy than manufacturing. Studies conducted at the Fraunhofer Institute in Stuttgart, Germany have estimated that the energy savings by remanufacturing worldwide equals the electricity generated by five nuclear power plants. This equates to 10,744,000 barrels of crude oil or a fleet of 233 oil tankers. Estimates for resource impact suggest remanufacturing also saves in excess of 800,000 tonnes of carbon dioxide emissions each year.

COMPETITIVE ADVANTAGE FOR BUSINESSES

Remanufacturing also presents a strong business opportunity, with some reports suggesting it can be twice as profitable as manufacturing. Access to parts and information are seen as key enablers for advanced product remanufacturing. Remanufacturing now increasingly requires economies of scale to source parts and components competitively, but this can also be a barrier to new entrants.

CARWOOD RECOGNISED AS SUSTAINABLE BUSINESS

In 2018 Carwood was awarded "Most Sustainable Business Model" by the Automotive Parts Remanufacturers Association (APRA). Carwood has over 50 years of remanufacturing history, six locations and process diesel fuel injectors and pumps, turbo chargers, rotating electrics, engines, generators, winches and other parts.

CHALLENGE

- Remanufacturing companies are usually small with limited resources to invest in the fast pace of change in alternative fuel technologies e.g. EV batteries and hydrogen vehicles etc.

In 2018, Carwood became a signatory to the report, increasing remanufacturing signatories to four (including Michelin, which also produces new products). Those companies diverted 15,700 tonnes from landfill.

STANDARDS

In the background, cross sector work is progressing to implement the BS8887 series of standards which provides guidance on design for remanufacture, through the remanufacturing process, to end of life disposal which will help establish more trust and credibility for the remanufacturing sector.

A dialogue is also taking place with the Department for Environment, Food and Rural Affairs (Defra) to consider remanufacturing best practice and how to promote it to the wider market to divert products from landfill or low-level reprocessing

CHALLENGE

- A key barrier to the uptake of successful remanufacturing is the return of end of life products (or 'core') from the consumer back to the remanufacturer, although remanufactured products are sometimes sold at 30-70% of the cost of new products
- Although the remanufacturing sector has the potential for huge job creation, these jobs are skilled and the associated costs of training a new or existing workforce are high.
- Access to test data or the ability to extrapolate test data is critical since products are becoming more complex and particularly in automotive are integrated into the overall vehicle management rather than being standalone parts.

TABLE 3 | BENEFITS OF REMANUFACTURING

ENVIRONMENT	CUSTOMER
REDUCED RAW MATERIAL CONSUMPTION by preserving much of the material in the original product, less raw material is used than during the manufacture of new products.	**VALUE FOR MONEY** remanufactured products can have longer durability than some original parts of lower quality.
REDUCED ENERGY CONSUMPTION AND CO_2 EMISSIONS by limiting the amount of raw material extracted and the manufacturing of new components, remanufacturing typically uses less energy than manufacturing a new product.	**AVAILABILITY** may allow the customer to continue to use equipment no longer manufactured. Remanufactured components may also have a shorter lead time than products made abroad.
REDUCTION OF MATERIAL SENT TO LANDFILL by keeping material in use for longer.	**DESIGN IMPROVEMENT** may improve the original design by engineering out any design faults.

It needs to be noted that the benefits listed above can only be released when the original part is of good quality. Some parts do not meet the requirements needed to enable their remanufacture. Consequently, a large number of resources ends up at landfill prematurely and legitimate part manufacturers and remanufacturing companies are being undercut. This results in environmental penalties and the UK economy being disadvantaged.

VISION FOR THE NEXT 20 YEARS

With the current speed of technological innovations and growing customer and stakeholder expectations, the automotive industry must now innovate at a speed not seen since the introduction of the internal combustion engine. From driving further the efficiency of production processes, to developing and driving new vehicle technologies to market, to providing mobility as a service, the next 20 years might be the most challenging and exciting in the whole history of the sector. The move to connected, autonomous and zero emission vehicles will significantly alter the road transport landscape, bringing positive benefits to consumers and our environment.

In 2018, the UK government set out its vision for low emission road transport in its Road to Zero strategy, with an ambition for nearly all new cars and vans to be zero emission by 2040. This is a challenging goal requiring collaboration between government, industry and stakeholders, alongside bold, supportive policy-making. The automotive industry continues to invest billions of pounds to develop and bring to market new products to help ensure this can be achieved.
As the powertrains that drive the vehicles evolve, those same vehicles will also become more connected and autonomous, delivering further unprecedented change. More than 18 million new vehicles with autonomous features are expected to be added to the global motor parc by 2030, signifcantly changing the way people drive.

FUTURE OF PRODUCTION PROCESSES:

HYDROGEN

Automotive manufacturers have made great progress over the past 20 years in minimising and decarbonising production processes and vehicle emissions. However, for the UK to achieve the emissions reductions required by 2050 under the Climate Change Act 2008, all energy will need to be supplied almost entirely carbon-free. Therefore the UK needs to go beyond the successful decarbonisation of electricity into a broader strategy for buildings, industry and transportation, which could mean a role for hydrogen produced in low-carbon ways.

While production and use of hydrogen is generally less efficient than electrification, it can be more easily stored than electricity at a very large scale. This means that hydrogen has particular value as a low-carbon replacement for natural gas (e.g. for heating buildings, industrial process heat and back-up power generation) and liquid fuels (in heavy transport buses, trains and lorries and potentially for longer-range journeys in lighter vehicles, where the need to store and carry large amounts of energy is greater). With a planned approach, it is likely that the use of hydrogen will enable UK emissions to reach lower levels by 2050 than could be achieved without it.

TOYOTA ENVIRONMENTAL CHALLENGE 2050
To help tackle climate change, Toyota has a strategy for achieving zero CO_2 emissions in its manufacturing plants by 2050, focusing on improving the technologies it uses and switching to alternative power sources.

This will be achieved by rationalisation of the manufacturing processes, making them shorter so that less CO_2 is produced. Facilities will be made more energy-efficient, while renewable energy sources, such as solar and wind, and low-carbon power such as hydrogen energy, will be adopted

CHALLENGE

- Lithium based batteries are currently the dominating technology, however there is a large number of new chemistries in development to counter their limitations. Consequently, some investments in battery production might be on hold in anticipation for the new battery technology breakthrough.
- Battery production is very energy intensive so further efforts are needed to lower the manufacturing carbon footprint and other impacts linked with resources extraction.

CHALLENGE

- As the population ages, so does the workforce due to increasing retirement age. The industry needs to plan for the future to enable employees to be productive for longer. Further digitalisation and automation of automotive production is likely to result in moving away from manual labour to digital process control.

INDUSTRY AND WORKFORCE 4.0

More advanced products will require more advanced production lines, which in turn will affect the way manufacturing works. According to the Made Smarter Review 2017, industrial digitalisation could be worth as much as £455 billion to UK manufacturing over the next decade.

In order to remain competitive, industry needs to continue developing and bringing to market new digital technology solutions to unlock the opportunities to innovate and improve efficiency. The long-term vision is to assure future interoperability between different machines.

INFRASTRUCTURE

For technologies to be fully functional, infrastructure plays a crucial role. Government's £200 million 5G testbeds and trials programme will fund projects to explore different connectivity solutions and business models for 5G. Moreover, full fibre broadband will add to faster and more reliable connections. Most manufacturing sites are located in suburban and rural

CHALLENGE

- CAV deployment raises privacy and data protection issues, in the context of the EU General Data Protection Regulation (GDPR) issues, which make the exchange of data more challenging.
- Handling a large amount of data presents issues with security and effective processing.

areas, which require a lot more funding for the network rollout. It needs to be noted that seamless connectivity also comes with some security risks, which need to be addressed.

PEOPLE AND SKILLS

The greatest challenge to adopting new technologies is a lack of the necessary skills. Bringing together creative businesses with researchers and technologists, could foster innovation. Access to easily accessible specialist, localised programmes to help manufacturers navigate this complicated landscape and find a result that is tailored for them is also essential.

ROAD AHEAD FOR VEHICLES:

CONNECTED AND AUTONOMOUS VEHICLES (CAVS)

The emergence of CAVs is expected to bring unprecedented change to the automotive industry worldwide, transforming commutes and benefiting those who face significant mobility restrictions. In the long-term, safety gains brought about by CAVs will see some safety features become redundant, resulting in lower average vehicle weight. Currently, from the five defined levels of automation, driver-in-the-loop assistance features, which are broadly categorised as Level 2, are already available on the market. These include features such as lane centering with adaptive cruise control. Regulation

JAGUAR LAND ROVER RUNS AUTONOMOUS RINGS AROUND COVENTRY

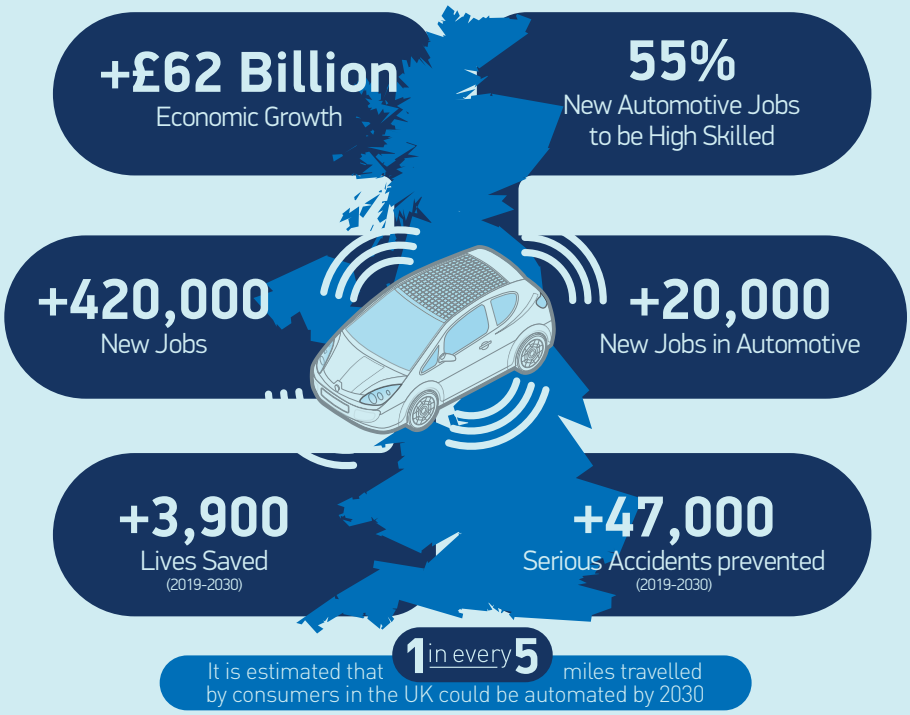
Jaguar Land Rover accelerated the development of future self-driving and connected technology in 2018 after completing the first ever self-driving lap of one of the UK's most challenging road layouts.

A prototype self-driving Range Rover Sport handled the complex Coventry Ring Road, successfully changing lanes, merging with traffic and exiting junctions at the speed limit of 40mph.

The trial, which was part of a £20 million government-funded project, UK Autodrive, saw Jaguar Land Rover engineers complete significant self-driving technology testing on closed tracks before heading onto public roads in Milton Keynes and Coventry. The safety-enhancing and emission reducing technology uses the internet to connect vehicles to each other and to infrastructure such as traffic lights enabling the vehicle to autonomously handle roundabouts, pedestrians, cyclists and other vehicles on complicated roads.

Jaguar Land Rover is working on fully-and semi-automated vehicle technologies to offer the choice of an engaged or automated drive.

POTENTIAL OVERALL IMPACT OF CAVS ON THE UK ECONOMY BY 2030



permitting, vehicles with higher levels of automation are set to roll out over the next decade. This will start with driver-out-of-the-loop traffic jam and highway pilot features, allowing drivers to disengage safely from dynamic driving tasks such as manoeuvring in traffic jams and driving on motorways. From 2021 onwards, some early generation Level 4 automation features may be introduced. These may include highly automated highway pilot, automated valet parking and automated vehicles such as taxis operating within virtually defined or 'geofenced' zones in urban areas.

HEAVY GOODS VEHICLES

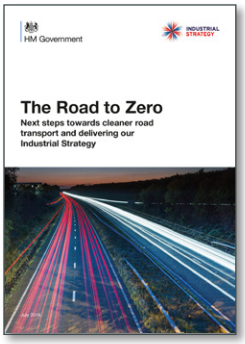
In 2017, the European Commission agreed new regulations requiring truck manufacturers to report fuel consumption and CO_2 emissions from new trucks registered from July 2019. The Vehicle Energy Consumption Calculation Tool (VECTO) is used to calculate the fuel efficiency and CO_2 of new trucks based on type approval data and this will enable vehicle operators to compare these attributes in a standardised way.

Further EU regulation requiring manufacturers to reduce their HDV CO_2 emissions by 15% by 2025, and 30% by 2030 will be formally adopted in mid-2019. Any excess emissions will result in manufacturers being penalised.

As well as improvements in HDV fuel efficiency and CO_2 emissions, the operational efficiency of road freight movements is being assessed. The Department for Transport (DfT) has been running a trial since 2012 monitoring the use of Longer Semi-Trailers (LSTs) to assess environmental and economic benefits, while maintaining safety. The trial involves longer semi-trailers of 14.6 metres and 15.65 metres in length (17.5 metres and 18.55 metres total vehicle lengths respectively). The trial was initially scheduled to run until 2022 with a total of 1,800 LSTs, however it was extended to 2027 with an additional 1,000 LSTs.

The Department for Transport (DfT) is also funding £8.1million towards the first real-world operational trial of platooning vehicles on UK motorways. The trials, which were announced in 2017, will feature convoys of semi-automated trucks that will operate in tandem using a wireless connection. Acceleration, braking and steering will be controlled by the lead vehicle and each will have a driver in the cab ready to retake control at any time. The trials are intended to assess the potential benefits of platooning, which are expected to include cutting congestion and the cost of fuel for hauliers.

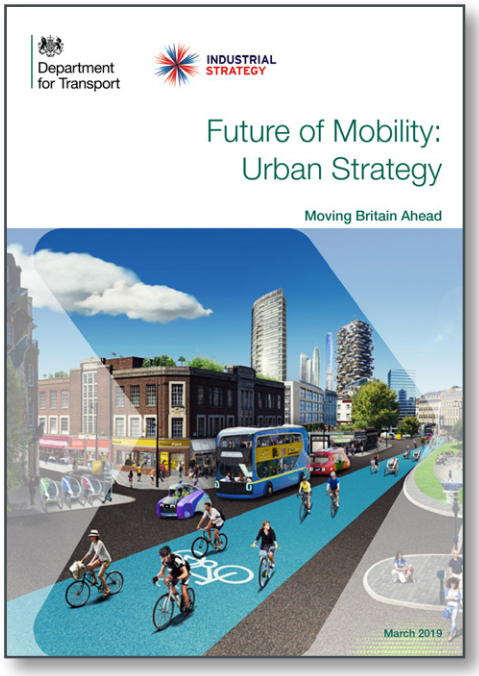
ROAD TO ZERO



In 2018, the UK government set out its vision for a low emission future for road transport in its **Road to Zero** strategy. The ambition is that, by 2040, all new cars and vans will be effectiviely zero emission. The strategy sets out how government plans to encourage the uptake of ultra-low emission vehicles, on the pathway to 2040.

The government has also targeted for at least 50%, and as much as 70%, of new car sales to be ultra low emission by 2030, alongside up to 40% of new vans, with a commitment to enable a roll-out of infrastructure to support the move to electrified vehicles.
These are challenging levels of ambition requiring extensive collaboration between government, industry and stakeholders, alongside bold, supportive policy-making.
The automotive industry is responding by investing billions of pounds developing and bringing to market alternatively-fuelled vehicles to help consumers make the shift. In 2018, AFV registrations accounted for 6.2% of the market, but not all of these vehicles fall within the government's ULEV defintion. BEV registrations, for example, are still only 0.7% of registrations illustrating the significant uplift that will be required to meet the ambitions and targets.

GOVERNMENT FUTURE OF MOBILITY: URBAN STRATEGY



The Government recently published its **Future of Mobility: Urban Strategy**, setting out the approach it will take to seize the opportunities from the changes happening in urban transport.

Underpinning the Government's vision of urban transport are nine high-level principles:

- New modes of transport and new mobility services must be safe and secure by design.
- The benefits of innovation in mobility must be available to all parts of the UK and all segments of society.
- Walking, cycling and active travel must remain the best options for short urban journeys.
- Mass transit must remain fundamental to an efficient transport system.
- New mobility services must lead the transition to zero emissions.
- Mobility innovation must help to reduce congestion through more efficient use of limited road space, for example through sharing rides, increasing occupancy or consolidating freight.
- The marketplace for mobility must be open to stimulate innovation and give the best deal to consumers.

- New mobility services must be designed to operate as part of an integrated transport system combining public, private and multiple modes for transport users.
- Data from new mobility services must be shared where appropriate to improve choice and the operation of the transport system.

These principles extend to not just the automotive industry but also all other sectors and transport modes involved in urban mobility, for example micro-mobility, last mile delivery, freight, passenger services and other forms of urban transit.

As part of the Industrial Strategy's Future of Mobility Grand Challenge, the Government also commits to several broad enabling measures:

- Implementing a flexible regulatory framework
- Supporting industry and local leaders
- Ensuring Government decision-making is robust
- Continuing established technology-specific programmes
- Other wider measures such as digital infrastructure and skills

FUTURE SHARED MOBILITY

The fundamentals of our transport systems have not changed much over the past 50 years. However given rapid technological advances, population growth, consumer expectations and environmental and health concerns the mobility system is undergoing a change. New technologies, connectivity and data mining are leading to new business models, such as Mobility as a Service (MaaS) and the sharing economy, which will have a big impact on cities.

Intelligent transport systems and technologies allow transport modes to communicate with each other allowing for efficient multimodal journeys. This might drive a move away from private vehicles and car ownership.

BMW JOINS SHARED MOBILITY

In 2011, BMW Group launched its carsharing service DriveNow, which started in Germany and now operates in nine European cities including London. In October 2017, the company reached the milestone of 1,000,000 customers. In April 2018, BMW Group and Daimler AG agreed to combine their mobility services, including their car sharing devices DriveNow and car2go, to became SHARE NOW, to shape sustainable urban mobility for the future. The merger will promote electromobility, for example, by offering electrified CarSharing vehicles as well as easy access to charging and parking options to make the use sustainable m obility services even easier. .

Traditional models of ownership are changing and as AVs become more commonly used, they have the potential to change how we move around our cities. Shared AVs could have a big impact on how road space is used, as they will travel in closer proximity, also roads could be narrower, car parking could be removed, and roadside signage reduced. Shared AVs could also contribute to decarbonisation goals.

SUSTAINABLE DEVELOPMENT GOALS

With the world population expected to reach 9.8 billion by 2050, societies are facing a range of issues such as climate change, poverty and ongoing urbanisation. To deal with such issues, the United Nations has adopted a set of 17 Sustainable Development Goals (SDGs), outlined in the 2030 agenda. Transportation and the freedom to move plays an important role in increasing social mobility and driving human progress.

The automotive industry is very aware of its responsibility to provide value to society by delivering safe, secure and sustainable mobility for all.
A number of signatories to this report identified a range of ongoing sustainability-related activities, which can contribute to achieving those goals. Some examples of such work are demonstrated in case studies included in this report.

KEY PRIORITIES FOR A SUSTAINABLE UK AUTOMOTIVE SECTOR

PRODUCTION
Ensure any future relationship with the EU delivers frictionless trade to help ensure a competitive business environment for UK Automotive.

Further enable the sector's reduction of its carbon footprint.

PEOPLE
Secure commitment from industry and government to produce a skills element to the automotive industrial strategy sector deal that addresses both existing and future skills challenges and strengthens automotive competitiveness in the UK.

SMALL VOLUME MANUFACTURERS
Safeguard small volume manufacturers by ensuring low volume provisions are included in regulations, where appropriate.

SUPPLY CHAIN
Continue to provide targeted business measures to encourage sustainable growth and development in the UK automotive supply chain.

USE
Ensure an ambitious and joined-up approach across government to deliver consistent, supportive policies to drive the transition to ultra low emission vehicles.

END-OF-LIFE VEHICLES
Tightening of the vehicle deregistration system, with more effective enforcement, to ensure that all vehicles enter the correct channels at the end-of-life stage.

REMANUFACTURING
Recognise and promote the resource efficiency benefits of remanufactured products, encouraging their uptake through supportive policies.

SIGNATORIES TO THIS REPORT

Signatories to this report	Brands
ATP	ATP
Autoelectro	Autoelectro
Aston Martin Lagonda Ltd	Aston Martin, Lagonda
Bentley Motors Ltd	Bentley
BMW Group UK including Rolls-Royce Motor Cars Ltd	BMW, MINI, Rolls-Royce
Bosch	Bosch
Carwood	Carwood
Caterpillar	Caterpillar, Perkins
Ford Motor Company Ltd	Ford
Honda (UK) and Honda of the UK Manufacturing (HUM) Ltd	Honda
IBC Vehicles Ltd	Vauxhall, Opel
Jaguar Land Rover Ltd	Jaguar Cars, Land Rover
LEVC	LEVC
Leyland Trucks	DAF Trucks
Lotus	Lotus
McLaren	McLaren
Michelin Tyre plc	Michelin
Nissan Motor Manufacturing (UK) Ltd and Nissan Technical Centre Group	Infiniti, Nissan
Optare	Optare
Pritex	Pritex
PSA Group	Citroën, Peugeot, DS Automobiles
Robert Bosch	Bosch
Schaeffler	Schaeffler
Toyota (GB) plc **Toyota Motor Manufacturing (UK) Ltd**	Lexus, Toyota
Unipart	Unipart Logistics
Vauxhall	Vauxhall
Volkswagen Group (UK) Ltd	Audi, SEAT, ŠKODA, Volkswagen Passenger Cars, Volkswagen Commercial Vehicles
Volvo Car UK Ltd	Volvo

REFERENCES AND ONLINE CONTENT

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THE REPORT WILL NOT BE PRINTED THIS YEAR TO PRESERVE RESOURCES.

The 2019 report has 26 signatories, which represent 99.9% of vehicle production in the UK (In 1999 report covered 67%).

New signatories include, Carwood – a remanufacturing company and LEVC – electric taxi producer.

DHL and GKN Driveline was not able to provide 2018 data due to restructuring.

LEVC's data is not included this year as it only started producing vehicles in 2018.

Both GKN Driveline and LEVC were excluded from the 2017 on 2018 comparison. Some companies have corrected their 2017 figures.

*Sector turnover, R&D and jobs dependent on the sector are compiled from several official sources using expert SMMT analysis. The 2017 and 2018 figures are based on projections.

**Estimate of manufacturing, distribution, refuelling and repair of vehicles where automotive in the main activity of the firms.

All per vehicle figures contain resources used during engine and battery production, some of which are destined for export.

UK Production – the completed vehicles as they leave the production line in a UK facility.

Registrations –vehicles registered for road use in the UK for the first time with the DVLA or the DVLA's equivalent organisation in Northern Ireland, Channel Island's or Isle of Man.

UK Turnover – the money/income that a business generates each year.

UK expenditure on Business and R&D- the amount, in monetary terms, spent on research and investment, each year.

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