

Inquiry: Batteries for electric vehicle manufacturing
Business, Energy and Industrial Strategy Committee

About AMTE Power

AMTE Power is a leading battery cell manufacturer and we are one of the only companies producing cells in the UK today. Products like ours are vital to help meet net zero ambitions and electrify road transport. We are proud to be part of the UK's long-standing battery heritage. Our manufacturing plant in Thurso, Scotland has been making cells for over 30 years and together with our team in Oxfordshire's high-tech corridor and our collaboration with the UK Battery Industrialisation Centre (UKBIC), we are now looking to the future. We have ambitious plans to scale up production, reflecting growing demand for our cells both in the UK and overseas.

Executive summary

1. UK industrial strategy for UK batteries must enable the creation of a domestic manufacturing sector and supply chain which can respond to current and future technology requirements from OEMs.
2. The UK has a 'first mover' advantage in battery cells for the hydrogen fuel cell vehicle (FCEV) market; the battery cell demand for this market is often underestimated but FCEVs need batteries too. These vehicles are forecast to overtake ICE hybrid vehicles in 2029 becoming the largest market for high-power battery cells and consuming 21.2 GWh in 2031 globally.
3. AMTE Power is actively developing battery cells to meet this FCEV market demand as well as targeting high performance UK-based OEMs, motorsports and integrators and manufacturers of heavy duty vehicles that require high power cells.
4. There are also significant opportunities to manufacture UK batteries for energy storage and specialist markets. An integrated UK battery industrial strategy should support the role of battery cells for automotive and these sectors, and not position them in separate silos.
5. Alongside automotive, AMTE Power is developing batteries for the domestic energy storage market for both industrial energy storage and the residential sector.

There is currently a considerable deficit between UK battery demand and supply for the automotive industry.

6. There is an accelerating consumer preference towards EVs and by 2030 we expect there will be up to 10 million battery electric vehicles on the road according to Government reports.
7. The UK is a demand heavy market with an automotive exporting industry worth ~£77bn, accounting for ~10% of UK total export goods. It delivered £14bn in value to UK economy in 2022 according to the SMMT.
8. Most gigafactory announcements to date in the UK have been focused on delivering facilities capable of supporting large volume vehicle programmes.
9. AMTE Power has identified a market opportunity to develop a UK supply chain to support higher value, lower volume specialist automotive markets such as motorsport, sports car, long range commercial and off highway vehicles – applications where the UK is already a global leader. We want to play a role in supplying this market to protect the long-term sustainability of the UK automotive and high-tech industries.
10. Given the lead times and capital required to develop large scale >30GWh Gigafactories that can supply higher volume demands and the limited number of announced UK Gigafactories, there are currently concerns about the UK's ability to deliver a sufficient number of large scale gigafactories by the petrol and diesel 2030 deadline.
11. With appropriate investment to support the acceleration of AMTE Power's scale up plans, we intend to deliver a Gigafactory with a planned capacity of >0.5GWh by 2026. This facility would manufacture cells for the high power cell vehicle market in the UK, along with cells for the energy storage markets. We believe that this is complementary to the UK's efforts to quickly establish a battery supply chain given the fast timescales and favourable margins.

Battery manufacturing in the UK is essential to the long-term future of the UK automotive industry.

12. Batteries are heavy and hazardous to transport over long distances due to their flammability, and cross-border transportation regulations are increasing. Together with Rules of Origin legislation, this means OEMs typically want EV manufacturing to be located relatively close to battery manufacturing, probably in the same country or region. If batteries are made in Europe, US and Asia, then it is highly likely that the EV would be as well.
13. Building gigafactories in the UK is therefore essential to safeguard jobs and the future of a UK automotive industry with an export value of ~£77bn according to the SMMT.
14. A failure to capitalise on UK battery manufacturing would be a lost opportunity to create manufacturing jobs that are essential to the net zero transition and to effectively leverage the significant battery expertise and IP that already exists in the UK.
15. Without continued investment and growth, the industry will reduce as a % of GDP weakening the investment case of UK gigafactories and battery businesses.

UK industrial strategy for UK battery manufacturing must enable the creation and development of a supply chain that can support the future fuel cell technology requirements of UK OEMs and high-tech customers.

16. In the UK and overseas there is a rapidly developing fuel cell electric vehicle (FCEV) market, which is based on a hydrogen/high powered battery hybrid. FCEVs are already being adopted by OEMs including BMW with more set to launch over the next decade.
17. In a recently commissioned report from E Source, the FCEV market demand for high powered cells was projected to grow to over 21 GWh by 2031. Rising demand is also projected for high performance battery electric vehicles (BEVs) and aerospace applications.
18. Performance cars and motorsport OEMs and integrators are facing quickly tightening CO₂ legislated targets which they cannot meet with their legacy powertrains. They need to move to a powertrain solution that still provides the high performance levels their customers expect, while also reducing CO₂ emissions. To solve this dilemma, multiple UK OEMs are forecast to launch a fuel cell vehicle by the end of the decade and AMTE Power plans to serve this market in addition to the smaller volume, specific high value applications mentioned above.
19. AMTE Power is actively developing battery cells for the growing fuel cell market and high performance UK-based OEMs, motorsports and integrators that require high power cells for hybrid powertrains. These cells, which have been developed at our Thurso facility in Scotland, will continue to be developed for automotive customers at the UKBIC in Coventry before moving to full-scale production at our proposed Gigafactory in Dundee.
20. We believe that there is still an opportunity for the UK to be a 'first mover' in this part of the evolving battery cell market. However, this will require continued and growing Government support to help battery cell manufacturers invest in gigafactories and deliver supporting infrastructure.

There are significant opportunities to manufacture UK batteries for energy storage and specialist markets. An integrated UK battery industrial strategy is required that supports the role of battery cells for these sectors and does not position them as separate silos.

21. As renewable power generation expands in the UK as part of net zero transition and diversification away from fossil fuels, the volatility of the grid's power supply will grow. A key mechanism for managing this and ensuring uninterrupted supply is through flexible capacity, which is most easily scaled through battery storage technology.
22. The energy transition will fail without sufficient flexible capacity as growing renewable capacity will lead to intermittent supply shortages and price volatility, which in turn leads to either an unstable grid with power outages or an unsustainable reliance on transition fuels such as natural gas to provide ongoing baseload power.
23. The pace of built battery storage capacity in the UK has begun to accelerate again after stalling in 2019 and 2020, with nearly 600MW of capacity becoming operational in 2022. The UK Battery Storage Project Database estimates there is 2.4GW of capacity operational in the UK across 161 sites and a future total pipeline exceeding 61.5GW.

24. Batteries are an essential part of securing the UK's domestic energy supply. Battery cells for industrial energy storage projects in the UK are currently being supplied by companies in Asia or North America.
25. Through our engagement with energy generators, renewable energy producers, integrators and home energy storage system manufacturers, we can see that the demand for a rapid expansion in the wide scale use of battery storage systems based on more sustainable materials and supply chains is urgent. The UK needs a homegrown manufacturing sector which can produce batteries for the domestic energy storage market, both for industrial energy storage and residential use. This will deliver UK security of supply, protect the most vulnerable consumers, and stabilise the energy market.
26. Lithium-ion chemistry is not right for every battery cell application, and AMTE Power is currently one of the only UK cell manufacturers developing a viable, alternative sodium-ion cell for renewable energy storage. This technology is highly suited for large-scale industrial energy storage and the residential sector because it safe to use, and the raw materials can be sourced more easily. Using sodium also means we do not add further to demand for lithium which will be vital for new electric vehicles.

Other specialised markets

27. The nature of work undertaken in decarbonising industries such as construction, mining, oil and gas, and agriculture require a combination of high power and range from battery cells. With this, and growing engagement from the rail industry, there are further market opportunities for UK-made batteries.
28. To support these markets AMTE Power is developing non-rechargeable cells with very high energy density and high-temperature performance for use in environments where temperature, access and potentially depth are key considerations.

In the short term, the UK battery industry will continue to rely on the import of critical raw materials until a local supply chain is scaled up inclusive of recycling.

29. AMTE Power's objective is to secure critical raw materials that comply with Rules of Origin & ESG standards, with multiple sources for each using supply chains in Europe & Asia.
30. Our current supply chain depends on complex, fragile import networks which create bottlenecks that can threaten domestic security as we rely heavily on raw material from the East. Many of the partners we are engaged with are shifting investment to Europe to support potential UK demand. The UK has some supply options, but they are immature and currently not set up for large scale production meaning much opportunity exists especially for materials processing and recycling.
31. AMTE Power has invested in its supply chain capability to secure long-term offtake agreements for all raw materials, with competitive fixed pricing. We will drive cost efficiencies by working with our strategic partners identifying value through material substitution and technological innovation. We will drive further cost benefit through direct agreements with mines for cathode materials, leveraging our gigafactory volumes to contribute to the cost competitiveness of the batteries that we produce.
32. The commodity that remains the utmost concern is Lithium. China currently produces the majority of the world's lithium salt production – around 70% – while Europe produces less than 1%. The landscape is likely to change over the next decade, with lithium salt production in Europe reaching approximately 450 kt by 2030 (14% of global total). Following this trend, the UK has some Lithium potential (TVL, Green Lithium & Cornish Lithium), however these startups will require time to scale.
33. Given our focus on hydrogen/high power fuel cell applications which require smaller battery packs, our products will require less raw material and therefore AMTE Power will contribute less to the burden on material supply chains.
34. It is unclear if the European Union's proposed Carbon Border Adjustment Mechanism (CBAM) will cover the inclusion of battery precursor chemicals. If included, this could increase the cost of production for UK battery manufacturing, further encouraging the need for localised supply of raw materials and a local battery recycling industry.
35. Battery raw material supply chains are already being established to support the build-up of a UK battery industry so it is essential that this is understood at the soonest to confirm the design chemistries, viability of production and costs that will secure offtakes with vehicle OEMs.

36. AMTE Power has developed cells such as the Ultra Safe cell which have sodium-ion chemistry. Therefore, its raw materials are more sustainable and cost-effective than lithium-ion alternatives thanks to the global abundance of sodium, mitigating some of the impact that the CBAM may have on this product.

Government investment is required to support and develop an ecosystem of UK gigafactories which include large and small scale facilities

37. In terms of state investment per GWh for large scale >30GWh gigafactories, there appears to be significantly more incentive and investment to a higher % of intervention provided by other countries compared to the maximum £100m grant offered by the ATF.
38. AMTE Power does not plan to build a large scale gigafactory, instead planning for a capacity of >0.5GWh by 2026, with a desire to grow and to support the specific markets that we are targeting within the UK automotive supply chain. Therefore, the conditions of ATF grant funding are likely more suited to the lower capital requirements for a smaller facility such as ours.
39. AMTE Power already benefits from support from Scottish Enterprise (given the location of our existing facility in Thurso) and we embrace further engagement as we look to work in partnership with UK government to deliver our growth plans and play our part in supporting the UK's battery supply chain ambitions.

The UK has a rich history of battery technology expertise but needs to build a UK manufacturing workforce with the skills for Giga-scale production.

40. Skills development and knowledge transfer must be a central pillar of a UK battery industrial strategy to build upon the decades of UK expertise in the battery manufacturing industry. We have people with the right skills, but we need more of them.
 41. We are supporting the creation of a national framework for skills in the sector which will require additional investment from Government and collaboration with the private sector.
 42. To bring forward our Gigafactory we would like to work in partnership with central and local Government, universities and colleges to develop a skills manifesto for our proposed facility.
 43. We will draw on the skills and expertise of staff at our Thurso facility, which has been manufacturing Li-ion battery cells since the early 2000s. The staff at our Thurso plant have also trained others in cell manufacturing from universities and other commercial organisations to further enhance the UK's skill base in cell manufacturing.
 44. Our apprentice training programme, in collaboration with North Highland College, has allowed AMTE Power to tailor the skills of young people to match the fast-growing requirements of the industry.
 45. Using the skills it has developed and acquired, AMTE Power has recently designed and manufactured a range of unique battery cells with superior power, temperature, and safety characteristics. These cells designated Ultra High Power (UHP), Ultra Prime and Ultra Safe have been designed in our engineering facility in Oxford using our world-class electrochemists and engineers and developed into prototypes at our facility in Thurso using our in-house trained production specialists.
 46. Our automotive UHP cell has also been scaled up and manufactured using giga scale processes in the UKBIC, with AMTE Power electrochemists, engineers and production specialists collaborating and working alongside UKBIC staff.
 47. Future production of our UHP cells will take place in our planned Gigafactory which is being designed using our own in-house industrialisation engineers.
 48. To match our growth ambitions, further investment will be required to develop, attract and retain critical skills from NVQ through to post doctorate qualifications.
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