

Business, Energy, and Industrial Strategy Committee

Inquiry into the Supply of Batteries for Electric Vehicle Manufacture in the UK

Midlands Engine Response

February 2023

Summary of Response

The UK remains a leading manufacturing nation, in part due to the continued strength of our automotive industry. In the Midlands Engine geography, this industry provides 64,000 direct jobs (40% of the UK total) and supports many thousands more through interconnected supply chain businesses. 44% of the value of UK vehicle production originates from the Midlands, predominantly from our major Jaguar Land Rover and Toyota plants.

Therefore, changes and shocks to automotive and manufacturing have a far greater impact on the Midlands than other regions. It remains a critical foundation of our economy, providing high-level, high-skilled jobs, innovation and levelling-up opportunities.

Battery and electric vehicle production presents both a major risk and opportunity for the Midlands economy, not just because of the big vehicle manufacturers in the region, but also because of the wider industry and society they support and are supported by. Not securing battery production could fundamentally damage the possibility of a fledgling UK automotive industry, and lead to damaging cuts to jobs and livelihoods in the Midlands.

However, battery production and the associated supply chains are also a massive opportunity for innovation and solving the productivity puzzle regionally and nationally. This can have a multiplier effect across the entire UK economy, contributing to levelling-up through the provision of a business-led growth cluster. The UK should be looking to invest further and grow manufacturing, rather than allowing it to decline – with the most damaging impacts coming across the Midlands and North.

The transition to large-scale successful UK battery and electric vehicle production will not happen overnight, and the evidence currently suggests the UK is falling behind international peers with regard to support and investment in relevant infrastructure and technologies. As it stands, China currently dominates the battery market, delivering 77% of global supply and we are unlikely to have sufficient production to meet our own national ambitions.

Thus, greater government support is required to unlock investment which will deliver on the potential and sustainability of UK automotive. A comprehensive strategy, led by the government but developed in collaboration with local leaders, businesses and academic expertise, should be a priority for the government. Several pressing issues require solutions – including access to critical materials, skills and energy supply, and investment – and a strategy can help bring these answers together and maximise the opportunity of specific sites, such as in Coventry.

Critically, without strategic urgent follow-up action, the UK will lose out in the global race for battery and electric vehicle production, resulting in a major missed opportunity and adverse effects on the economy – particularly in areas like the Midlands that remain reliant on automotive and wider manufacturing. This threatens not only growth, investment and net zero, but levelling-up too. Not to mention the adverse impacts of over-reliance on foreign companies on the UK's critical infrastructure.

Full Response

Is there enough UK vehicle manufacturing demand in the UK to support gigafactories?

- The UK remains a strong manufacturing nation, led by the success of our automotive industry over many decades. The Midlands region in particular is renowned for advanced manufacturing, building on over a century of innovation and invention from world-beating companies across sectors. This foundation needs to continue to shape our future in terms of new technologies and the transition to net-zero; especially related to electric vehicle production in automotive.
- The Midlands Engine advanced manufacturing sector provides £37.8bn Gross Value Added (GVA), our second largest sector; providing £73,635 GVA per Worker (Productivity), which is considerably higher than the economy average, with the case being the same for earnings. The region provides 513,005 manufacturing jobs, over 25% of all manufacturing jobs in England – more than any other region. More information is available [here](#).
- Direct automotive sector employment is over 64,000 in the Midlands Engine (40% of the UK total), with the cluster centred heavily around the West Midlands (Jaguar Land Rover, Aston Martin and BMW) and Derbyshire (Toyota), but supported by a large number of smaller interconnected supply chain firms across the region; meaning the overall economic contribution of automotive in the region is much higher. Confirmed by [independent academic research](#), 44% of the value of UK vehicle production originates from the Midlands.
- The scale of automotive and wider manufacturing in the Midlands (among other regions such as the North East) suggests that there is enough manufacturing demand to support gigafactories, and indeed supply of capable, innovative Midlands suppliers. The transition to battery production is critical to the Midlands and UK economy in regard to levelling up. This needs to support the continued existence of large vehicle producers, but also their wider supply chains through thousands of SMEs which provide to the industry.
- And, despite UK car production falling by -9.8% (775,014 units) in 2022, there are record levels of electrified vehicle production in the UK; 234,066 battery electric (BEV), plug-in hybrid (PHEV) and hybrid electric vehicles (HEV), with combined volumes up 4.5% year-on-year representing almost a third (30.2%) of all cars made fully electric or hybrid as demonstrated by [The Society of Motor Manufacturers and Traders \(SMMT\)](#). Since 2017, the value of BEV, PHEV and HEV vehicles has grown seven-fold from £1.3bn to more than £10bn, with electrified vehicles representing 44.7% of the value of all UK car exports up from 4.1%. BEVs are specifically important and essential to UK prosperity with their export value up from £81.7m to £1.3bn. The auto sector is integral to levelling up, net zero and advancing global Britain with needs to upscale UK battery production and the shift to electric vehicles.
- Furthermore, there is high global demand for British cars, with one-in-eight cars manufactured in the UK (44% of which come from the Midlands) being built for overseas markets and the annual market growing by 9.4%. The UK exemplifies specific strengths in specialist, luxury and performance cars with output rising to 6.6% worth an estimated £3.7bn at factory gate prices.
- Yet, there are currently no operational gigafactories in the UK. This compares with 300 globally and 40 in Europe. By 2040, UK demand for electric vehicle battery manufacturing capacity is expected to reach 200GWH – equivalent to 10 gigafactories, each with a 20GWH output. Gigafactories are therefore crucial in securing battery manufacturing and associated supply chains, but beyond this they anchor the wider chain, creating economic benefits regionally and nationally. There is a critical need for investment in Gigafactories to meet the governments vision for net zero transition and levelling up.

- **Will the UK have sufficient battery production supplies by 2025 and 2030 respectively to meet the government phase-out plans for petrol and diesel vehicles?**

- It is difficult to predict the future state of battery production in the UK as the transition timeline can be viewed as unrealistic. However, it currently seems unlikely that the UK will have sufficient battery production supplies by either 2025 and 2030, without sufficient planning, implementation and delivery of sufficient infrastructure.
- One way for the UK to move towards sufficient battery production is by improving its competitiveness in clean growth and addressing climate change. A CBI report has identified that the UK has one of the lowest proportions of spend at 1.2%; in contrast France (2.5%) has committed over twice and Germany (5.2%) over four times as much spend. Subsequently, this has caused the UK market in clean tech to erode. In practice, the UK should be well placed to capture a significant proportion of this economic opportunity given its innovation capability and specialist knowledge. Demand for EVs is increasing year-on-year in all major economies, including the UK. Additionally, there are expectations of an imbalance of supply and demand within the European market between 2023 and 2030 creating an undersupply of 567GWh – creating a major export opportunity for the UK.
- Some of the ways to improve capacity and competitiveness to grasp this opportunity comes from the [UK Onward](#) think tank, such as providing cheaper energy costs for heavy industries to match those of Germany and France. Currently UK energy prices are almost 60% higher than the European average – 34% of electricity costs are tax, compared to the European average of 21%, but UK energy is 12% greener on average. Other suggestions include offering tax breaks for green factories; Changing rules in renewable energy competitions; Matching cash incentives offered by the US and the EU for companies to build battery “gigafactories” and other green factories; Stopping UK steel producers being undercut by competitors in places with lower environmental standards, like China and India, by introducing a carbon border tax and banning imports of the highest-carbon goods.
- One step in the correct direction in moving the UK towards sufficient battery production is within the planned [West Midlands Gigafactory](#) near Coventry which will be 100% powered by sustainable energy and production ready in 2025. The mission is to create the UK’s largest battery Gigafactory as a strategically crucial investment for the region and UK, playing a major role in securing the future of the automotive industry. The Gigafactory will provide up to 60GWh – enough to power 600,000 electric vehicles per year. The project will invest £2.5bn in the region and create 6,000 new highly skilled jobs directly and thousands more in the supply chain. Top-level government support, engagement and working with industry to attract investment to deliver this facility and others will be critical to success.

- **Is UK-based battery production necessary to support the manufacture of electric vehicles in the UK?**

- Yes, UK-based battery production is necessary to support the manufacture of electric vehicles to support major car manufacturers in the region i.e., Toyota, JLR, Aston Martin, BMW. Currently, OEMs in the Midlands have a vast supply chain around them; if battery plants moved abroad, their supply chains would follow. It is thus necessary to anchor our existing OEMs to the UK through the establishment of a Tier 1 supply chain (which we are sadly lacking at present) and attract new FDI to the Midlands and wider UK in the form of OEMs and suppliers.
- It is however possible that electric vehicles can be manufactured in the UK using batteries produced in other countries and imported to the UK. Then again, this is a narrow-minded and dangerous approach. Domestic battery production will have many benefits such as job creation, boosting local economies, cheaper costs, reducing dependence on imports and increasing self-sufficiency from external shocks and increasing energy security. On the flip side, not securing battery production could fundamentally damage the possibility of a fledgling UK automotive industry. In addition, this also means that the UK is well positioned to meet growing demand for electric vehicles in the future whilst contributing to the government's aspirations of reducing emissions, transitioning to a low-carbon economy, and levelling up.
- Furthermore, battery production and the associated supply chains are a massive opportunity for innovation and solving the productivity puzzle. This can have a multiplier effect across the entire UK economy.
- And low carbon opportunities like these will be necessary and can be aided by internationally renowned expertise already present in the region: for example, the UK Battery Industrialisation Centre in Coventry. Harnessing the strength in partnership of industry and academia, with support from government and private investment, can ensure battery production creates a net benefit to the regional and national economy.

- **What are the risks to the UK automotive industry of not establishing sufficient battery manufacturing capacity in the UK?**

- Risks to the UK automotive industry for not establishing sufficient battery supply in the UK represent a loss of opportunity. Electric battery manufacturing reflects a £24bn electrification opportunity for the UK, in the Midlands alone it could be worth £916m. The Midlands Engine has highlighted this opportunity and worked with partners on realising it for several years now, including via this [Manufacturing Opportunities report](#); it is a major growth area and opportunity to build on UK and local industrial strengths in a mass market. As highlighted in previous questions, sufficient battery manufacturing is a key underpinning factor to making the most of the electric vehicle opportunity.
- Furthermore, other impacts of not establishing sufficient manufacturing capacity in the UK include increased manufacturing costs due to the need to import parts (making British industry more vulnerable to external shocks in global demand as well as exchange rates) or completed products, alongside significant job loss. Job loss would especially be damaging to the Midlands Engine - 44% of the value of UK vehicle production originates from the region and employs 40% (64,045) of total automotive employees in Great Britain.
- The UK is therefore at risk of losing large chunks of UK automotive including wider manufacturing, the expansive UK automotive supply chain alongside impacts on the wider economy like materials production, wholesaling, retailing and maintenance. Regions like the Midlands will be detrimentally affected due to further reliance on automotive and manufacturing in contrast to other parts of the UK – hurting government goals of levelling up, low carbon economy and reducing emissions. As suggested by a recent report from the [Centre for Social Justice](#), the UK should be looking to invest further and grow manufacturing, rather than allowing it (and it's productive, well-paid, high-skill jobs outside of London and the South East) to hollow-out. Centrally, this draws on evidence that suggests the relative decline in manufacturing has been a key contributing factor to growing regional inequality.
- Furthermore, it is worth noting that sourcing batteries from Europe and beyond is a feasible but high-risk strategy. This is as it opens the door for our OEMs to offshore manufacturing in order to position themselves closer to the supply chain; significantly weakening the UK FDI proposition. Additionally, UK intellectual property will be continuously exploited offshore and will cause an associated hollowing out of our skill base. This would greatly reduce UK competitiveness in the long-term.

- **What other domestic end uses for batteries would provide a market for UK battery production?**

- Other domestic end uses for batteries provide a market opportunity to address several short and medium-term energy storage issues in transport, housing, and other commercial applications. Long-term end uses provide a need to improve energy density of storage through either improving battery technology itself, or alternative storage technologies like hydrogen. The Midlands Engine has significant expertise, infrastructure and heritage within manufacturing and innovation of these technologies which can be amplified with further investment, as highlighted in our [Hydrogen Technologies Strategy](#) and [Green Innovation report](#).
- Other domestic end uses for batteries include renewable energy storage; grid storage and stability; localised energy storage for homes alongside use of microgrids; maximisation of solar and wind power for business; uninterruptable power supplies; personal mobility solutions; robotic systems for logistics fulfilment centres; portable devices such as smartphones, laptops, smart technology, electric bicycles, and rail.
- Cross sectoral potential should therefore not be ignored, also including grid storage, uninterruptable power supplies, personal mobility solutions, robotic systems for fulfilment centres, et al which will create additional demand. Moreover, this demand will increase as we continue our transition to BEV for passenger car and relevant commercial vehicles.

- **Does the UK have a sufficient supply of critical materials to support vehicle battery production?**

- Currently the UK lacks the sufficient supply of critical materials to support vehicle battery production, including a steady and consistent supply of British steel. However, there is a £3bn “chemistry supply chain opportunity” identified by WMG (Warwick Manufacturing Group) by 2030. In order to build batteries the UK needs a sufficient supply chain to provide materials such as Cathode active material, Anode Active material, Separators, Electrolytes, Anode copper foil, Electrode binders, solvents and additives, Cathode aluminium foil, and the aforementioned steel to manufacture module components and pack components. The average value of cell materials per car is £3,200 (battery only, excluding vehicle) whilst the typical value of chemicals in internal combustion engine cars is £800-1,000 (including vehicle).
- However, several other nations already building or proposing Gigafactories also lack this supply. As part of the overall investment the UK must develop its own supply chains. In the medium term this ensures security of supplies, whilst in the longer term it is about developing alternatives for critical materials. Critical materials would include lithium, cobalt, nickel, platinum, palladium, and manganese.
- Developing these supply chains and access to critical materials must be part of a comprehensive strategy for UK battery / EV production, led by government in partnership with industry and academic expertise.

- **How ready are UK vehicle producers for the EU-UK Trade and Cooperation Agreement (TCA) rules of origin (ROO) phasing in from 2024?**

- It is unclear how ready UK vehicle manufacturers are for phasing from the EU-UK TCA ROO from 2024, as their full impact is uncertain. This is as UK-manufactured vehicles will not attract tariffs if at minimum 40% of the value parts in a finished vehicle is manufactured in the UK in order to qualify for tariff-free access to the EU market. This could present challenges as a report from [UK in a Changing Europe](#) from 2020 has found that typically just 20-25% of the overall value of cars produced in the UK originates from the UK with the rest being imported. Additionally, for most of the UK automotive industry around three quarters of the aforementioned imported components come from the EU and Turkey. A generalisation can be made that vehicle producers are not ready.
- In general, the readiness of producers is dependant on a wide variety of factors including their size and complexity of supply chains, domestic, foreign, and internal investment into innovation activity, and adaptability to regulation. The Midlands will be well posed in order to adapt to these changes provided investment keeps coming into adoption of new infrastructure, supply chain development, manufacturing, and future skills development as many of these skills may not exist yet.
- This also highlights the importance of constant government engagement with industry, at all levels, with regard to transition to new technologies and approaches such as battery / electric vehicle production.

- **What can the UK learn from investment in other countries in the establishment of gigafactories?**

- The UK can learn that it should not solely focus on building Gigafactories, but the components, raw materials, infrastructure, equipment, and parts which go into it. This includes the development of the associated supply chain ranging from suitable clean energy for the manufacturing processes, security of supply material, production of automotive compliant products and anchor customers. Likewise, the UK can learn from countries like China in regard to the significance of government support to develop competitiveness, R&D activity, and ways to keep costs down. Moreover, it is worth noting that gigafactories like the ones of TESLA allow for faster production and eliminating associated extra logistics costs.
- Current UK government policy has only pledged £1bn for the sector and has ambitions of only hosting seven gigafactories by 2027, this provides a challenging outlook as competing nations are offering close to £750m per factory.
- Another lesson the UK can learn is to invest in clusters such as the Satakunta region in Finland, or others in Germany and the United States. Clustering is an important part of developing innovation and spontaneous collaboration between companies and key institutions like universities. The Midlands Engine is already well prepared for this thanks to its immense clusters in advanced manufacturing (and specifically automotive), however further investment will go a long way in developing R&D capability to increase competitive advantage. Furthermore, the Midlands has a multitude of relevant cluster organisations and academic institutions to support this include: the Society of Motor Manufacturers and Traders; MakeUK; Motorsport Industry Association; Innovation Alliance for the West Midlands; and the Automotive Council. The UK must learn to continue providing further funding and maintenance to its clusters.

- **Do we have the skills in the workforce required for the production of batteries? If not, what needs to be done?**

- The Midlands offers a large range of current expertise at the heart of transport manufacturing in the UK, with major capabilities across automotive. The Midlands' transport and mobility cluster includes cutting edge research and development and established original equipment manufacturers (OEMs). These are supported by globally competitive, robust, and interconnected supply chain firms providing a skilled labour base. However, despite having the correct skills we do not have enough of them from technicians to production managers. This reflects manufacturing of today, with shortages of manufacturing of the future likely to be even starker.
- A report from [HVM Catapult](#) suggests a strong case for the electrification skills in automotive manufacturing with 63% of current jobs, and as high as 84% for electric machines will be subject to significant change. Quality engineers and technicians with the knowledge of electronics are amongst the biggest change with needs to re-skill and re-train. Beyond manufacturing, there will be a potential need to reskill 182,000 mechanics and around 175,000 independent dealerships by 2030. Emergency response roles will also need specialist reskilling including as much as 61,000 visible police, 28,500 specialist police, 26,000 specialist advanced paramedic and paramedic, and 44,000 firefighters. There is a need to enable technical reskilling, guided through an appropriate industrial strategy that includes skills programmes for automotive's transition – incorporating both digital and green skills.
- Regarding higher education, the Midlands has an excellent stock of relevant automotive graduates including 8,055 from Midlands universities in 2021 with an excellent retention rate of 97.3% within the advanced manufacturing automotive sector. The region also contains the University of Nottingham; University of Birmingham; University of Warwick; Loughborough University with relevant high-ranking departments in QS 'Engineering and Technology' world subject ranking 2022 - institutions appearing in UK top 25. Furthermore, the Universities of Keele; Loughborough; Nottingham Trent; Birmingham; Leicester; Nottingham; Warwick have high performance within their research. These strengths combined provide a good foundation for battery production skills, but bringing them together into a deliverable plan is required.
- The region and UK would further benefit from the creation of a long-term and constituent policy to prioritises and values STEM from per-school to post-graduate and continuous development. There is also huge untapped potential to reskill and upskill our existing workforce which requires constant government support to do so at scale. Some ways which could be attained is through partnerships with industry like apprenticeships, or attraction of talent from elsewhere through competitive salaries and benefits to create long-term successful careers in the sector.

- **Will the cost of UK batteries be competitive compared with batteries produced elsewhere?**

- UK batteries can be competitive in contrast to international markets, exemplified within the Midlands through a highly skilled workforce, strong R&D ecosystem, and a favourable business environment to advanced manufacturing supporting the development of new and more efficient production processes. Likewise, the Midlands has significant potential to benefit from reshoring which will reduce carbon emissions and allow for greater exports. Considering the Midlands already has an efficient and robust automotive sector, there is a strong belief that the same can be replicated with EV batteries, maintaining the UK's global market share in automotive
- Currently China dominates the battery market through the delivery of 77% of global supply according to Bloomberg NEF's lithium-ion supply chain rankings – followed by Poland and the US at around 6% each. China is expected to maintain its global dominance in market until 2027 with US battery capacity expected to grow over 10 times – further expected capacity is also expected from Germany, Hungary, and Sweden. Moreover, the US Inflation Reduction Act will leverage subsidies to drive further investment into EV manufacturing and the EU is considering a reciprocal trade response. Considering the UK's reliance on global manufacturing, the UK is highly open to global trading relationships and protectionist policies; and therefore, needs to act in order to protect this important growth industry at home.
- In order to make the cost of UK batteries to be competitive in contrast to batteries produced elsewhere government will need to implement a strategy; working alongside local partners to build competitive advantage. One way forward is to implement further investment, similar to the newly announced [Faraday Battery Challenge from UKRI](#). The £27.6m challenge will aim to increase UK competitiveness across the battery value chain through building and securing the UK supply chain, improving battery performance, reducing costs, developing more efficient and globally competitive manufacturing, developing sustainability, acceleration in the development and scale-up of battery technologies.
- However, a key barrier relates to the cost of energy for manufacturers in the UK – much higher than other competitive nations. The new Department for Energy Security and Net Zero needs to look at this as a priority in order for industry to remain competitive internationally.

- **What impact will the European Union's proposed Carbon Border Adjustment Mechanism have on UK production?**

- The proposed mechanism will be dependent on multiple factors within UK production, these mainly revolve around whether UK manufacturers will be able to meet EU standards. In the case that UK manufacturers meet CBDM criteria, this will include the creation of a level playing field for UK exporters (especially important to the Midlands) to the EU market. On the other hand, UK manufacturers will face increased costs and a reduction to their competitiveness. It is important that the UK government collaborates with industry as the European Union has a 57.6% of the market share for export destinations for UK cars; as per [The Society of Motor Manufacturers and Traders \(SMMT\)](#).
- The mechanism will especially be impactful on the West Midlands due to the region containing a high content of carbon-intensive sectors like iron and steel, electricity, and hydrogen.