

BEIS Committee Inquiry on Batteries for electric vehicle manufacturing

Written Evidence submitted by the
Department for Business and Trade

February 2023

Contents

Q1. Is there enough UK vehicle manufacturing demand in the UK to support gigafactories?	2
Q2. 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?3	
Q3. Is UK-based battery production necessary to support the manufacture of electric vehicles in the UK?	4
Q4. What are the risks to the UK automotive industry of not establishing sufficient battery manufacturing capacity in the UK?	5
Q5. What other domestic end uses for batteries would provide a market for UK battery production?	6
Q6. Does the UK have a sufficient supply of critical materials to support vehicle battery production?	7
Q7. How ready are UK vehicle producers for the EU–UK Trade and Cooperation Agreement (TCA) rules of origin (ROO) phasing in from 2024?	8
Q8. What can the UK learn from investment in other countries in the establishment of gigafactories?	9
Q9. Do we have the skills in the workforce required for the production of batteries? If not what needs to be done?	10
Q10. Will the cost of UK batteries be competitive compared with batteries produced elsewhere?	11
Q11. What impact will the European Union’s proposed Carbon Border Adjustment Mechanism have on UK production?	12

Executive Summary

- i. The UK is the sixth largest car producer in Europe, with 3,600 businesses operating across the UK automotive sector.¹ Automotive-related manufacturing in 2021 contributed £58.7 billion turnover and £14 billion value added to the UK economy.²
- ii. In value terms, the UK auto sector generated £31.9 billion in exports in 2021, accounting for 11.3% of the UK's total manufacturing exports.³ 155,000 people were employed in automotive manufacturing in the UK in 2021, 6.1% of total UK manufacturing employment, around half of which were in the manufacturing supply chain and the large majority of which were outside the South East.⁴ A further 347,000 jobs are estimated to be supported by the industry in the wider economy.⁵
- iii. Battery manufacturing represents a key priority for Government, as the UK automotive industry transitions to net zero. The Government has implemented several schemes to support this through innovation and industrialisation, including the Automotive Transformation Fund (ATF), Advanced Propulsion Centre (APC), UK Battery Industrialisation Centre (UKBIC), and the Faraday Battery Challenge. In the last couple of years alone, we have seen significant investments in the sector, with Nissan and Envision investing £1 billion in an electric vehicle (EV) manufacturing hub in Sunderland, Bentley investing £2.5 billion in Crewe and Ford investing £380 million to make Halewood their first European EV components site. Further supply chain investments will be important for enabling a successful transition.
- iv. Government continues to prioritise support for the sector that unlocks private investment and develops an internationally competitive electric vehicle supply chain within the UK. This will continue to be an important component of the UK's economic success.

¹ The Office for National Statistics, 2022

² ONS 2021

³ ONS 2021

⁴ ONS 2021

⁵ ONS 2021

Q1. Is there enough UK vehicle manufacturing demand in the UK to support gigafactories?

- a) The automotive sector is undergoing a fundamental change to zero-emissions technology, with battery electric vehicles representing a significant market opportunity. UK automotive manufacturers have substantial plans for electrification buoyed by surging demand for EVs (new EV registrations in the UK increased to over 52% in the last year alone).⁶ Plans have also been driven by regulations for phasing out the sale of internal combustion engine vehicles in a number of key export destination countries, given the UK sector is internationally competitive sector and exports approximately 80% of production.⁷
- b) Companies like Nissan, Ford, Bentley and Stellantis have already made substantial investments in the production of electric vehicles in the UK.
- c) Recognising efficiencies from sourcing batteries produced in the UK, gigafactories, UK-based manufacturers and the Government are in ongoing dialogue, both on a bilateral basis and through the Automotive Council, to discuss technological specifications and other needs, with a view to building a critical mass of UK vehicle manufacturing demand to support gigafactories.
- d) Recent estimates from the Faraday Institution predict that UK demand for EV battery manufacturing capacity will reach just over 100 GWh per annum in 2030 and nearly 200 GWh per annum in 2040.⁸ As set out by the Faraday Institution, batteries manufactured for private cars and light commercial vehicles in 2040 are expected to account for around 80% of total UK battery demand, with the remainder manufactured for HGVs, buses, micromobility and grid storage.⁹ Further end uses for off-road, maritime and space applications are also anticipated.

⁶ Society of Motor Manufacturers and Traders, 2022

⁷ ONS 2021

⁸ UK Electric Vehicle and Battery Production Potential to 2040, The Faraday Institution, 2022

⁹ UK Electric Vehicle and Battery Production Potential to 2040, The Faraday Institution, 2022

Q2. 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?

- e) In 2022, 90% of all new cars and vans sold in the UK were imported¹⁰ and, considering expected developments in UK consumers' preferences, there is no indication that this trend is likely to change in the coming years. Therefore, it is expected that the take-up of zero emission vehicles (ZEVs) that will replace new petrol and diesel vehicles by 2030 will be met by mostly imported production.
- f) International manufacturers that are leading brands in the UK vehicle market are investing heavily in electrification. They are likely to sell those vehicles in the UK to comply with regulation, such as the proposed ZEV mandate, so as to maintain access to a large and profitable market.
- g) Domestic demand accounts for approximately 20% of UK vehicle production.¹¹ It will be important for UK manufacturers to invest in electrification to remain globally competitive and to maintain and build key export markets. Electric vehicles developed and built in the UK for export markets will likely also be sold in the UK to meet individual manufacturers' sales-based ZEV mandated targets.

¹⁰ IHS 2022

¹¹ ONS 2021

Q3. Is UK-based battery production necessary to support the manufacture of electric vehicles in the UK?

- h) In 2021, the UK was Europe's sixth largest car producer and the majority of its automotive manufacturers had committed to internal combustion engine phase-out dates. UK-based battery production will be important to support the transition of these manufacturers to the production of EVs.
- i) The UK automotive industry is export-oriented, and securing UK-based battery manufacturing capacity will help to ensure that UK-made EVs can continue to enjoy tariff-free trade and remain competitive in international markets. Rules of Origin (RoO) under free trade agreements require that a high proportion of an EV's value is produced locally in order to benefit from tariff-free trade, and batteries form the most significant portion of the final value of an EV. The Trade and Co-operation Agreement (TCA) with the EU – our biggest export market for our automotive industry – requires 55% UK/EU content with an EU/UK originating battery by 2027 for exported EVs to access preferential (tariff-free) trade.
- j) Alongside representing the most valuable component of an EV, batteries are its largest and bulkiest part. They are difficult and costly to transport, which is another strong incentive for manufacturers to seek to minimise the distance that the batteries need to be shipped. Transporting batteries for large distances would likely put manufacturers at a competitive disadvantage, whilst at the same time increasing the embedded carbon in the final vehicle, due to shipping emissions. UK-based battery manufacturing will enable manufacturers to access an internationally competitive cost base for their operations.
- k) This is why the Government has prioritised the development of an internationally competitive EV supply chain through the Automotive Transformation Fund (ATF) and continues to engage with investors to secure important supply chain investments.

Q4. What are the risks to the UK automotive industry of not establishing sufficient battery manufacturing capacity in the UK?

- l) The EV manufacturing industry is still establishing, and new business models are emerging. The high fixed capital costs of entry for the new technologies, combined with global uncertainty, continues to create a real challenge, particularly with the current state of capital markets. On the other hand, we have seen that existing facilities can be scaled up, if the commercial opportunity arises and private initiative can be unlocked. Finally, it should be noted that there are different risks for low-margin globally mobile investments versus UK premium manufacturers.
- m) The UK remains an attractive investment location and has a supportive innovation ecosystem. However, global competition is intensifying for securing investment in the next generation of vehicle technology and the EV supply chains that will be important to anchoring car manufacturing to the UK. For instance, the US Inflation Reduction Act (US IRA) and potential EU response could adversely impact the competitiveness of the UK automotive sector and impact global supply chains in batteries, electric vehicles and wider renewables.
- n) That is why the Government has established the ATF, alongside other innovation programme, in order to support late-stage R&D and capital investments in key technologies with the aim of creating an internationally competitive electric vehicle supply chain in the UK.

Q5. What other domestic end uses for batteries would provide a market for UK battery production?

- o) In the June 2022 update¹² to its report “UK Electric Vehicle and Battery Production Potential to 2040”, the Faraday Institution identified battery demand from commercial vehicles, HGVs, buses, micromobility and grid storage. These accounted for around 20% of the forecast total UK battery demand, with private cars and light commercial vehicles being the remainder. Further end uses for off-road, maritime and space applications are also anticipated.
- p) We expect a range of battery technologies to play a part across these market segments. For example, sodium-ion batteries are useful for applications where cost, operating temperature range and safety considerations are more important than energy density. Applications include home energy storage systems, uninterruptible backup power supplies, and applications requiring safe transportation, as well as replacements for diesel generators and lead acid batteries for starter motors. Sodium-ion technology is particularly attractive for stationary energy storage, supporting the move to solar and wind energy supply across national grids.
- q) Where range and weight considerations are more important than cost considerations, lithium-sulphur batteries may see early adoption, for example in high-altitude pseudo satellites, drones and UAVs (for both civilian and military use). Lithium-sulphur cells may also be suitable for larger vehicles, such as buses, HGVs, freight trucks, agricultural vehicles, mobile cranes and other special purpose vehicles.
- r) Sectors such as aviation may also give rise to battery demand, for example with lithium-sulphur and solid-state batteries playing a role in aircraft, including use cases such as short-range aircraft, and vertical take-off and landing applications.

¹² UK Electric Vehicle and Battery Production Potential to 2040, The Faraday Institution, 2022

Written evidence from the Department for Business and Trade (BEV0051)

Q6. Does the UK have a sufficient supply of critical materials to support vehicle battery production?

- s) Global demand for electric vehicle battery minerals is projected to increase by between six and thirteen times by 2040,¹³ exceeding the rate at which new primary and secondary sources are currently being developed.
- t) While the UK does have pockets of mineral wealth, it is not feasible nor desirable to onshore all elements of the supply chain. Access to imported primary minerals, materials and components (alongside a focus on resource efficiency and circular economy) will continue to be necessary to meet domestic demand. Collaboration (by government and industry) with international partners is vital to ensuring our needs are met. Recent government collaboration includes critical mineral partnerships with South Africa and Saudi Arabia, among others.
- u) Government can also play a strategic role in highlighting supply chain vulnerabilities. The Critical Mineral Intelligence Centre has published a study that maps out future demand scenarios for electric vehicle battery minerals and assessing the nature and risks in their supply chains.¹⁴
- v) Electric vehicle battery minerals include cobalt, manganese, graphite, lithium and nickel. Cobalt, lithium and graphite are listed as critical in the British Geological Survey's 2021 criticality assessment. Manganese and nickel are on the Critical Mineral Expert Committee's watchlist of minerals with increasing in criticality. The supply chains of these minerals are at risk due to a range of factors including geographical dominance, disconnect between supply and demand, state-sponsored activity, market volatility and opacity, and environmental, social and governance standards (ESG) issues.
- w) To ensure a resilient supply of Critical Minerals for UK manufacturers, Government has published its Critical Minerals Strategy, which sets out plans to accelerate domestic capabilities, collaborate with international partners and enhance international markets.

¹³ 'The Role of Critical Minerals in Clean Energy Transitions', International Energy Agency, 2021

¹⁴ 'Study on future UK demand and supply of lithium, nickel, cobalt, manganese and graphite for electric vehicle batteries', UK Critical Mineral Intelligence Centre, 2022

Q7. How ready are UK vehicle producers for the EU–UK Trade and Cooperation Agreement (TCA) rules of origin (ROO) phasing in from 2024?

- x) Automotive is an export focussed industry and so agreements that offer smooth and tariff free trade are important. The EU-UK Trade and Cooperation Agreement (TCA) provides this. The rules agreed in the TCA were modern and flexible, reflecting UK and EU industry supply chains, but also providing for a phase-in period for electric vehicles and related batteries.
- y) Until 2024, companies can source most of their battery inputs from outside the UK and EU. From 2024 onwards, they must source more inputs from the UK or EU and use originating active cathode materials (CAM), which is a key part of an EV battery. From 2027 they must source yet more inputs from the UK or EU; and EV batteries must be of UK or EU origin for the vehicle to be exported tariff-free to the EU. The TCA includes a review clause on EV batteries whereby the UK or EU can request to review the Rules of Origin after 2025.
- z) We are determined to ensure that the UK remains one of the best locations in the world for automotive manufacturing and through its policies and investments, the Government is accelerating electrification and unlocking industry investment to meet our net zero ambitions. We are aware that some members of UK and EU industry are concerned about the 2024 rules and we continue to work closely with industry to understand and mitigate the impact of external factors, such as the Covid-19 pandemic and the global semiconductor chip shortage on the production of electric vehicles and batteries.

Q8. What can the UK learn from investment in other countries in the establishment of gigafactories?

- aa) The EU, the US and the UK have developed different frameworks to establish gigafactories and their supply chains.
- bb) In the US, bespoke incentives have been historically more common than highly structured subsidy funds. For example, the recent Inflation Reduction Act includes a suite of grants, loans and tax credits aimed at protecting domestic manufacturing, including loans to build new clean vehicle manufacturing facilities; and tax credits to purchasers of qualifying clean vehicles. This legislation is aimed at developing a domestic supply chain and fast-tracking the US transition to EVs, with a view to accelerating EV adoption as the US EV market is small compared to China and Europe.
- cc) EU interventions are organised over different levels of government, from the local and national to the intergovernmental and supranational levels, depending on the degree of subsidiarity and proximity of the intervention itself to affected communities. The most notable EU-level scheme is the 'Important Project of Common European Interest' (IPCEI), funded via national contributions, administered at EU-level and aimed at establishing battery production in Europe and reduce reliance on imports. The Green Deal Industrial Plan, recently announced by the EU Commission in response to the Inflation Reduction Act, could add significantly to this policy landscape.
- dd) The UK's interventions are underpinned by the imperative to realise the opportunities for economic growth inherent in the transition to Net Zero. We have deployed a highly structured framework, composed of a set of interventions that work together to accelerate technologies from the early stages of innovation through to industrialisation. The UK framework is aimed at unlocking an industry-led transition to Net Zero, prioritising investment where there is a strong case for government intervention, whilst leveraging additional funding from industry.

Q9. Do we have the skills in the workforce required for the production of batteries? If not, what needs to be done?

- ee) The UK automotive workforce is highly productive, secondly only to Germany at a large manufacturer level, and draws from a strong engineering heritage.
- ff) Manufacturing employers have developed 149 high-quality apprenticeship standards to meet their skills needs, including Lean Manufacturing Operative at Level 2 and Manufacturing Engineer at Level 6. A level 3 battery manufacturing technician apprenticeship standard is in development and will be submitted to the Institute for Apprenticeship and Technical Education for approval in Spring 2023.
- gg) In addition, the Faraday Battery Challenge will fund work focusing on the training needs of UK industry as it electrifies. Level 3 short courses covering aspects of battery manufacturing from design to disassembly has also been developed and complement courses available through the DfE funded Emerging Skills Project.
- hh) The Faraday Battery Challenge will also run a competition in Spring 2023 to fund at least one regional training centre, with an expected focus on level 2/3 manufacturing operatives needed within the next 2 years. Creating the infrastructure to deliver the workforce to operate battery manufacturing facilities in the UK will help to attract investment as the availability of a skilled workforce is a priority for gigafactory investors.
- ii) Finally, the UKRI-led 'Driving the Electric Revolution: Building Talent for the Future' programme has invested over £4 million to support skills, talent and training across Power Electronics, Machines and Drives (PEMD) manufacturing and supply chains. These technologies are essential for the transition to electrification and includes 29 projects delivered by 37 organisations.

Q10. Will the cost of UK batteries be competitive compared with batteries produced elsewhere?

- jj) Of the cost factors for a battery that are dependent on the location of manufacture, energy can be the most variable. In the short-term, high energy costs are a concern for the automotive sector. In response, we introduced the Energy Bill Relief and Discount Schemes, and we continue to engage with industry on this issue. We have also announced a package of measures to support Britain's most Energy Intensive Industries (EIIs) from high electricity prices from 2024 onwards, and this includes battery manufacturing. The support through the British Industry Supercharger will be crucial in helping eligible businesses remain internationally competitive and move us further towards achieving our net zero ambitions.
- kk) In the longer term, our transition to Net Zero will increase our energy resilience by reducing our dependence on volatile fossil fuel markets and deliver a radical long-term shift in our energy with cleaner, cheaper power and lower energy bills.
- ll) The package of announcements set out in November last year to invest in low carbon power, and boost energy efficiency are part of wider energy plans being pursued by Government and we will continue to set out further details going forward.
- mm) Finally, the UK is ahead of our competitors in making the transition to renewables, putting us in a strong position in the longer term. Sustainability is increasingly becoming a factor in investment decisions – for environmental and security of supply reasons – with investors aiming to ensure their gigafactories are 100% powered by renewables.

Q11. What impact will the European Union's proposed Carbon Border Adjustment Mechanism have on UK production?

- nn) The UK has ambitious carbon pricing through the UK ETS and Carbon Price Support mechanism. The design of the EU CBAM would require reporting by businesses in the vast majority of jurisdictions exporting products within scope of the EU CBAM to the EU. The EU CBAM will initially cover a number of specific products in some of the most carbon-intensive sectors: iron and steel, cement, fertilisers, aluminium, electricity and hydrogen, as well as some precursors and a limited number of downstream products. Some indirect emissions will also be included in the regulation. The EU CBAM will begin to operate from October 2023 onwards. Initially, this will be with reporting obligations only. In 2026, the full CBAM is intended to be implemented.
- oo) The level of administration requirements would be determined by the decarbonisation policies in place in the exporting countries, and whether businesses meet their reporting requirements using 'default values', which would require reporting but not new individual data collection, or 'actual emissions data', where new data collection is likely to be required. Government is engaging industry stakeholders and conducting analysis to assess the risk of diverted products to the UK market following the introduction of the EU CBAM.
- pp) UK officials continue to monitor the detail of the EU CBAM, as its design and secondary EU legislation continues to develop following the end of trilogues.