



FULL THROTTLE TO FULL CHARGE: DRIVING FORWARD UK AUTOMOTIVE

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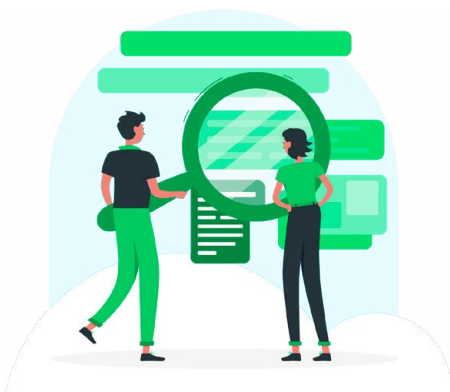
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FOREWORD

Leading net-zero, supporting high-value, rewarding jobs, delivering for the economy, producing cutting-edge technology, and driving exports and growth – a strong domestic automotive sector is rightfully an ambition of all nations.

The UK's automotive industry is one of its most valuable assets and it is one of the world's most diverse, manufacturing cars, commercial vehicles, buses, engines, parts and components, as well as a thriving aftermarket and one of the most vibrant and progressive markets, seeking to lead on technological change.

From Full Throttle to Full Charge marks the next stage on the UK's journey to Net Zero, presenting an updated roadmap and new forensic analysis of the supply chain that is necessary if we are to ensure UK Automotive is competitive at home and abroad.

Our last competitiveness report was published in June 2021, emerging from lockdowns towards what we hoped was going to be a period of economic recovery and growing confidence in industry's ability to deliver on shared goals – if the right conditions were put in place. Fast forward just 12 months and the operating landscape has changed dramatically and unexpectedly.

A Covid resurgence; war in Ukraine; volatile energy markets; soaring commodity prices; a cost of living crisis; spiralling inflation; component shortages; supply chain disruption; logistics upheaval; trade uncertainty; regulatory change; and a climate emergency. Each a challenge to growth of itself but, collectively, the most significant storm to beset the industry in a generation. All at a time when the industry is facing the most radical technological change since its inception.

Automotive is global and the UK industry is not alone in its ambition, its transition or its challenges. But the UK has additional issues with which it must deal: changing trade relationships, markedly higher energy costs and the most ambitious timescale for regulatory measures to deliver zero emission mobility.

The race is on. We must create the most competitive conditions for investment; to build battery production and electrify supply chains; to upskill our globally renowned workforce to ensure they are fit for the future; and to help our existing manufacturing base grow and prosper in the electrified age.

We recognise the competing pressures on Government and UK spending. However, the strategic importance of automotive should not be ignored. We need to build confidence, consistency and competitiveness. Action now will drive economic growth in the years to come. With the right support on business costs; on supply chain security; on skills; innovation and investment, our industry can repay investment many times over and not just recover but thrive in the global economy.

The prize is significant: accelerated decarbonisation will help the UK meet carbon budgets; a healthy market will afford consumers choice and increasing affordability to make the leap into new technologies; creating competitive conditions for our world-leading manufacturing capabilities will provide exports leadership; and investment into our people will support households and economies across the entirety of the UK.

This can only happen if all stakeholders work together. *From Full Throttle to Full Charge* provides a deeper understanding and consolidated policy roadmap to better illuminate the way.

Mike Hawes Chief Executive

The Society of Motor Manufacturers and Traders (SMMT)

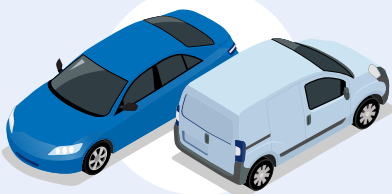


OUR 2030 VISION

To develop a UK Automotive ecosystem fit for a zero emission future. An ecosystem which delivers a healthy market and vibrant domestic production footprint, founded on a resilient supply chain successfully evolved to meet current and future technological needs for a zero emission future – taking UK Automotive from Full Throttle to Full Charge.

WHY AUTOMOTIVE MATTERS

£14BN



The motor industry directly contributes £14bn in GVA for the UK economy

182K



182K employees are directly employed in automotive manufacturing

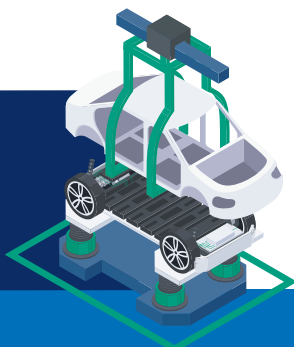
600K



600K additional workers in the wider automotive sector

150

The UK exports to more than 150 markets worldwide



80%

of cars made in the UK are exported



At £30bn the automotive industry is the UK's largest source of exports for goods



The average wage in the automotive industry is 14% higher than the UK average



Every job in the sector creates another 2.1 jobs in sectors from chemicals and steel to finance and advertising



11% of all UK business R&D is invested by the motor sector



In total, the motor manufacturing industry directly contributes £14bn in GVA for the UK economy

UK SUPPLY CHAIN IN TRANSITION

UK SUPPLY CHAIN OVERVIEW

In 2020, the UK automotive supply chain generated an aggregate turnover of £21.2 billion and £5.7 billion of gross value-added, down almost a fifth on 2019 levels. Exports of engines and components were worth £7 billion. Generating that wealth were around 123,500 people working at around to 5,000 companies. The situation has deteriorated since 2019 because of the many headwinds facing the industry – notably the consequences of Brexit, Covid-19, the chip shortage, the changing structure of the sector and, more recently, the war in Ukraine.

In a new study, by SMMT and AutoAnalysis, we have looked more deeply at the UK automotive supply chain, looking in particular at the broader industries which supply into automotive, like steel, plastics and paint to better understand the size and structure of the sector. This shows the wider footprint of the sector, but also the wider jeopardy to the transition of the sector and opportunity for growth. This additional element of the supply chain takes GVA from £3.6 billion to £5.7 billion and employment from 88,850 to 123,500 people in 2020

The adverse conditions of 2020 did knock turnover by -19% compared with 2019 and GVA by -18.5%. However, employment and the number of enterprises was almost unchanged. And although we might expect to see some 5,000 jobs go in 2021 due to the closure of two major plants in 2021, there has not been widespread disinvestment. Moreover, the sector is attractive for employees, typically offering wages above the national average in key regions they work in (eg 8% higher in the North East).

The automotive supply chain faces major challenges with the switch to electric vehicles (EVs) and the wider decarbonisation agenda. For several long-established component segments and their supplier companies, such

as engine and gearbox manufacturing, this presents challenges, but it also opens up opportunities for suppliers of new technologies into the EV sector, for example, in batteries, motors and power electronics.

Suppliers of engine components, conventional gearboxes, clutches, drive axles, exhaust systems, engine cooling systems and fuel delivery systems will see their business decline steadily as these systems are not required on fully electric vehicles, although some residual business will remain for the provision of aftermarket spares. Other existing supply chain companies, for example in the supply of steel, paint, interior components (such as seats, headliners), lighting, wheels and tyres, will see their business remain, although cost and weight reduction pressures on companies in these areas will intensify as the move to EVs accelerates.

The Advanced Propulsion Centre (APC) has also identified £24 billion of opportunities over a five-year period in 12 key areas, focused around batteries, power electronic and electric machines. To win this new business will require investment in the UK, either transitioning existing suppliers to new technologies, or all-new businesses starting. These will then need to convince vehicle manufacturers' purchasing departments to source from the UK.

2020 OVERVIEW



Turnover
£21.2bn



GVA
£5.7bn



123,500
employed



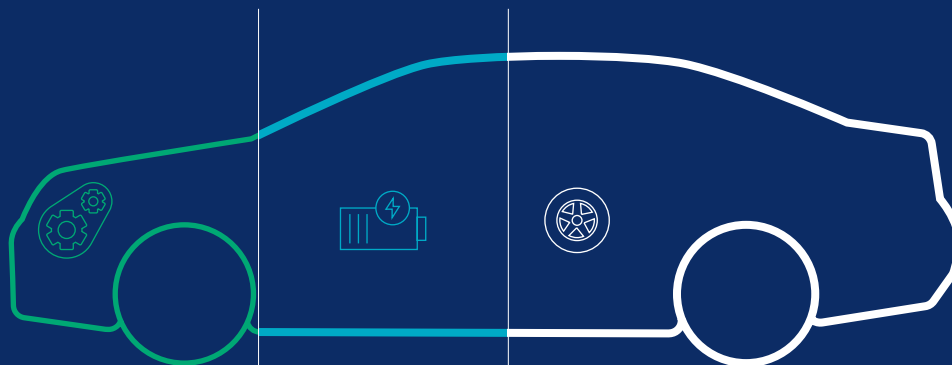
Some **5,000**
businesses



Exports
£7.0bn

The automotive supply chain faces major challenges with the switch to electric vehicles (EVs) and the wider decarbonisation agenda

SUPPLY CHAIN: BREAKDOWN OF PARTS



ICE Supply Chain

engines
gearboxes
radiators
exhausts
emissions control systems
clutches
ignitions
start motors
distributors
fuel tank
spark plugs

EV Supply Chain

motors
electric machines
power electronics
semi-conductors
sensors
inductors and capacitors
batteries
cathodes, anodes and electrolytes, cell assembly
battery packs
components
electric machines
magnets
stampings
laminations

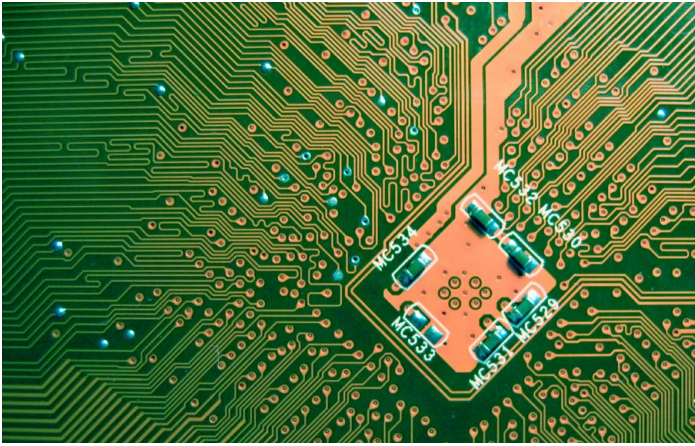
Existing and Evolving Supply Chain

bumpers
dashboards
brakes
body panel
electronics
lights
mirrors
tyres
safety equipment (eg airbags)
seats
steering wheels
suspension
wheels
wipers

Broader supply chain

steel and other metals
plastics
paint
rubber
textiles
electronics
glass
petrochemicals

SEMICONDUCTOR SHORTAGES: DISRUPTED SUPPLY CHAINS CONTINUE



The semiconductor shortage has halted assembly lines, impacted production and cost billions in lost vehicle sales worldwide. The market has developed a systematic gap between demand and supply, driven by structural imbalances and a fundamental supply chain mismatch. Exacerbated by Covid-19 and accelerated by technological transition, manufacturers' inventories are at their lowest levels in years. The supply crunch is still some way from being resolved with no full recovery forecast before 2023, and no dedicated UK semiconductor strategy.

Globally, more than 11.3 million units of production were lost in 2021 due to the chip shortage (AutoForecast Solutions), costing the global automotive industry \$210 billion in revenue in 2021 (AlixPartners). The ongoing shortage highlights why there must be a coordinated industrial policy that delivers substantial public investment while encouraging private investment, to strengthen production and resilience in component production.

In the UK, all types and sizes of automotive businesses have been impacted by supply issues from the ripple effect of production stoppages. The new car market ended 2021 up just 1.0% on an extremely weak 2020 outturn and -34.4% off the 2015-2019 five-year pre-Covid average. The sector lost £22 billion in revenue in 2021, while SMMT's outlook for 2022 has been cut from 1.897 million units to 1.722 million.

UK and global automotive businesses are planning and investing to boost resilience. For many, sourcing closer to home, as well as securing diverse supply, will be crucial. Clear government action is needed to ensure that the UK is not left behind, given it currently has limited production capacity, unclear ambitions, while first movers – including the USA and EU – stand to benefit from state interventions.

MAJOR GLOBAL AUTOMOTIVE NATIONS RESPONSE PACKAGES INCLUDE



US

Recently approved a bill to provide \$52 billion in subsidies for semiconductor chip manufacturing as part of a strategy to increase domestic production.



EU

Proposals to allocate up to 20% of \$917 billion Covid recovery fund toward digital infrastructure including the microelectronics industry. Commission proposals for \$30-\$50 billion European Chips Act to double EU's 10% share of the global semiconductor market by 2030 via a dedicated European Semiconductor Fund.



South Korea

A "K-Semiconductor Belt" strategy aimed at building the world's largest semiconductor supply chain by 2030. Includes investment tax credits on semiconductor R&D up to 50% and facility investments up to 20% to attract more than \$450 billion private sector investment in the domestic semiconductor industry by 2030.



Japan

\$6.8 billion funding for domestic semiconductor investment to double domestic chip revenue to \$114 billion by 2030, including legacy production, R&D of next-generation silicon, and up to 50% of construction costs of a TSMC plant in Kumamoto prefecture.



China

A "Made in China 2025" industrial plan, under which the country aims to produce 40% of the semiconductors it uses by 2020 and 70% by 2025, with extended preferential tax, finance, and policy measures to promote its domestic integrated circuit industry.

EMPLOYMENT

The broad automotive supply chain analysed in this report employed 123,500 people at around 5,000 companies in 2020. Approximately 89,000 of these jobs were in the traditional supply chain.¹

The traditional automotive supply chain represents just over half of all automotive jobs. It also represents 3.6% of all manufacturing jobs and 0.3% of all jobs in the UK. Employment in the automotive supply chain is more broadly distributed than in vehicle manufacturing, reflecting the larger number of production locations and their much smaller size.

In the West Midlands, the automotive supply chain accounts for 8.6% of all manufacturing jobs and 0.9% of total jobs. It has the highest share of employment in the automotive supply chain at 28.7%, and at the vehicle manufacturing companies themselves at 38.5%.

Yorkshire and the Humber has the second highest ratio of automotive supply chain employment (13.3%), reflecting the region's mid-way location between the West Midlands and the North East. It also has a large concentration of vehicle body-builder and trailer manufacturers. The North West is home to 12% of supply chain employment, which reflects supply into Bentley, Vauxhall and commercial vehicle companies, as well as some supply to vehicle plants in the West Midlands. The 8.4% employed in the South East reflects supplier locations for Ford, Vauxhall and MINI. Jobs in the North East are primarily for Nissan supply.

Full time employees in the traditional supply chain across the UK earned £29,706 on average in 2021². While this was -5% below the national average earnings, it is higher than in many regions of the UK. For all employees (full and part time), the supply chain's earnings were 10.4% above the national average, and was often 20% higher than the average across the North East, Wales, South West and Yorkshire and Humberside and 14.4% above the West Midlands.

¹ The traditional supply chain covers SIC codes 29.2 and 29.3; the wider supply chain covers other SIC for which regional employment breakdown is not available

² Full time employees median annual gross salary, ONS Annual Survey of Hours and Earnings (ASHE) data for SIC29.2 and 29.3 combined, no regional split at this SIC detail is available

Regional share of UK employment 2020							Source: ONS NOMIS data	
	Auto supply chain	Distribution	Vehicle manufacturers	Distribution	Distribution			
					All auto	All Manufacturing	All UK employment	
East	2,450	2.9%	3,500	4.5%	9.5%	8.3%	3.7%	
East Midlands	5,450	6.5%	3,000	3.8%	6.9%	10.9%	5.2%	
London	400	0.5%	3,000	3.8%	17.4%	4.9%	2.1%	
North East	6,700	8.0%	8,000	10.3%	3.5%	4.5%	9.1%	
North West	9,850	11.8%	11,000	14.1%	11.2%	13.9%	12.9%	
Scotland	1,525	1.8%	1,750	2.2%	8.3%	7.6%	2.0%	
South East	7,000	8.4%	9,000	11.5%	13.9%	11.2%	9.9%	
South West	6,000	7.2%	4,500	5.8%	8.4%	9.1%	6.5%	
Wales	7,935	9.5%	3,000	3.8%	4.3%	6.0%	6.8%	
West Midlands	23,950	28.7%	30,000	38.5%	8.7%	12.0%	33.4%	
Yorks and Humber	11,100	13.3%	2,500	3.2%	7.9%	11.5%	8.4%	
Total	83,500	100.0%	78,000	100.0%	100.0%	100.0%	100.0%	

CASE STUDY: FORD FROM TRANSMISSION TO ELECTRIC TRANSITION, FROM THE UK TO THE WORLD



Since 1909, Ford of Britain has been at the forefront of UK Automotive manufacturing. As the electrified era dawns, new skills and production capability are required to deliver the next chapter of Ford's UK history.

Through the leadership of Ford's "EPRIME" consortium, a broader consortium supported by the Advanced Propulsion Centre, Innovate UK and private partners was assembled in April 2018 to deliver manufacturing and engineering capability in new technologies, tools and equipment, skills and software and ultimately to create a facility for European electric vehicle (EV) component manufacture. At Halewood in North West England, this is now a reality.

Ford are embarking on an ambitious £230 million investment to transition the existing transmission facility to electrified power units to supply the UK and Europe – with the potential to expand further if the right conditions are in place, and sustained, for the UK to compete internationally. Retaking full control of a former joint venture with Getrag, Ford had a modern, well-maintained facility with a passionate and skilled workforce and a golden opportunity. The project will benefit from the Automotive Transformation Fund, creating over 300 jobs and safeguarding more than 350 existing roles, with all the spillover benefits for the supporting supply chain.

New and existing manufacturing processes will serve Ford's passenger and commercial vehicle supply chains in Germany, Turkey and Romania. Completed power units will be assembled and tested on site and then exported across Europe for assembly into finished vehicles serving UK, European and global markets.

Ford has worked with UK suppliers to source additional new componentry, creating local demand and building new capacity to meet these demands. This is driving forward the requisite domestic

ecosystem and knowledge base that can transfer to the benefit of the wider sector. SMMT's Automotive Supply Finder tool helped identify new connections while Ford also benefitted from strong and timely support across Government and academia. Meanwhile, piloting and prototyping has helped anchor Ford's Dunton campus as a product design and manufacturing leader, casting benefits beyond the Halewood site. The expertise and learning accrued through these projects is now inspiring and influencing change at a global level as Ford looks to make a global electric transition, showcasing the best of the UK's innovation and manufacturing capability.

Power unit production in Halewood is slated to begin in mid-2024 with production capacity forecasts of an initial 250,000 units a year. More widely, challenges now include planning for new skills and talent across battery cell production and assembly, power electronics and more, to solidify the skills base for an electric future. Maintaining a competitive business and R&D environment for advanced manufacturers pushing the very boundaries of advanced manufacturing can reinforce the foundations on which to realise future UK growth.

Ford are embarking on an ambitious £230 million investment to transition the existing transmission facility to electrified power units

EXPORTS

A third of all parts and accessories built in the UK are destined for export, this rises to nearer 60% for engines.

In 2019, UK exports of engines and components totalled £9.1 billion (split as £2.8 billion in engines, £1.3 billion in loose engine parts and £5.0 billion in non-engine components). By 2021 exports of engines and components had declined to £6.5 billion.

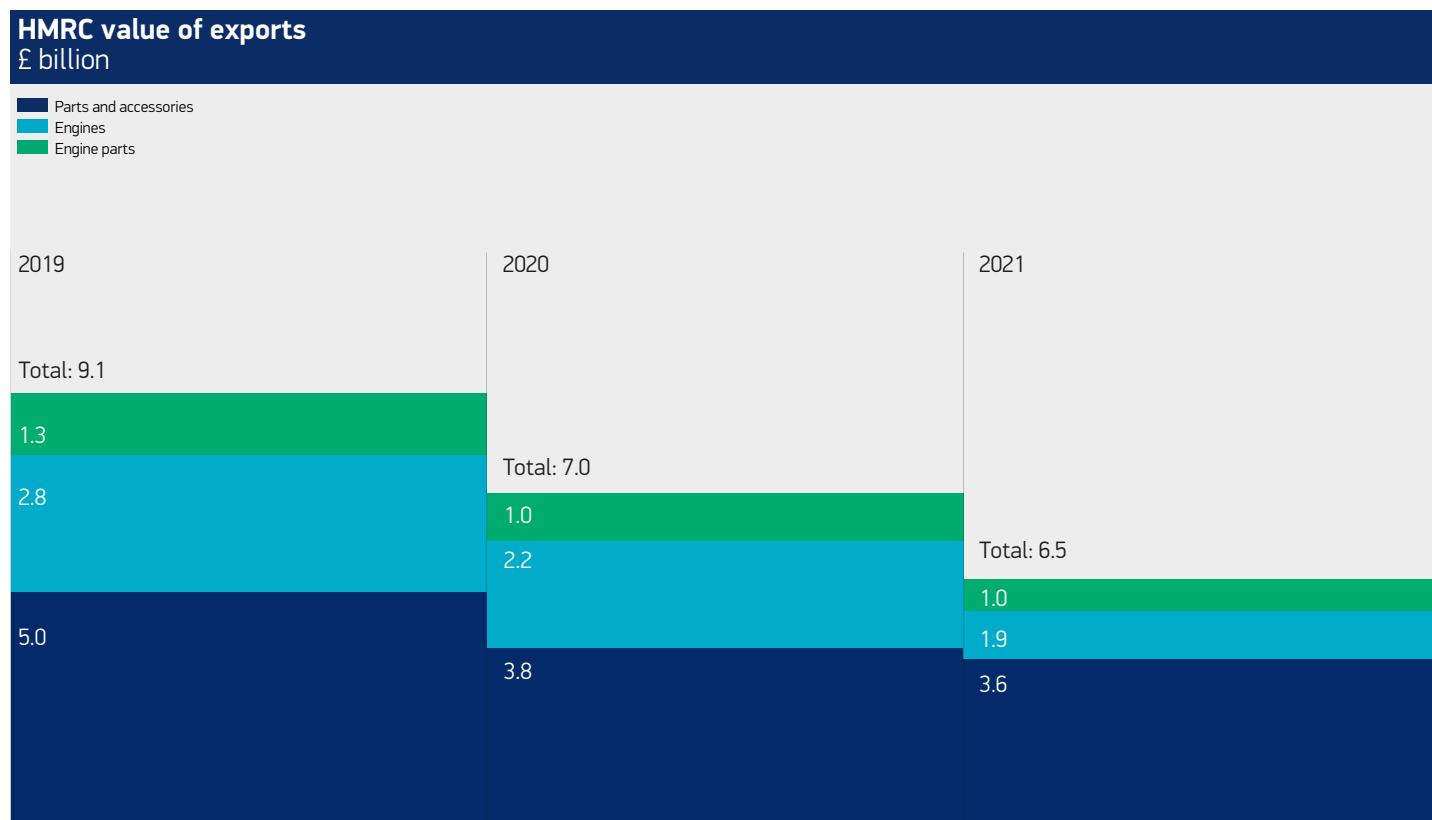
The UK runs a trade deficit in parts and accessories. In 2019, exports totalled £9.1 billion, while £16.1 billion worth of goods were imported, creating a UK trade hub worth £25.2 billion. This trade hub value had fallen by nearly 30% in 2021 to £17.7 billion.

The EU accounted for 61.1% of parts exports, worth £5.6 billion, showing the importance of UK-EU trade in common with the overall sector as with the overall UK automotive sector. A significant proportion of the remainder goes to Turkey. Turkey accounted for 10% of exports, worth almost £1 billion (£911 million), including 45% of UK diesel engine exports. It was also the third largest export market for petrol engines, after the EU and the USA.

Some 60% of engines built in the UK are exported worth £2.8 billion - £1.3 billion for petrol, £1.5 billion for diesel.

This export sector is going to decline rapidly as the automotive market moves away from conventional ICE. There will be some demand in the commercial vehicle segment and some hybrid petrol powertrains will also continue into the 2030s, but most exports will be lost within the next decade and a half. This has significant implications for the UK automotive sector and employment at every level.

Conventional gearboxes, gearbox parts, drive axles, clutches, fuel tanks, silencer, mufflers and other elements of exhaust system will also all disappear once EVs have become universal. Existing engine cooling systems will also become redundant, although some of the technological skills and manufacturing facilities in this sector could be transferred to battery cooling systems. Whether future production of batteries or cells and motors can be exported at rates which can replace this lost business is the key challenge facing industry. There has been an early win with Ford announcing Halewood will export motors to its European assembly plants and others may follow. Many OEMs, however, are making the motors and potentially other parts of the value chain themselves, using the transition to EVs to increase vertical integration. Breaking into these emerging markets will be a challenge.



VULNERABILITY

The UK automotive supply chain is linked intrinsically to domestic vehicle production. The fortunes of UK vehicle manufacturers will in part dictate the success of traditional suppliers as well as the broader chain, including metals, plastics, paint manufacturers, logistics and more.

The Production Outlook report, produced by AutoAnalysis for SMMT in March 2022, projected UK production of cars and light commercial vehicles to reach between 1.12-1.28 million units per annum through to 2027, well below the 1.38 million produced in 2019. There are opportunities for higher growth, if the electric transition happens more rapidly, raw material prices fall faster than expected, or if new entrants appear in the UK. Conversely, if the UK's net zero transition is inhibited, there is the threat of lower volumes and even plant closures. OEMs' forthcoming electrification plan investment decisions, and also the Government's decision on what will be allowed to be sold between 2030 and 2035, will be critical to the UK's pathway.

The transition to EVs and whether the UK supply chain can adapt, how long legacy technologies remain in place – especially considering the strong export focus of the UK automotive sector, plus broader reviews to consider security of supply chains and the decarbonisation agenda – will also be important factors for suppliers.

The transition to EVs and the demise of ICE technologies will need the UK supply chain to make a major transition to remain viable. At present at least some 22,000 jobs, £11 billion of turnover and £2 billion GVA is reliant on ICE based technologies, covering both engine and related products. The ICE focused element of the sector is at least 15% of the total traditional automotive sector. Elements of the wider automotive supply chain are also ICE focused, e.g. 44% of automotive products identified in basic metals, and 15% in fabricated metals, again suggesting that the number of jobs and value of turnover and GVA at stake will be higher.

While businesses operating in some of these fields will transition, some may not and the jobs¹ and skills involved with ICE tech may not be transferable to EVs. CLEPA, the European Association of Automotive Suppliers, commissioned PwC to undertake a study which suggested an EV-only future would see 501,000 jobs lost across the EU27 automotive supply chain, with only creating 226,000 new jobs, leading to a net loss of 275,000 – i.e. only around 45% of lost jobs would be replaced. However, this would mean the UK could create at least 10,000 new EV-related jobs – and given this is based on a likely conservative estimate of current jobs, it could be many more.

The UK supply chain could benefit from decisions designed to improve security of supply and minimise the carbon footprint of producing a vehicle. This would involve reshoring, which could reduce some of the jeopardy of just-in-time production, being closer to supply chains and allowing more flexibility on volumes. However, given the export focus and potential for firms to re-configure their supply chains around EVs it is not guaranteed that the UK will benefit from such actions. Indeed, if key export markets decide to undertake similar activities, UK producers could be cut off. Improving the core competitiveness of doing business in the UK will help assist attracting inward investment into the UK. This would involve making energy costs, business rates and R&D support more competitive, decarbonising the energy supply industry and minimising the cost to trade overseas. Specific measures to ensure the workforce is properly trained in skills around electric vehicles and digitalisation would also exist.

¹ <https://clepa.eu/who-and-what-we-represent/ev-transition-impact-assessment/>

SEMICONDUCTOR FOCUS

Currently vehicle production – and therefore new vehicle registrations – are marred by the supply chain crisis around semiconductors. This is in part related to the global pandemic and is a global supply issue, but the UK makes very few chips for the automotive sector, meaning UK producers are reliant upon overseas suppliers. The uncertainty over chip supply has made production planning extremely difficult, even over the long term. There also appears to be little appetite to develop a UK-based automotive chip industry. While other countries, notably the US and the EU have plans to invest and heavily support domestic production, the UK currently has no such plans. The chip supply issue is taking much longer to overcome than expected, with some in industry now expecting it to continue till 2023 or even into 2024. EVs require significantly more chips than conventional vehicles, but the longer term impacts on demand and supply, and whether they balance and at what price, is another challenge for the sector.



THE NEXT CRISIS?

Given the issues the automotive sector and, in particular, the supply chain has experienced in recent years, the next question is where next crisis will be. This is impossible to answer. But, there are growing concerns about the supply of some raw materials to make key components for EVs, whether they will be accessible and affordable. There is also concern about supply of energy, especially decarbonised energy necessary to deliver net zero in the manufacturing process.



CASE STUDY: ADIENT EVOLVING SUPPLY CHAINS BEYOND ELECTRIFICATION, SEATED IN A UK ECOSYSTEM

A global Tier 1 supplier, Adient specialises in seat manufacturing and has a UK footprint that directly and indirectly supports major OEMs with plants in Sunderland, Liverpool, Wednesbury and Burton-on-Trent and over 1,000 employees, headquartered in the West Midlands.

The demands and rigours of just-in-time, just-in-sequence manufacturing demands co-location with customers which drives investment choices. Major vehicle production is an integral driver of supply chain positioning and anchors in the wider automotive ecosystem, attracting and encouraging wider supply chain businesses. Within this, Adient must then manage its operations, investment, general manufacturing costs and competitiveness challenges – across energy, business rates and labour for example.

Often with a broadcast window of only hours and an extensive bill of materials with over a thousand inputs, Adient must build components to match customer need in a precision operation to deliver complete seating systems to vehicle assembly lines, and often quickly ramp up production to meet orders in a disrupted marketplace, maintain operational excellence and delivery flows.

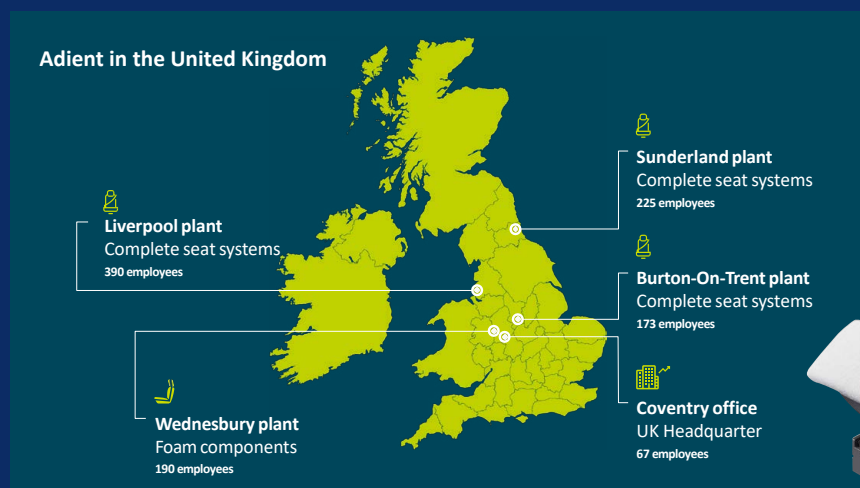
Compliance with international standards and regulations for UK and global markets required deep technical engineering, coupled with high quality aesthetic and haptic design, and innovation to deliver market leading products and potential growth opportunities. These include new smaller, integrated sound systems with in-built amplification that improve customer experience and contribute to lightweighting vehicles, the latest air bag systems for improved safety, and new functionality for new modes of travel in automated vehicles. Adient operates within a section of the market less exposed to the megatrends and structural changes needed for zero emission vehicle production and will continue to serve combustion engine, zero emission and automated mobility solutions, but must evolve to meet future interior architectures as vehicles evolve. The industrial

Adient specialises in seat manufacturing and has a UK footprint that directly and indirectly supports major OEMs

transition too is no less challenging, as Adient seeks to pursue critical decarbonisation and sustainability goals.

In the wider value chain, Adient has a manufacturing plant at Wednesbury, building foam components from raw materials and chemicals, where the advantages of R&D credits and a positive UK culture of innovation can invite compound benefits for UK plc. It is also looking to reduce other costs by locating close to OEMs given the inefficient logistics of moving large, complex, lightweight goods over long distances. However, this is impacted by high energy costs compared to continental Europe for high energy processes.

Adient epitomises the needs and challenges facing the broader supply chain – including those both directly and indirectly impacted by electrification. To continue this success story, a strong, robust vehicle manufacturing base, complemented by a compelling competitive business environment, will create the conditions to capitalise on new opportunities. Regulatory certainty, reduced and reliable energy costs, and ongoing support mechanisms for innovation, R&D and industrial decarbonisation can accelerate the journey with a firm foundation right here in the UK.



BEV PRODUCTION AND SUPPLY CHAIN OPPORTUNITIES

BEV PRODUCTION

At present, there are two BEVs made in the UK by volume manufacturers - the MINI at Oxford (c37,000 made in 2021) and the Nissan LEAF at Sunderland (c33,500 made in 2021). These accounted for 7.5% of UK production in 2021. Further EVs will be added to UK production in the next few years, including the electric van to be made by Stellantis at the Vauxhall plant, the all-electric Range Rover and Range Rover Sport in 2024, the replacement for the existing Nissan LEAF in 2025, and a new range of all-electric Jaguars and Bentleys from 2025. Later in the decade, further fully electric Land Rovers will be introduced. MINI is expected to be all-electric by 2030. Some of the small volume manufacturers are also to bring to market electric models, and both Bentley and Lotus plan to be all electric by 2030 and 2028 respectively. Other manufacturers may also develop electric models and new entrants to the UK may also appear.

As well as these fully electric vehicles, there will be hybrid vehicles, using many of the same or similar components required for BEVs. AutoAnalysis currently expects several OEMs to make hybrids into the 2030s, with the end of hybrid production in the UK dependent on the final decisions on ending hybrid sales in export markets yet to be confirmed, especially across Europe and in North America.

By 2030, with UK vehicle production forecast by AutoAnalysis to be some 1.1 million in 2030 and potentially between 1.25-1.3 million in 2035, BEVs are expected to account for 45-48% of production in 2030 (ie 495-530,000 vehicles) and 70-75% in 2035 (875-975,000 vehicles). Hybrids of various forms will account for the majority of the balance: 42-46% in 2030 (ie 460-505,000) and 25-28% in 2035 (315-365,000)¹. UK hybrid production will be heavily determined by decisions yet to be made on model replacement timing, but if there is potential to accelerate BEV production plans for the UK, then the hybrid ratio will fall faster and the BEV ratio rise faster than currently projected. It should be noted that with 80% of UK production destined to export markets, it will be regulatory regimes in Europe, the USA, and other key markets, as well as in the UK, that influence the level, format mix and rate of take up of electrified powertrains. There will likely be a small residual element of ICE engines for commercial vehicle applications and some low volume sports cars by the mid-2030s, but ultimately the ICE proportion will fall to zero. It is likely to become uneconomical for the volume players to produce limited volumes of ICE-powered cars for export markets which may have no end of sale dates in mind.

With regulatory ambition ramping up around the world, the speed of transition may need to accelerate. That said, too aggressive an uplift in any market, particularly in a relatively small market like the UK, could lead to overall volumes falling or increased chance of imports if the domestic sector is overtly hit by additional cost burdens.



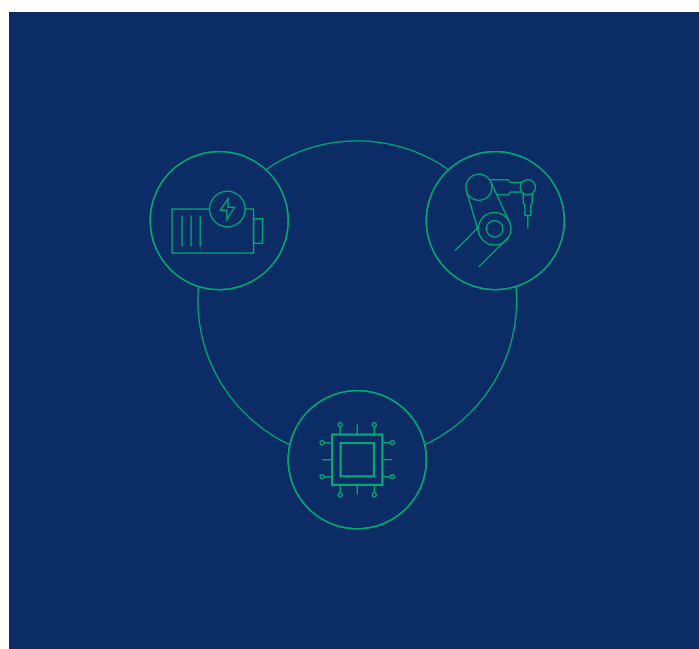
SUPPLY CHAIN OPPORTUNITIES

The EV switch creates new supply chain opportunities for UK suppliers, both for existing companies and new investors. With close to one million EV batteries required by UK vehicle companies by 2035 (plus more than 300,000 hybrid batteries), there is a major opportunity for UK-based battery factories to win this business, to avoid batteries being imported, primarily from the EU to comply with the UK-EU TCA and local content rules, but also to reduce carbon footprints (and transport costs) by shortening supply chains.

Progress has already been made, with the commitment by Envision and Britishvolt to build battery or cell plants in the north-east. However, more investment in battery and cell production will be required if the UK vehicle companies are to source batteries in the UK. There are significant sourcing decisions yet to be announced for future EVs to be made in the UK and winning further battery factory investment is essential to these.

APC has estimated these broad opportunities are worth a potential £12 billion in batteries, £2 billion in electric motors and £12 billion in power electronics². Within these three areas, specific opportunities are:

- **Batteries:**
cathode materials refining, manufacture of cathodes, anodes and electrolytes, cell assembly, battery packs components (eg housings, lids, frames, seals, cooling systems, wiring harnesses, bus bars)
- **Electric machines:**
magnets, stampings or laminations for rotors and stators, motor assembly including housing manufacture
- **Power electronics:**
semi-conductors, sensors, passive components including inductors and capacitors.



In addition to investment in battery and cell production by Envision and Britishvolt, there has been some progress in other areas, notably the announcements from Ford and Jaguar Land Rover to assemble electric motors in Halewood and Wolverhampton respectively. The challenge for the UK is to attract suppliers to build a robust supply chain to allow these tier 1 investors to maximise their UK tier 2 and 3 sourcing.

Plans have also emerged for opening lithium processing facilities in the Tees Valley³, potentially drawing upon UK sources of lithium⁴, notably in Cornwall⁵. Green Lithium and Inobat have formed a strategic partnership to build a large scale lithium refinery in the UK too. In the components supply chain arena, the decision by Saietta, a motor manufacturer, to locate a plant in Sunderland is very positive⁶. Further successes such as this are required for the UK to take advantage of the opportunities which are progressively emerging in the EV sector.

¹ Based on latest AutoAnalysis production forecast, May 2022
² <https://compositesuk.co.uk/system/files/documents/APC-Passenger-car-electrification-report-June%202020.pdf>
³ This will initially be for batteries for the energy storage sector but opens up the possibility for supply to auto movie battery suppliers: <https://www.business-live.co.uk/enterprise/company-behind-teesside-lithium-hydroxide-23401693> and <https://theenergyst.com/europes-first-lithium-processing-plant-progresses-at-teesside/>
⁴ <https://www.electrive.com/2022/06/07/inobat-teams-up-with-green-lithium-for-uk-cooperation/>
⁵ Small scale lithium mining is already underway – see: <https://inews.co.uk/news/environment/cornwall-uk-electric-car-battery-hub-world-first-mining-breakthrough-1381841> but it is not yet clear if industrial scale lithium mining in Cornwall is viable
⁶ <https://saiettagroup.com/saietta-accelerates-growth-with-a-new-manufacturing-facility-in-sunderland/>

The EVs switch creates new supply chain opportunities for UK suppliers, both for existing companies and new investors

CASE STUDY: BRITISHVOLT THE 'BRITISHVOLT EFFECT' POWERING THE UK AHEAD IN THE RACE TO ZERO

Britishvolt (BV) is a British battery technology company and advanced manufacturer building its first full scale Gigaplant in North East England. The company has big ambitions to accelerate the decarbonisation of society producing battery solutions for an electrified automotive industry, and beyond, at home and abroad. BV is already the partner of choice for Aston Martin Lagonda and Lotus Cars with an expanding roster of clients.

BV is pursuing a deliberate strategy of co-location and collaboration to attract the requisite evolving supply chain up and downstream. This can help reduce the overall industry carbon footprint and meet trade and origin obligations via localisation where possible. Also, it enhances resilience, streamlines logistics, and improves supply chain transparency, to create a halo effect that secures the long-term skills and value chain in this ecosystem of automotive excellence.

The first phase of battery production will commence in 2024, creating up to 3,000 jobs and more in the supply chain by the end of the decade. Through a four-phase expansion BV seeks to build enough cells each year for well over 300,000 electric vehicle battery packs (equivalent to almost a third of current UK vehicle manufacture), securing Global Britain's position on the sustainable battery production map. The site offers local renewable energy generation, a deep sea port and railhead, as well as the heritage of automotive skills and suppliers the region boasts as a foundation for future success.

BV was enabled through strategic collaboration, leveraging the existing world-class UK battery cell ecosystem developed with the foresight of UK Government. Further fiscal support from the Automotive Transformation Fund kickstarted the venture under the Government's Transport Decarbonisation Plan. Alongside visible and vocal Government assistance – symbolic in itself – Britishvolt leveraged £1.7billion in mobile capital investment from the private sector, critical to spearhead a British-led project in this nascent sector. This is matched by strong institutional R&D partnerships, including UK Battery Industrialisation Centre (UKBIC) and The Faraday Institution to pioneer new battery technology and futureproof its operations into the next electric decade.

The first phase of battery production will commence in 2024, creating up to 3,000 jobs and more in the supply chain by the end of the decade.

Attracting wider elements of the critical supply chain will facilitate BV and the wider industry to go further to collectively meet the end of sale of combustion engines, domestic carbon budgets, and increasingly stringent origin rules for EU and global trade to avoid punitive tariffs. Embedded skills in the region and greater visibility of automotive as a lifelong, rewarding, high skilled, high wage career path are crucial, but there remains a growing skills gap in emerging technologies to maintain, re-train and attract new talent to deliver on the UK's potential.

BV demonstrates what can be achieved when all parties work together through public-private partnership, to foster an internationally competitive offer, matched with UK ingenuity and enterprise. As other major economies pursue parallel electrification strategies, clusters and collaboration can be a catalyst for the UK's zero emission future. The 'Britishvolt Effect' seeks to leave a positive legacy for the UK and power ahead industries of the future.



CASE STUDY: TMD FRICTION BRAKE FRICTION TECHNOLOGY ADJUSTING TO ZERO EMISSION TRANSITION



TMD Friction develops and produces brake friction technologies for cars and commercial vehicles, and is part of Nisshinbo Group, one of the world's largest friction manufacturers. Their UK manufacturing base in Hartlepool produces 24 million pieces of brake per year, with a capital expenditure of £2.5 million. It employs 650 people, out of 6,500 across the whole company. More than 300 are involved in research and development for original equipment and aftermarket manufacturing worth £30 million per annum in investment. The company maintains a fleet of 100 vehicles conducting thousands of UN approval tests, with evolving regulatory obligations and deep technical understanding paramount to ensuring standards for domestic and overseas markets are met.

The UK site is specifically equipped to do short changeovers from one shape of friction to another – up to 750 per week – with its ESPI capability offering a competitive edge for the UK site. With a catalogue of more than 10,000 pad variations, Hartlepool can produce 90% of these to order, to service a wide range of vehicles from short production runs through to larger needs for aftermarket and original equipment manufacturing. This capacity can also support single line production elsewhere in the business if required.

R&D is at the heart of UK operations. Consequently, the UK's R&D tax credit and capital allowance frameworks are critical enablers and can attract further innovation and investment potential if properly geared to support manufacturers with an internationally competitive offering. TMD Friction is adjusting to zero emission transition. UK businesses can be a beneficiary with electric powered vehicles operating smaller brakes with lower wear (approx. 20% less), and industry seeking to maximise the advantages of lightweighting to support range and sustainability ambitions without compromising performance.

Input materials are also advancing with everything produced for the aftermarket copper-free, and innovation in processes reducing waste, as part of the sustainability and circularity journey. New product lines and new technology and processes will also demand upskilling as production methodology changes. Skills retention remains challenging. TMD Friction relies on apprentice schemes and other policy levers to ease the challenges.

Other strong headwinds can be seen in rising energy prices, which risks increased costs for customers and consumers, with double digit increases above planned estimates. Solutions, such as a potential hydrogen source in the North East cluster hold promise with the business open to exploring every possible avenue to get involved in green energy and renewables schemes to support overall competitiveness. Rising commodity prices are a further pressure to cost competitiveness, as well as extended logistics lines in reaction to changing trade rules, but TMD Friction look to the future optimistically amongst the UK supply chain.

TMD Friction develops and produces brake friction technologies for cars and commercial vehicles, producing 24 million pieces of brake per year.

HOW COMPETITIVE IS THE UK?

The worldwide transition of the automotive industry makes it a fiercely competitive time for securing new investments and shoring up existing ones. The UK has been a key player in the global automotive industry since the origins of the car. The sector has thrived because of underlying strengths – its scale and scope, its global outlook, and engineering excellence. These strengths are now being tested, and securing future investment is by no means guaranteed. The current trading environment is, arguably, the toughest ever faced. The cost of living crisis is also a cost of making crisis. To tackle the challenges head on will require concerted, coordinated action on business costs and key enablers for the regulatory, market, infrastructure and skills transition, to build a robust and competitive environment that fosters resilience, growth, innovation and decarbonisation.

TOP 8 KPIS



01	Productivity
02	Labour flexibility
03	Labour costs
04	Availability of skilled engineers
05	Availability of operators/technicians
06	Access to trade
07	Government incentives
08	Energy costs

The Automotive Council *UK International Competitiveness Report 2022* – benchmarking key strengths for automotive competitiveness and identifying opportunities

In Summer 2022, the Automotive Council will finalise its latest *UK International Competitiveness Report*, collating and assessing the views of 50 automotive businesses on critical Key Performance Indicators (KPIs). Tracking key influencing factors on investment decisions, the report clearly sets out the UK's strengths and where targeted measures could boost its competitive position.

First undertaken in 2015, the report has added new KPIs to reflect the changed UK operating context (trading relationships) and opportunities (Diversity & Inclusion). Early key findings for 2022 include:

- Productivity in automotive vehicle manufacturing has been a long-term strength of the UK industry and it can be seen as a potential key driver across the wider economy. Further support for productivity improvements across the supply chain will position the industry to benefit from the shift to zero emissions.
- High labour flexibility is a competitive advantage for the UK – enabling companies to grasp opportunities while mitigating risk. However, automotive values long-term employment. Proactive coordination between industry and government to maintain employment in automotive manufacturing will be critical during the structural changes in the coming years.
- Automotive is the UK's largest sector for exported goods and it is important that the industry is put at heart of any trade deals – supporting export and reducing barriers to entry. At the same time, it is important to ensure that trade deals in place – including the critical EU-UK TCA – are secure and working in practice.
- Government incentives matter to investment decisions. All countries with a significant automotive and manufacturing sector have state aid regimes which are both flexible and generous. To compete, the UK will need to continue to innovate in this area, including on R&D tax credits.
- The cost of energy has become a significant concern and the UK has among the highest costs in Europe. Advantages in labour productivity and flexibility cannot offset huge increases to cost and could deter investment in the UK.

Productive rankings
GDP / Hour Worked (\$)

US	74.2
France	67.6
Netherlands	67.0
Germany	66.9
UK	61.3
Canada	56.6
Italy	54.8
Spain	52.3
Turkey	48.5
Japan	48.1
Slovakia	45.7
Czech Republic	42.5
South Korea	41.8
Poland	41.0
Hungary	39.3
Romania	33.1
Russia	27.7
Mexico	20.3

Productive rankings
Auto GVA PP (€)

Germany	135.5
UK	125.5
Netherlands	119.3
France	97.2
Italy	90.0
Spain	79.5
Hungary	50.8
Czech Republic	50.6
Slovakia	48.7
Poland	38.4
Romania	25.8

Incentives
Effective rates for large companies

India	0.34
France	0.30
Thailand	0.30
Spain	0.25
Italy	0.25
Czech Republic	0.21
Brazil	0.20
US	0.14
South Africa	0.14
China	0.13
Canada	0.11
Russia	0.10
Japan	0.10
UK	0.10
South Korea	0.03
Germany	0.00
Poland	0.00
Turkey	0.00
Indonesia	0.00
Mexico	0.00

Incentives
Effective rates for SMEs

India	0.34
France	0.3
Thailand	0.3
UK	0.3
Canada	0.26
Spain	0.25
Italy	0.25
South Korea	0.25
Czech Republic	0.21
Brazil	0.2
US	0.14
South Africa	0.14
China	0.13
Japan	0.12
Russia	0.1
Germany	0
Poland	0
Turkey	0
Indonesia	0
Mexico	0

CHALLENGES IN FOCUS

While automotive nations across the world have all seen supply chain disruption, rising input costs of energy, labour and raw materials make the UK experience more acute. The UK sector not only pays the highest electricity prices of all European automotive manufacturing countries, but must deal with loss of readily accessible mobile talent, including European labour; ongoing trade and border friction and new embedded costs; tough Rules of Origin requirements; and new regulatory developments.

These challenges span the breadth and depth of the UK automotive ecosystem, from vehicle manufacturers of all sizes and the supply chain, through to aftermarket, and across all market segments: passenger and commercial vehicles, heavy duty vehicles, bus and coach, specialist, volume, premium and luxury.

A successful transition to our automotive vision for 2030 and beyond must involve all stakeholders within and adjacent to the direct automotive sector. Together, we must create new, modern ecosystem that sustains and grows the industry, protects and enhances its diversity and innovation, and is attractive to existing businesses and new investors alike.



CHALLENGES IN FOCUS

Energy:
**The (ongoing)
Cost Crisis**

Skills:
**Transitioning the
Workforce**

UK regulatory
environment:
**ZEV Mandate
and cumulative
pressure**

Trade:
**Rules of Origin
and Electric
Vehicles**



ENERGY: THE ONGOING COST CRISIS

RENEWABLE @ AFFORDABLE ENERGY FOR A NET-ZERO CRITICAL INDUSTRY

Today, the UK has the highest electricity costs in Europe and they are increasing more rapidly than in competitor countries, exacerbated by the war in Ukraine. This risks undermining investment in the UK at a pivotal moment in its transition to electrified vehicles and battery manufacturing.

As the industry simultaneously seeks to decarbonise industrial practices from well to wheel, it needs low-cost, stable supply of low-carbon energy to maintain the sustainability and competitiveness of UK vehicle manufacturing.

A combination of short-term policy measures and long-term strategy can make UK Automotive more competitive and resilient across production, encouraging investment in alternatively fueled vehicles to propel Britain to become a global leader in green technology and mobility.

The UK has the highest electricity prices in Europe, 59% higher than EU average, equivalent to £50 million

34% of UK electricity costs is tax, compared with just 21% averaged across the EU

Energy costs in automotive have broadly doubled in 2021, faster than the national average

Wider supply chain and logistic costs are rising on the back of surging energy costs up and downstream

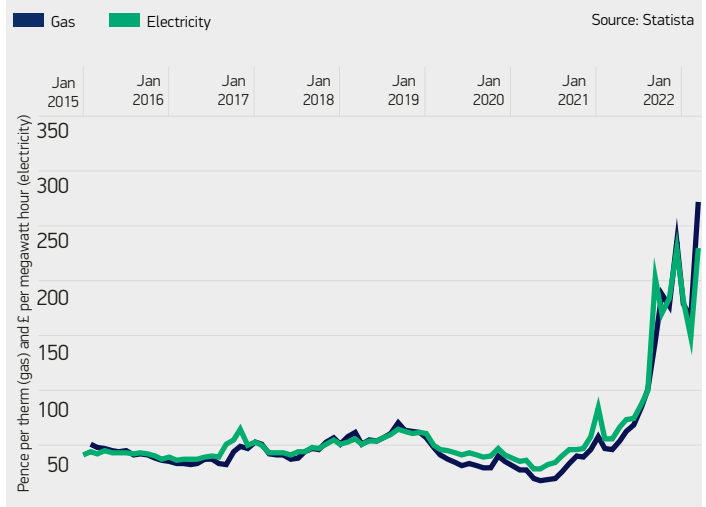
Firms face a £90 million uplift in energy bills this year, as costs surge 50%

WHY ENERGY COSTS MATTER

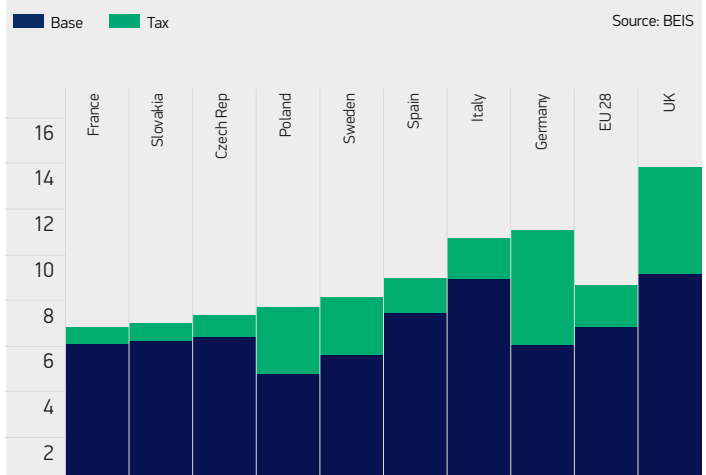
- The automotive sector spends millions of pounds on energy each year. It is typically the second largest in-house cost to manufacturing, and the UK has the highest electricity costs in Europe
- As the sector looks to decarbonise the manufacturing process, this will see a shift from gas to further electrification, hydrogen, biomass and other renewable fuels. Higher electricity costs could undermine the pace of this transition and deter new capital investment
- Vehicles are typically sold in advance at a fixed price. Longer lead times due to supply chain disruptions combined with energy price volatility erodes already low margins and profitability
- Electric vehicles, and notably their batteries, are more energy intensive to produce than conventionally fueled cars, meaning affordable clean energy will play a major role in decisions on where to build new models
- With electricity costs increasing faster than oil prices, the advantages of lower running costs for consumers are being eroded, threatening to slow the switch to EVs.

The Government should designate the automotive sector as a net zero-critical industry – without which climate targets cannot be achieved – linked to a package of energy and investment policies that encourage growth and transformation. For our list of energy recommendations see the Roadmap.

Average monthly gas and electricity prices in Great Britain 2015-2022



Electricity prices, incl taxes - 2021 - large users (pence per kwh - source BEIS)



SKILLS: TRANSITIONING THE WORKFORCE



TAKING SKILLS AND JOBS ON THE AUTOMOTIVE JOURNEY

The impact of Covid-19 on the automotive workforce and labour market has been felt across all sectors of the industry, with at least 13,500 jobs lost. During the pandemic, automotive apprenticeship starts dropped dramatically. The UK is currently experiencing critical skills shortages across Level 2 and Level 3 qualifications, particularly in the advanced manufacturing supply chain. With a cumulation of factors, including Brexit, Covid and the UK's ageing workforce, filling semi-skilled roles in the supply chain is challenging, and these gaps have already led to production stoppages and even plant shutdowns.

Automotive manufacturers face the dual task of maintaining production of current vehicles and components to stay in business and service today's market, while developing the expertise and engineering infrastructure to create new vehicles and powertrains. The 2030 ICE end of sale date and the need to ramp up production of batteries and electrified vehicles by 2024 to meet Rules of Origin requirements means the workforce faces increasingly short upskilling timeframes. Currently, the UK possess few qualified workers who can manufacture battery cells and yet, according to Faraday Institution estimates, by 2025 we will require 5,000 such engineers, increasing to 20,000 in 2030.

HIGH-VALUE MANUFACTURING CATAPULT SKILLS VALUE CHAIN

In parallel, the industry is undergoing a digital transformation. The UK's data literacy is uncompetitive compared with international rivals, and upskilling in this field, beyond the levels addressed by the government's digital skills bootcamps, is a significant challenge.

Of the 182,000 workers employed directly by UK Automotive, it is estimated that 120,000 of them (65%) are in engineering or production roles, split between operatives (65%), technicians (15%), engineers (15%) and senior engineers/managers (5%). Many will need some form of upskilling or reskilling, not just in relation to electrification, but digitalisation, automation and connectivity, and the UK must ensure employees have access to relevant training. Electric batteries; electric drives and motors; digital reality; data literacy and digital thread; physical reality; and productivity and competitiveness have all been identified as urgent priorities for course development.

The sector has undertaken significant foresighting analysis to understand emerging and future skills needs, and support and funding is needed to reskill and upskill large cohorts of the workforce at pace. The industry is calling for existing skills initiatives and training programmes to be collated into a one-stop hub for employers of all sizes to access. This must reflect national, regional, and local activities, so requiring support from Whitehall departments, as well as bodies such as the Combined Authorities.

PROUD, POSITIVE AND VALUABLE JOBS FOR THE WIDER ECONOMY

The skills challenge is clear, but it also creates opportunities for the wider UK workforce

Boosting communities and levelling up:

Above average salaries in locations across the UK with automotive companies supporting local communities

Rewarding individuals:

Automotive jobs give pride and offer lifelong careers in delivering net zero ambitions

Facilitating employment:

Vehicles give personal mobility and boost productivity. Econometric estimates suggest that every 10% improvement in accessibility leads to about a 3% local increase in the number of businesses and employment

Driving the economy:

Enabling business, logistics, the movement of goods and connecting people across the UK every single day

Full Throttle 2021 gathered views from a group of long-serving automotive workers, with roles ranging from operatives to engineers and section managers, and their messages were clear:

- They were fiercely proud of the quality of British workmanship
- They placed a high value on the good pay and job security
- They took pride in being associated with prestigious companies providing so many jobs in the local area
- They see clearly in their everyday lives the positive impact of automotive employment in the local economy.
- They were concerned about the impact on their communities if the automotive industry declined

“It’s great for the local economy. Logistics, suppliers, you name it – it’s a knock on effort for thousands and thousands of people. It would be devastating if anything happening to it.” Engineer, Birmingham

“I’m proud to work there and I’m proud of what we do. I build cars. You see them on the road and you’re like, ‘we built them’.” Supervisor, Durham

“The automotive sector is at the heart of our green recovery, its successful transition will cement the UK as a manufacturing powerhouse. Miss this opportunity and it will not come around again. We’re working every hour of the day to secure the investment necessary in new models, national infrastructure and a resilient UK supply chain that’ll provide secure futures for our plants ... But without government action, business will simply take its investment elsewhere....A revolution is underway in the automotive sector. It is going green and electric at a rapid pace - but the danger is that this government does not appreciate either the urgency or extent of the action needed to support it, and without that both the wider economy and skilled UK workers will lose out.”

Steve Turner, Assistant General Secretary, Unite

CASE STUDY: WEST MIDLANDS ENABLING A JUST TRANSITION

The British Academy’s *Enabling a just transition in automotive report*, published April 2022, examines the issues facing the supply chain’s electric vehicle transition in the Midlands.

The study showed there were marked gaps in the automotive value chain in the West Midlands, which could hinder the transition, but also represent an opportunity. It highlighted the importance of ‘national strategic assets’, key anchor companies that are the focal point for the supply chain. In the Midlands that is primarily Jaguar Land Rover, but could equally be any of the large vehicle manufacturers to their local regions.

For EVs, the study noted the lack of specialist equipment needed to undertake the production of batteries, the high value battery components and key electric motor components. It also noted issues further down the supply chain, such as materials availability, and the UK’s high energy prices, which would act as a barrier to international competitiveness.

The report included two key policy asks. The first; to enhance the region’s general competitiveness by improving infrastructure and supporting low cost, low carbon energy provision. The second; significant support for EV manufacturing, including supply chains and gigafactory provision. This could make the case for reinstating a Manufacturing Advisory Service and a Skills Strategy to train workers.

Birmingham City University’s Centre for Brexit Studies has noted the importance of interdependency of sectors, with suppliers further down the supply chain often supplying into different sectors. In the Midlands this was largely automotive, aerospace and medical businesses. Therefore, the failure of one could have major consequences for the others.



UK REGULATORY ENVIRONMENT: ZEV MANDATE AND CUMULATIVE PRESSURE

AN OPPORTUNITY TO GROW UK BUSINESS COMPETITIVENESS

Automotive has always been a heavily regulated sector – from products to processes – and as a complex industry this has always been significant.

UK Automotive needs an industrial and regulatory framework, coupled with a clear strategy and delivery plan, that ensures the UK is the best place to develop, manufacture and market electric, hydrogen and alternatively fueled zero emission vehicles, and that allows manufacturers to continue to access zero-tariff trade with the EU from 2024, when the next phase of Rules of Origin comes into force, and beyond.

SMMT has engaged extensively with government on better regulation and red tape initiatives, and has found limited scope to remove existing legislation given the pan-European nature of industrial markets. However, we continue to review positions in light of the new post-EU context, including identifying any potential for duplication of requirements now in place, or gold-plating across key issues. Other urgent areas of concern include customs and border implementation and requirements, UK REACH and chemical registration issues, and future UK emissions trading schemes and environmental reporting, and UK-BAT (Best available techniques).

In recent years, Impact Assessments and Consultation processes have been truncated or removed, but collaboration between government and industry is critically important given the crucial nature of long-term planning and certainty for automotive businesses. We have a strong record of working with government and, if we are to avoid the risk of cumulative regulatory impacts and identify opportunities to transform the business environment, this relationship must continue.

ZERO EMISSION VEHICLE MANDATE

From 2024, the UK will regulate the percentage of zero emission vehicles each manufacturer sells. While the industry does not debate the need for urgent action on climate change, good practice normally allows at least 24 months for implementation of a new regulation. The current proposals set out a trajectory that will begin, at best, nine months after the legislation is published. This is insufficient for any manufacturer to change its market strategies or product plans. The introduction of zero emission technologies can require a whole new vehicle platform – typically a five to eight-year process – as well as new factories and supply chains, all significant investments. Given these constraints, the regulation must take into account manufacturers' limited flexibility – especially in the early years – so that each can maximise its carbon reduction investments.

TYPE APPROVAL

Any future GB scheme must not impose unnecessary burdens on businesses operating in the UK market and must be introduced with adequate phased in lead times to avoid delays in bringing products to market which could impact both the viability of the industry and consumer choice. It is imperative that the UK obtains the necessary legal powers to be able to introduce a pragmatic scheme while ensuring that the market continues to conform to the latest relevant safety and environmental standards.

SUBSIDY CONTROL

Post-Brexit, there is a substantial opportunity for the UK to establish a modern, flexible and globally competitive subsidy regime that delivers benefits for the economy and long-term prosperity, while continuing to comply with our international obligations. We hope that this can be streamlined, pragmatic and business-focused. UK incentives for inward investment, including 'state aid' support, need to be highly visible in domestic and global boardrooms when future decisions are being made and capital allocated. The UK must keep pace with other countries competing for investment, and we believe government can and should use this opportunity to embed a new dynamic, 'can-do' culture and understanding of the role of subsidies as a positive enabler, adopting them as part of its international competitiveness toolkit.

In 2021's *Full Throttle report* we set out the case for the UK increasing its competitiveness as a market for consumers. The dual impact of Covid and ongoing supply disruption has heavily impacted the domestic market, and one which has yet to return to pre-pandemic levels. Amid the challenges there have been positives, including substantial growth in the uptake of plug-in vehicles, driven primarily by fleets and businesses. To continue this trajectory for growth, a ZEV mandate must be matched by infrastructure targets, supportive regulation, fiscal policy and delivery.

HOW THE UK CAN LEAD THE WORLD ON BETTER REGULATION

As the government develops our new regulatory framework, we believe that principles of good regulation should be put in place for the post-Brexit era that:

01

Minimise administrative costs to business (fees, compliance etc) and any other associated costs

02

Avoid or reduce unnecessary or exceptional duplication (eg Type Approval, emissions testing) or double regulation

03

Avoid regional/ devolved divergence, eg differing and complex Covid-19 rules across devolved nations, or application of Clean Air Zones/ other measures. Instead, we require greater standardisation/ harmonisation

04

Avoid the risk of creating Technical Barriers to Trade with key trade partners or retaliatory action

05

Focus on evolving new and future regulation, rather than reforming the existing baseline – divergence remains a risk unless it is deliberate, limited and targeted, and designed and delivered in collaboration with key stakeholders

06

Full engagement and dialogue with key stakeholders, including consultations allowing sufficient time for a comprehensive response (minimum 12 weeks) with timely impact assessments to understand the rationale behind proposed legislation

07

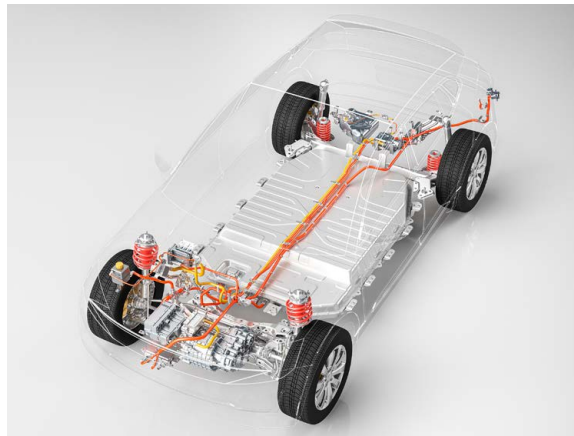
Regulatory roadmaps to establish and take action to avoid a cumulative and competitiveness-hindering impact of regulations



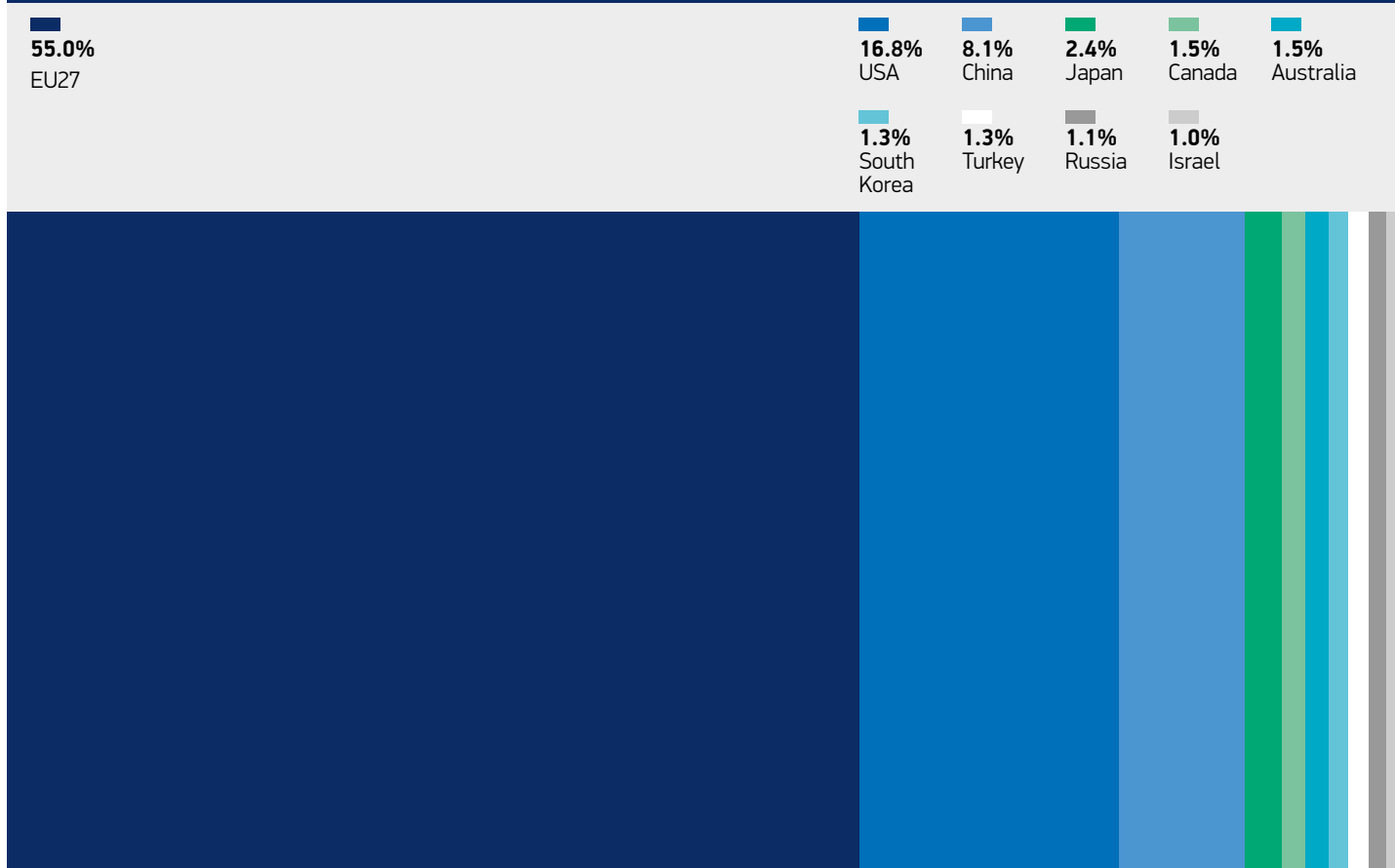
INTERNATIONAL TRADE: RULES OF ORIGIN AND ELECTRIC VEHICLES

UK Automotive is a powerhouse of international trade. Many countries have automotive industries, some larger in size, but no other nation can boast the depth and variety of the UK's sector. From specialist sports cars and high-end luxury vehicles to mass-market cars, from vans and trucks to the buses and taxis, the UK produces and exports them all.

To keep the UK at the forefront of the global electric and zero emission vehicle revolution, trade policy must prioritise automotive. Government must ensure that Rules of Origin reflect appropriate sourcing of parts and critical raw materials, in particular for batteries and other electric car components, so that UK-built zero emission vehicles can be freely exported, without punitive and uncompetitive tariffs.



Global demand for British cars Top export destinations for UK cars in 2021



RULES OF ORIGIN: WHAT ARE THEY AND WHY DO THEY MATTER?

Rules of Origin (ROO) are used to determine the economic nationality of goods traded under a Free Trade Agreement (FTA), and therefore whether those goods qualify for preferential rules such as zero tariff treatment.

They are typically determined by the value of a product or the value added by its production to meet an agreed threshold, or by changing the tariff heading as a result of significant processing. They are designed to benefit businesses located in the countries party to an FTA.

Workable Rules of Origin which reflect the UK's post-Brexit supplier base are essential:

- In all upcoming trade agreements, preferential ROO must reflect the UK supplier base following its withdrawal from the EU.
- Given the long history and intricate nature of embedded European supply chains, cumulation of EU content is the easiest way to reach ambitious content requirements in UK FTAs. In the absence of this, negotiators should seek lower value-added thresholds and more flexible alternative rules.
- UK deals must ensure that electrified vehicles, batteries and related technologies can benefit from future FTAs.

In particular, the EU-UK TCA ensures the opportunity for continued zero tariff, zero quota trade from January 2021, conditional on meeting Rules of Origin requirements. While no substitute for the benefits not equivalent for being in the Single Market, the new TCA delivers in a number of areas of importance and limits the impacts in some others. A TCA that works will give the stability needed to secure investment.

However, the TCA sets out tariffs still to be levied from 1 January 2021 for goods which do not satisfy new Rules of Origin requirements – and for batteries and electrified vehicles, these get increasingly stringent from 2024 and 2027. Currently, these products are significantly higher in value than ICE equivalents, and therefore could have a marked effect on UK Automotive's ability to meet agreed thresholds to maintain zero tariffs.

Tariffs on total product value if Rules of Origin thresholds not met

Product	HS code	UK Global Tariff	EU Common External Tariff
Passenger cars	8703	10%	10%
Trucks for semi-trailers	8701	10%	16%
Buses-coaches	8702	10%-16%	10%-16%
LCVs-HDVs	8704	10%	10%-22%
Special-purpose vehicles	8705	0%	3.7%
Most typical parts	8708	2%-4%	3%-4.5%
Engines	8407-8408	2%-4%	2.7%-4.20%
Batteries and cells	8507	2%	2.7%
Chassis with engines	8706	4%-18%	4.5%-19%
Bodies	8707	4%	4.5%

Product Specific Rules of Origin in the EU-UK TCA Increasingly more stringent ROO on Electrified Vehicles, BEVs, cells

Product	2024-2026	2027
EVs, PHEVs	55% MaxNOM / 45% RVC	45% MaxNOM / 55% RVC and the battery pack must be originating in the UK/EU
HEVs	55% MaxNOM / 45% RVC	45% MaxNOM / 55% RVC
Battery Packs	CTH (except from non-originating cathode active materials) or 40% MaxNOM / 60% RVC	CTH (except from non-originating cathode active materials) or 35% MaxNOM / 65% RVC
Cells, modules, parts	CTH (except from non-originating cathode active materials) or 50% MaxNOM / 50% RVC	CTH (except from non-originating cathode active materials) or 35% MaxNOM / 65% RVC

CASE STUDY: STELLANTIS INDUSTRIAL HERITAGE, REMADE FOR AN HISTORIC FUTURE



Ellesmere Port sits at the heart of Vauxhall's story, a British brand at the centre of Stellantis' operations in the UK and strategic plan for an electrified future. Moving to reduce the company's carbon footprint by 50% by 2025 and 75% by 2030 and produce zero emission vehicles for both the passenger and light commercial segments requires significant business changes. Ellesmere Port's innovative workforce creates a compelling business case for this new, all-electric vehicle manufacturing plant, which protects and repositions 1,100 jobs as part of a €120 million investment.

In the era of advanced, greener manufacturing, the General Assembly floorplan will shift from 100,000m² to just 15,000m². This increases overall efficiencies, reduces running costs, and co-locates battery and vehicle assembly. The introduction of smaller and more efficient cleaner energy systems – with a focus on hydrogen supply, complemented by solar and wind projects – should have a marked effect on competitiveness, providing access to low carbon, more affordable energy. New self-contained HVAC systems will help prevent unnecessary waste.

The EU Trade & Co-operation Agreement remains a critical tool given Ellesmere Port will serve both UK and European markets and face stiff competition from the European mainland within and outside of the Stellantis portfolio. Increasingly stringent Rules of Origin from 2024 onwards enhance the need for attracting the wider electrified supply chain to increase the value chain in favour of UK origin. This will help avoid the risk of future tariffs – especially with exceptionally high prices for critical raw materials such as lithium – as all markets pursue net zero against a backdrop of sustained economic headwinds.

Even at the scale of Ellesmere Port, one plant alone cannot sustain the volumes and economies of scale to support cost competitive supply chains across all requirements. Government must focus on creating desirable business conditions and incentives to attract new suppliers that can meet the collective requirements of other British-based manufacturers. Smooth border and customs procedures must complement domestic efforts and avoid entrenching competitive disadvantages in UK manufacturing.

UK teams are already learning to build these new vehicles and processes from production lines in Portugal and Spain benefiting from shared knowledge across Europe.

By going straight to full electric, Ellesmere Port leaps straight to the next generation to its long-term advantage, but this is the only the beginning and maintaining a competitive position is not guaranteed. Policies must be regeared to overcome these hurdles and sustain businesses in the long term.

Stellantis is committed to exporting to the EU and rest of the globe from a world class, UK-anchored manufacturing facility. Ellesmere Port's blueprint for success can work for other UK sites to seize on the net zero transition opportunity.

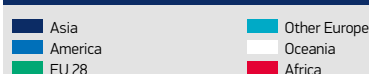
SECTOR FOCUS: UK LOW-VOLUME AND SPECIALIST VEHICLE MANUFACTURING: WORLD-LEADING DESIGN, ENGINEERING AND MANUFACTURING

The UK is home to one of the most diverse automotive industries in the world. As well as hosting mass market manufacturers, we are also the world's leading location for the design, prototyping, engineering and manufacturing of luxury, sports and specialist vehicles (SVM). Products and technologies produced by this sector have some of the highest levels of domestic content seen across the entire industry.

The overall contribution made by these companies, many of which only have UK-based facilities, is invaluable and irreplaceable, as set out by SMMT in its 2021 *UK Low Volume and Specialist Vehicle Manufacturers Report*. Their contribution to UK innovation and productivity, driven by a highly skilled, committed workforce, is considerable. It could be even greater, making scaling up R&D tax credits a key opportunity.

The value of this sector must not be taken for granted. It faces stark challenges as it undergoes massive transformation while simultaneously adapting to new trading relationships and pandemic impacts. To safeguard its future, we need a regulatory, economic and trade policy agenda that reflects the sensitivities of this specialist sector and its unique cost base.

SVM exports by destination



CASE STUDY: MCLAREN COMPOSITES TECHNOLOGY CENTRE

In 2018, McLaren opened its McLaren Composites Technology Centre (MCTC) in the Sheffield region. More than simply a manufacturing location, it is an innovation centre and a place where new technology is developed to further understanding of composite material, including carbon fibre. What has been achieved at the MCTC is world-first cutting-edge innovation. McLaren took an innovative idea and scaled up to full manufacturing, which demonstrates the capability of the UK automotive supply chain. Innovation funding is a welcome priority in the UK, however, often support is needed to bridge the gap to industrialisation due to the high initial capital equipment and set-up cost.

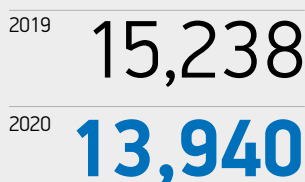
Low Volume and Specialist Manufacturers Overview

Low volume

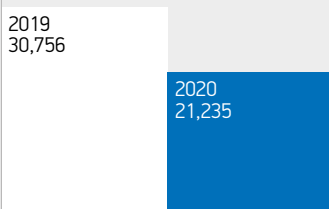
Turnover (£ billions)



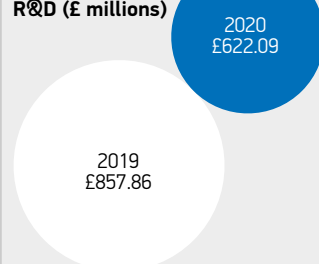
Number of employees (direct) - UK



Number of vehicles produced

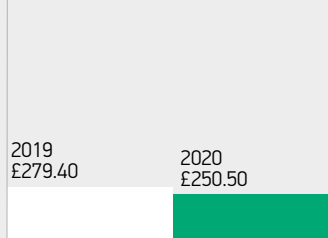


Estimated expenditure on R&D (£ millions)

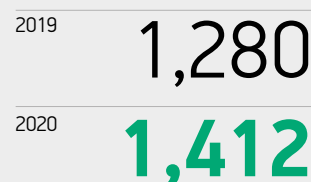


Specialist manufacturers

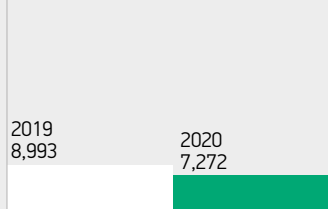
Turnover (£ millions)



Number of employees (direct) - UK



Number of vehicles produced



Estimated expenditure on R&D (£ millions)



CASE STUDY: ALEXANDER DENNIS ALL ABOARD FOR ENGINEERING EXCELLENCE TO ACHIEVE NET ZERO

Alexander Dennis is a global leader in the design and manufacture of buses and coaches, spanning custom traditional, electric and hydrogen, and as of the latter part of this year, a fully autonomous bus service. Alexander Dennis operates major facilities in Falkirk, Scotland, and Scarborough in northeast England – both non-traditional heavy manufacturing regions, providing great jobs and supporting local economies – and has eight UK sites in total, producing more than 2,000 vehicles in a typical year. With more than 31,000 vehicles in service in the UK, Europe, Hong Kong, Singapore, New Zealand, Mexico, Canada, and the USA, there is global appeal and opportunity for these marquee British vehicles.

Producing Battery Electric Vehicles (BEVs) since the early 2010s, and with hydrogen fuel cell orders ready for deployment in the UK, Alexander Dennis makes high quality, bespoke vehicles which are clean, comfortable, quiet, and safe. Buses and coaches are visible every day in our town centres and across the transport network offering greater mobility solutions, innovative technology, alternatives to private transport, and delivering satisfaction for passengers – all whilst playing a crucial role in decarbonising transport.

Several factors can enable a successful transition to net zero across the whole UK value chain level. For buses, this includes the swift deployment of the Zero Emission Buses Regional Area (ZEBRA) funding, with added mechanisms to support all applicants. This could better enable smaller fleet operators to benefit from greater accessibility and help achieve price parity.

On innovation and skills, Alexander Dennis employs more than 300 dedicated clean tech engineers – but skills shortages make workforce development, talent attraction and retention challenging, particularly in more remote regions. However, one multi-million-pound, multiyear project to develop hydrogen technologies involved up to 40 engineers across multiple disciplines, who undertook on-the-job learning and research. Team members involved in the project worked with and learned from suppliers and vice versa, supported developing the young workforce through taking on six graduates and created new partnerships and business relationships.

There is appetite to invest in new UK facilities to futureproof production, combat soaring energy prices and use new technologies to upgrade processes, but support is rarely geared towards manufacturing business models, or is simply impractical for SMEs.

Infrastructure to support commercial use is fundamental, with unique challenges such as rural routes, and charge points for electric coaches – often underappreciated in the long-distance movement of people.

Finally, Alexander Dennis is developing more local and sustainable supply chains. It asks suppliers to demonstrate their value chain to support carbon reduction and ethical sourcing, while building in greater resilience and community benefit.

Global fleet renewal is opening new markets for zero emission buses and coaches. Thus with the right support, the sector can maintain its leading role as an iconic, technology capable industry to seize new opportunities in the net zero era, with Alexander Dennis as a leading actor.



CONCLUSION

Automotive is at the heart of, and vital to, Government ambitions for a net-zero, global Britain. Its value is unquestionable, from hundreds of thousands of jobs in R&D, engineering, production, the supply chain, aftermarket, and logistics, to billions of pounds in trade with Europe and the rest of the world.

UK Automotive has ambition, innovation and creativity at its core. Yet future success is not assured. The global industry – not just the UK – is in transition. It is a fiercely competitive industry and plants, regions and countries compete for new investment. And while all automotive nations across the globe face headwinds, they perhaps blow most strongly in the UK.

The UK has been a key player in the global automotive industry since the origins of the car. The industry has thrived because of its underlying strengths – its scale and scope, its openness, its highly skilled workforce, engineering excellence and market strength. These strengths have been tested to their limits in recent years and past performance means little when the global industry is in transition.

Our deep dive into the supply chain, which in 2020 showed turnover of £21.2 billion and £5.7 billion of gross value-added, illustrates the immense value it has to UK plc. Yet vulnerabilities have been exposed, not just by the pandemic but by international conflicts, trading frictions and shortages of labour. In what is a rapidly evolving industry, we must support the industry – address those vulnerabilities, invest in its strengths, and rebuild its inherent competitiveness so it can seize the opportunities presented by technological change.

UK Automotive has
ambition, innovation
and competitiveness
at its core

The investment window is open. Global companies are making big bets on manufacturing locations for new technologies. The UK has been successful with several early wins highlighted within this report but there is the potential for much more. To be successful we need to enhance the competitiveness of our business environment, mitigate higher costs such as energy and business rates, support skills and training, and frontload and accelerate investment in infrastructure and the critical technologies needed for a decarbonised future.

The resilience and ingenuity of the sector is to be celebrated. Like other industries and wider society, the past few years have been tough. But by working together, government and industry can deliver a recovery, anchoring the industry in the UK and the UK at the forefront of the zero emission revolution.

Our vision is a simple one. A healthy market, a vibrant domestic manufacturing industry, a supply chain resilient and evolved to meet current and future technological needs and an ecosystem that delivers zero emission mobility for the consumer and for society. Together we can take UK Automotive from Full Throttle to Full Charge.



AUTOMOTIVE ROADMAP: DRIVING FORWARD UK AUTOMOTIVE COMPETITIVENESS TO 2030

The scale, depth, complexity and diversity of the UK Automotive sector, facing a once-in-a-lifetime technological transformation, cannot be resolved with a single policy change. It will take the cumulative effect of multiple policy levers and collaboration across industry, Government, and academia to enable the best possible foundation to deliver on our 2030 vision.

Key: [New for From Full Throttle to Full Charge](#) / Updated or carried forward from Full Throttle 2021

	By end of 2022	2023-24	2025-2030
Notable Policy Milestones	Autumn Budget 2022	Expected introduction of Zero Emission Vehicle Mandate (2024) End of Phase-1 of TCA Transitional rules on electrified vehicles, batteries (2024)	Tapered increase %age of EV sales required by ZEV Mandate (2024-2030) End of sale of new petrol and diesel cars / vans (2030) End of EU-UK TCA transitional rules for electrified vehicles, batteries (2027)
Manufacturing Competitiveness	<p>Deliver a streamlined globally competitive business environment for automotive:</p> <ul style="list-style-type: none"> Subsidy control regime to support investment Reform business rates with exemption for plant & machinery A UK's semiconductor strategy <p>Expedite delivery of critical bus & coach ZEBRA funding</p> <p>Support businesses facing high energy costs:</p> <ul style="list-style-type: none"> Temporary measures to alleviate energy cost crisis – e.g. Levy reductions & automotive EII status Continued eligibility in all future Climate Change Agreements <p>Support immediate and medium-term skills needs:</p> <ul style="list-style-type: none"> Ensure cross-government support of forthcoming Automotive Council Skills report, funded support for the continuation of the Emerging Skills and foresighting activities 	<p>Deliver a streamlined globally competitive business environment for automotive:</p> <ul style="list-style-type: none"> From March 2023, introduce at least 100% expensing for capital allowances and competitive investment regime Complete fundamental review of Business Rates and incentivise / exempt net zero critical investments <p>Ensure automotive supply chain, critical minerals & inputs of production requirements for key UK net zero critical sectors are reflected in dedicated government strategies</p> <p>Support net zero business & energy transition:</p> <ul style="list-style-type: none"> Link UK Emissions Trading Scheme (ETS) with EU ETS markets by 2024 Hypothecate automotive UK ETS revenue to benefit the sector's net zero transition (via ATF) Evolve / expand the Industrial Energy Transformation Fund to reflect net zero critical sector needs <p>Focus on medium to long term skills needs:</p> <ul style="list-style-type: none"> Reform of the Apprenticeship Levy to improve the flexibility and enable greater flexibility and scope Ensure Local Improvement Plans are funded to tackle Level 2 and Level 3 skills shortages 	<p>Maintain globally competitive business environment for automotive.</p> <p>Support net zero business & energy transition:</p> <ul style="list-style-type: none"> Deliver a UK demand-side focused energy strategy that supports businesses and roadmap to support industrial decarbonisation and investment. Secure stable supply of low cost zero emission electricity, ensuring renewables deliver nearly 90% of generation under normal operation by 2035 Build significant progress on hydrogen supply <p>Support long term skills needs:</p> <ul style="list-style-type: none"> Deliver a long-term UK domestic skills strategy that includes support for retraining, retention and upskilling of existing workforce, aligned to net zero critical and export-led sectors with cross-Whitehall alignment of department skills strategies and policies
Technology & Innovation	<p>Expand the scale and scope of the Automotive Transformation Fund to leverage investment and compete globally</p> <p>Secure further commitments for UK-based battery production</p> <p>Fund trial demonstrations for hydrogen in manufacturing processes</p>	<p>Deliver on Battery and fuel cell gigafactories construction and secure further commitments to reach UK capacity targets</p> <p>Regulatory reform to enable highly automated cars, passenger shuttles and delivery vehicles no later than 2025</p> <p>Implement a long-term R&D tax credit regime from 1 April 2023, including increased scope for inclusion of capital expenditure and continue to strategically invest in R&D for step-change battery and fuel cell technologies</p> <p>Streamline processes for obtaining necessary permits and licenses for new production facilities and depot charging</p>	<p>Reach at least 60 GWh battery production and 2 GW of fuel cell production capacity</p> <p>Ensure electricity networks are future-proofed and fit for purpose for zero emission mobility</p> <p>Scale up the production and use of green hydrogen and support uptake of unproven technologies</p> <p>Battery recycling and repurposing and materials refining facilities commissioned</p> <p>Support the early commercial deployment of all types of automated vehicles, including in public transport and delivery/logistics.</p>
Consumer & Market	<p>Deliver a workable and achievable ZEV mandate – with necessary flexibilities to enable industry competitiveness and support consumers</p> <ul style="list-style-type: none"> Ensure competitive ZEV mandate enablers are maintained to support fleet renewal – van grants to 2023, zero VED, low CCT – and review impact of end of plug-in car grant <p>Ensure full application of regulatory impact assessments to understand competitiveness outcomes, implement good regulatory development principles & regulatory roadmaps, and:</p> <ul style="list-style-type: none"> Confirm GB Type approval regulations with appropriate lead times for implementation Enact proportionate regulation to deliver consumer-centricity in charging policy Maintain and update annual MOT requirements to meet current and future mobility needs <p>Reform the VAT regime for public charging to ensure consistent rate of 5% for charging</p>	<p>Ensure ZEV mandate/CO2 Regulation is works effectively, and a healthy robust market is supportive to the transition</p> <p>Provide long term certainty on motoring taxes and any new regimes or mechanisms, such as road pricing, should be simple and revenue neutral</p> <p>Introduce a public charging infrastructure mandate that is:</p> <ul style="list-style-type: none"> Ratio-based and proportionate to expected EV uptake over time Specific to regional needs to ensure the right amount of the right type of chargers are in the right places, driving mass adoption of EVs Supports all vehicle types – cars, taxis, vans, HGVs, bus and coach Fully enforce consumer experience of charging regulation to deliver reliable chargers, pricing transparency, ease of payment and real-time information for consumers 	<p>Continue to significantly invest to uplift all types of charging infrastructure, particularly public chargers, ahead of need</p> <p>Introduce and phase-in new, simple and cost effective, motoring taxes that enable the transition to EVs and deliver revenues to maintain UK's roads and infrastructure</p> <p>Undertake a major consumer education campaign to support taxation and electrification changes</p>
International Trade	<p>Ensure implementation of EU-UK Trade & Co-operation Agreement:</p> <ul style="list-style-type: none"> Review EU TCA Battery 2024 on ROO to ensure UK Automotive is not disadvantaged Launch all auto relevant TCA working groups Negotiated settlement of Northern Ireland Protocol <p>Introduce UK tariff suspensions in line with formal automotive sector submissions, especially to support UK remanufacturing businesses</p> <p>Conclude renegotiations of continuity deals with major trading partners (incl. Canada, Mexico)</p> <p>Support sector's ongoing adjustment to new customs & origin requirements and support exporters to grow in existing and new markets</p>	<p>Maintain and evolve EU-UK Trade & Co-operation Agreement:</p> <ul style="list-style-type: none"> Review impact of end of phase-1 of all TCA transitional rules on EVs and batteries (2023) <p>Review tariff and waste classifications for remanufactured goods</p> <p>Prioritise automotive in UK trade strategy seek dedicated automotive chapters wherever possible in current and future FTA negotiations</p> <p>Sign trade deals with major markets (US, CPTPP, India etc)</p>	<p>Ensure full benefits of UK-EU Trade & Co-operation Agreement maintained and suitable for net zero future:</p> <ul style="list-style-type: none"> Review Rules of Origin obligations for 2027 battery packs and cathode active materials If appropriate, invoke the formal EU-UK TCA review clause to ensure rules remain fit for purpose Review impact of other end of phase-2 of EU-UK TCA transitional rules in 2026 <p>Deliver the UK Border Strategy 2025 to ensure smooth, effective customs and trade flows with increased digitisation</p> <p>Review and maintain effectiveness of all bilateral and multilateral trade deals to support automotive interests</p>

SUPPLY CHAIN ANALYSIS METHODOLOGY

The size of the supply chain is calculated from various official and publicly accessible government statistics databases, largely from the Office of National Statistics (ONS) and HM Revenues and Customs (HMRC).

Size of the sector: The Annual Business Survey (ABS) was used as the basis for assessing turnover, GVA and number of businesses data. The latest available ABS data is for 2020. Employment data is from ONS NOMIS dataset.

The 'traditional' automotive supply chain sectors are standard industrial classification codes (SIC) SIC29.2 – bodies and trailers and SIC29.3 – parts and accessories. The latter includes both original equipment parts which go into new vehicles and aftermarket components which provide replacement parts for vehicles in use or 'upgrades'. Bodies and trailers can be supplied both directly to vehicle manufacturers as part of their vehicle build process or are added on for customers after leaving the vehicle manufacturer.

Engines are also seen as a component of the vehicle. These are included in SIC29.1. However, given many of the vehicle manufacturers are also the engine manufacturers, we have only included export volumes in calculating the supply chain figures cited in this report. ONS manufacturers' sales by product ('prodcorn') data and knowledge of the UK engine plants to allocate an appropriate proportionate share of SIC29.1 as exported engines.

Typically, SMMT also includes ABS data on SIC22.11 – rubber tyres within the automotive sector. However, for this report we used UK input-output analytical tables by industry to capture the broader supply chain that feeds into the automotive sector. This 'input-output' data from the ONS shows what the UK automotive industry (SIC29) buys domestically from other sectors. This, for example, shows that in 2019 automotive consumed 20% of the SIC20.3 - paint sector; 14% of SIC24.1-24.3 - iron and steel; 10% of SIC24.4-24.5 - other base metals; and 6% of SIC22 - rubber and plastics. We have applied the proportion of the input-output share deemed automotive to the sectors' ABS data. Note we have not included service sectors such as logistics, or utilities such as electricity or water, although understanding the automotive sector would be significant users of both.

Regional employment: The 'nomis' official labour market statistics ONS dataset for SIC29.2 and SIC29.3 was used for regional employment data. This, therefore, only looks at the 'traditional' automotive supply chain, rather than our broader one assessed above. It was felt inappropriate to apply a blanket share of other sectors employment across the regions given that (like automotive) the businesses are unlikely to be evenly distributed regionally. 2019 data was used so as to be consistent with the use of 2019 ABS data, although 2020 data is available from nomis. We note that the regional spread shown for 2019 will have been impacted by changes in the constitution of the sector over time, with a large OEM and engine plant closing. This is likely to have impacted particularly on the Welsh and South West regions.

Earnings data: ONS Annual Survey of Hours and Earnings (ASHE) data for 2021 was used again only for SIC29.2 and SIC29.3. Median annual pay figures were used.

Trade data: HMRC UK trade statistics were used to provide automotive supply chain trade data. 2019 data is presented, but data up to 2021 is also referenced. Product codes 8708 (automotive parts and accessories), 8408 (petrol engines) and 8409 (diesel engines) and 8409 (parts of engines) were used. Trade Map data was used to provide some further, country of export destination, data (understanding that Trade Map uses HMRC as a data source).

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