



Department for
Business & Trade

UK Battery Strategy



Executive Summary

Batteries are essential products in modern, industrialised economies. In recent years, they have grown in importance as they power many of the technologies that will enable the transition towards net zero. Primary uses include personal and commercial transportation and grid-scale battery energy storage systems (BESS), which allow us to use electricity more flexibly and decarbonise the energy system in a cost-effective way.¹⁶ Batteries are also important to national security and underpin the UK's ability to develop innovative defence capabilities. As batteries become lighter, smaller, and more efficient, the aerospace, rail, and marine sectors, among others, are expected to increase their use of these technological advances.

Current battery production features complex value chains spanning multiple continents and is heavily reliant on East Asia.¹⁷ Like most countries, the UK currently meets the bulk of its domestic demand for batteries and their components through imports.¹⁸ Given that batteries are a vital component of many modern technologies, securing investment into the battery value chain is also important to economic security.

The global demand for batteries is expected to rise dramatically over the coming decades,¹⁹ and the UK is uniquely positioned to seize the opportunity thanks to our key areas of comparative advantage:

- **Innovation:** The UK is playing an important global role in research and development (R&D) into battery chemistry optimisation, underpinned by the strength of our world-class research base. The UK ranks third in the world in terms of research quality into industrial batteries.²⁰
- **Start-ups:** The UK has a leading electric vehicle (EV) battery start-up ecosystem, with the second highest enterprise value in Europe and fourth worldwide.²¹
- **Automotive manufacturing:** The UK's automotive manufacturing sector is the second highest by value in Europe,²² with an annual turnover of £70 billion²³ and employing 166,000 people across the country.²⁴

A successful battery industry will be an important source of jobs and regional economic growth. A battery industry that supports domestic demand for EVs could employ 100,000 people by 2040: 35,000 in cell manufacturing and 65,000 in the battery supply chain.²⁵ This represents an opportunity to create many highly paid, productive jobs across the country, from mining to processing and manufacturing to recycling.

¹⁶ The Faraday Institution. '[UK Electric Vehicle and Battery Production Potential to 2040.](#)' 2022.

¹⁷ Nicholson J and others. '[De-bottlenecking the battery materials midstream.](#)' 2023.

¹⁸ Du J and Shepotylo O. 'Powering the Future: Unveiling Economic Policy and Global Value Chain of the UK Electric Vehicle Industry'. Centre for Business Prosperity Working Paper. Forthcoming.

¹⁹ The Faraday Institution. '[The Gigafactory Boom.](#)' Faraday Insights: Issue 2. 2022.

²⁰ Government Office for Science. '[Rapid Technology Assessment: Novel Batteries.](#)' 2023.

²¹ UK Research and Innovation and Dealroom.co. '[Electric Vehicle Battery Tech in the UK.](#)' 2023.

²² DBT analysis of Office for National Statistics. '[GDP output approach low-level aggregates.](#)' 2023; Eurostat. '[National accounts aggregates by industry.](#)' 2022.

²³ Office for National Statistics. '[Monthly Business Survey turnover in production industries.](#)' 2022.

²⁴ Office for National Statistics. '[JOBS03: Employee Jobs by Industry.](#)' 2023; Office for National Statistics. '[JOBS04: Self-Employment Jobs by Industry.](#)' 2023.

²⁵ The Faraday Institution. '[UK Electric Vehicle and Battery Production Potential to 2040.](#)' 2022.

Businesses are already investing significantly in the UK battery supply chain. Recent examples include Tata Group's £4 billion investment to build one of Europe's largest gigafactories²⁶ and new investment by Nissan and AESC to create a battery and electric vehicle manufacturing hub in Sunderland.²⁷ Moreover, Nissan is leading a further £2bn investment in Sunderland with two new EV models. This represents another major vote of confidence in the UK, building on the £1bn investment announced in 2021.²⁸ We will build on these successes to put the UK at the forefront of battery development and production of the range of battery technologies that will be required, ensuring that this leads to a safe and sustainable industry.

Our Vision

This document sets out the Government's activity to support our strategic objectives and establishes the framework and priorities for our future work with industry. It was developed with the UK Battery Strategy Taskforce, drawing on the Call for Evidence²⁹ and engagement with businesses and stakeholders.

The Government's 2030 vision is for the UK to have a globally competitive battery supply chain that supports economic prosperity and the net zero transition. The UK will be a world leader in sustainable design, manufacture, and use, underpinned by a thriving battery innovation ecosystem.

Our Approach

To build on our strengths, the strategy is based around a DESIGN-BUILD-SUSTAIN approach:

DESIGN: Design and develop the batteries of the future that are smaller, lighter, and offer better capacity and value, building on UK world-leading research and innovation.

- a. Continuing to support **innovation** across the battery value chain.
- b. Exploring innovative **financing** mechanisms to support **scale-ups**.
- c. Maintaining stringent battery **safety and product standards** to support growth and protect workers and consumers.

BUILD: Working closely with our domestic industry and international partners to secure a resilient UK battery manufacturing supply chain that supports our strong domestic growth and thriving export markets.

- d. Strengthening the resilience of UK **supply chains** including through the Automotive Transformation Fund and the UK Critical Minerals Strategy.
- e. Building on our extensive **international collaboration** work with our partners to open new markets.
- f. Continuing to support **energy intensive industries** and speeding up **energy grid connections**.
- g. Ensuring **planning and permitting** reform actions will benefit the emerging battery sector.

²⁶ Department for Business and Trade. '[Tata Group to Invest Over £4 billion in UK gigafactory creating thousands of jobs.](#)' 2023.

²⁷ Nissan Motor Corporation. '[Nissan Unveils EV36Z.](#)' 2021.

²⁸ BBC. '[Nissan Commits to Make New Qashqai and Juke Electric Models in Sunderland.](#)' 2023.

²⁹ See Annex II

SUSTAIN: Enable the development of a thriving and sustainable sector, supported by proportionate regulations that drive investment across the supply chain, from raw materials through to end of life and recycling.

- h. Identifying and facilitating the **skills** needed for the battery sector.
- i. Collaborating with our international partners on **green trade** to reduce barriers.
- j. Exploring pro-growth regulation and industry standards to incentivise investment in the **circular economy**.

The strategy also sets out the areas of emerging growth, building on the UK's comparative advantage – our thriving auto industry, our world-class innovation base, and the recent investments by business.

How We Will Do This

This strategy will commit Government to exploring a range of policy options to deliver against our priorities. Specifically, we will:

1. Provide targeted support for zero emission vehicles, batteries, and their supply chains, including through **over £2 billion of new capital and R&D funding for five years to 2030**, building on the work of the Automotive Transformation Fund and the Advanced Propulsion Centre.
2. Provide **sustained, consistent, and targeted support** for large-scale, long-term **research and innovation activities**, from early to late stages, across applications and key areas of the battery supply chain.
3. Invest an additional **£38 million to enhance the UK Battery Industrialisation Centre development facilities**, boosting its capability for research and development in new chemistries and future technologies. This builds on our know-how in lithium-ion solutions and enables the scale-up of emerging innovations.
4. Invest **£12 million in the Advanced Materials Battery Industrialisation Centre**, a new world-class battery materials scale up facility in the West Midlands and North East to bridge the gap between laboratory research and commercial production.
5. Invest **£11 million in 20 competition winners developing technologies across the battery value chain** in areas such as artificial intelligence and digital tools to increase battery performance, future technologies such as lithium-metal anodes and sodium-ion batteries, and improved recycling technologies.
6. Explore opportunities to **promote the establishment of R&D centres** in the UK from leading battery and EV manufacturers.
7. Explore the case for new **financial mechanisms to support start-ups** in the battery sector, including through public/private equity investment with government seed funding.
8. Expand market access for the **trade of critical minerals** and promote **high international standards** in supply chains when negotiating new Free Trade Agreements.
9. Explore options for **international collaboration** on batteries through new and existing forums, and ensure that the sector develops **practical, widely adopted international standards**, and that those in existence keep up with technological developments.

10. Create an environment that is **welcoming to foreign investment** whilst protecting our national security by assessing investment into battery manufacturing and the wider energy sector under the National Security and Investment Act³⁰ on a case-by-case basis.
11. Work with industry, Ofgem, and the network companies to deliver the actions needed to **accelerate connection timescales**, including strategic investment, efficient and flexible management of network capacity, and a connections process that is fit for the future.
12. Ensure that **manufacturing skills training and education** is well supported by a high quality and employer led skills system. We will work closely with academia and industry, to identify areas of highest demand and promote best practice to **develop an inclusive talent pipeline**.
13. Publish a consultation and Call for Evidence through the Department for Environment, Food and Rural Affairs, in collaboration with the Devolved Administrations, as early as possible in 2024, focussing on **increasing collection rates for batteries** and **encouraging best practise in end-of-life management** of all battery types and chemistries. Defra will work with the whole supply chain to consider **regulation for the entire eco-system**.
14. **Influence and adopt international standards** for reuse, repurposing, and recycling in line with our closest trading partners, where it is in our national interest and achieves our desired policy objectives.
15. **Continue to convene a Battery Strategy Taskforce** to advise on the delivery of the strategy, emerging risks to security of supply, and opportunities for the UK Government.

³⁰ Cabinet Office. [‘National Security and Investment Act 2021.’](#) 2023.

Part One: Context

Why is the Battery Sector Important for the UK?

Batteries are essential products in modern, industrialised economies. In recent years, they have grown in importance as they underpin many of the technologies that will enable the transition towards net zero. They are a vital component in personal and commercial transportation, including hybrid and fully electric cars, buses, vans, and lorries. Grid-scale battery energy storage systems (BESS) enable us to use electricity more flexibly and decarbonise the energy system in a cost-effective way.³¹ As the technology and innovation in battery design, manufacturing, transportation, and deployment evolves, so will the development of additional applications.

Batteries are also important to the UK's national security and underpin the UK's ability to develop innovative defence capabilities - including communication systems, fighter jets and nuclear submarines.

We already have significant battery sector capabilities, as shown in Figure 1, including a fully operational gigafactory with an output of 2GWh.³² Investment in UK battery manufacturing is increasing, including the new AESC Group gigafactory being built in Sunderland – AESC UK plant 2 – and Tata Group's announcement of the construction of a new gigafactory, jointly creating over 5,000 jobs and increasing UK production capacity significantly to an estimated 52GWh.³³ This follows significant UK R&D investment, including the establishment of the Advanced Propulsion Centre (APC) in 2013 – bringing together £1.4 billion in joint industry and Government R&D advanced propulsion projects³⁴ – and the Faraday Battery Challenge in 2017 – making £541 million of funding available to the UK Battery Industrialisation Centre (UKBIC).³⁵

The UK has also seen major new commitments to electric vehicle (EV) manufacturing:

- JLR has set out £15 billion of investment over next 5 years to accelerate their path to electrification in the UK.³⁶
- Nissan, in partnership with AESC, is building a new EV manufacturing hub in Sunderland.³⁷
- Bentley has announced a £2.5 billion investment to produce its first EVs in Crewe by 2026.³⁸
- BMW has announced a £600 million investment to produce the next all electric MINI in Cowley from 2026.³⁹

³¹ Government Office for Science. '[Rapid Technology Assessment: Novel Batteries](#).' 2023.

³² SMMT. '[Race to Zero: Powering up Britain's EV Supply Chain](#).' 2023

³³ Department for Business and Trade. '[Tata Group to Invest Over £4 billion in UK gigafactory creating thousands of jobs](#).' 2023.

³⁴ Advanced Propulsion Centre UK. '[£86.9 million for scale-up and R&D of net-zero vehicle technology](#).' 2023.

³⁵ UK Research and Innovation. '[Faraday Battery Challenge](#).' 2023.

³⁶ Jaguar Land Rover. '[JLR to invest £15 billion over next five years as its modern luxury electric-first future accelerates](#).' 2023.

³⁷ Nissan Motor Corporation. '[Nissan Unveils EV36Z](#).' 2021.

³⁸ Bentley Motors. '[Bentley secures UK production of first electric car](#).' 2022.

³⁹ BMW Group. '[Mini Plant Oxford Goes Electric: £600m investment for all-electric MINI production in the UK](#).' 2023.

- Stellantis started producing Vauxhall, Opel, Fiat, Peugeot and Citroën electric vans at their Ellesmere Port plant in September 2023, following a £100 million investment that was secured with support from Government.⁴⁰

These recent announcements highlight industry's confidence in investing in the UK's battery ecosystem. But international competition is significant, particularly following the introduction of the US's Inflation Reduction Act and the EU's Green Deal Industrial Plan. This was reflected in the Call for Evidence,⁴¹ with higher subsidies in other countries viewed by some respondents as a key barrier to UK investment.

Securing investment into the battery value chain is key to our economic security. The UK currently meets most domestic demand for batteries and their components through imports.⁴² Like most countries, the UK currently relies on China as the largest import source of lithium-ion batteries for all applications.⁴³ In 2022, the UK imported nearly £1.8 billion worth of lithium-ion battery packs, of which around £0.9 billion came from China, £0.3 billion from Germany, and £0.1 billion from Japan.⁴⁴

Developments will continue to be driven internationally and so our battery strategy is flexible to changing global markets and opportunities. The UK is well placed to influence standards and capture market share of growing battery demand. Our focus and objectives are centred around building on our comparative advantage, scaling up our emerging supply chain, and securing internationally mobile investment.

⁴⁰ Stellantis. [‘Stellantis announces start of electric vehicle production at Ellesmere Port.’](#) 2023.

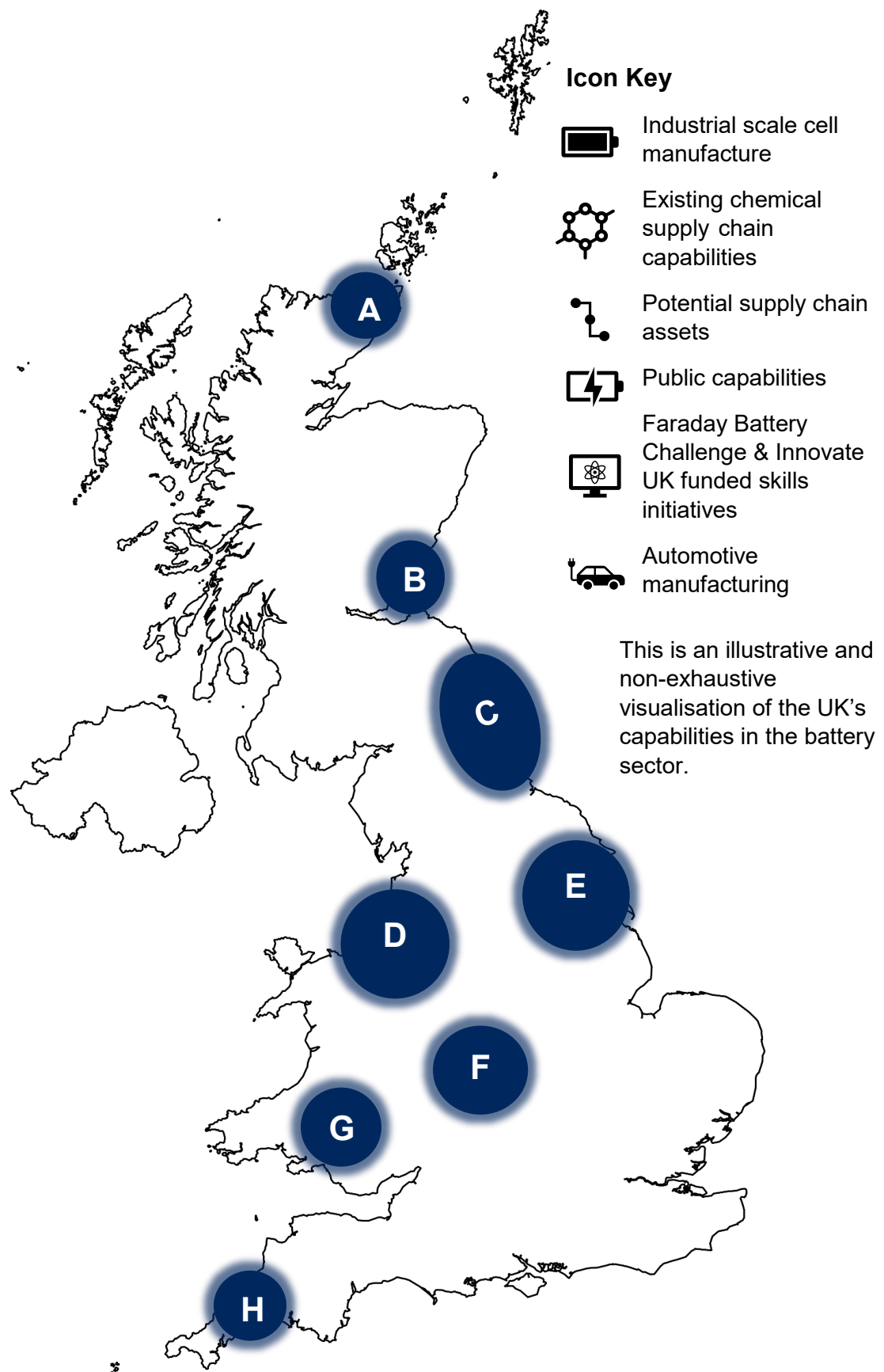
⁴¹ See Annex II

⁴² Du J and Shepotylo O. ‘Powering the Future: Unveiling Economic Policy and Global Value Chain of the UK Electric Vehicle Industry’. Centre for Business Prosperity Working Paper. Forthcoming.

⁴³ Energy Institute and others. [‘Statistical Review of World Energy.’](#) 72nd Edition. 2023.

⁴⁴ [Trade Map.](#) 2023.

Figure 1: Map of UK Battery Ecosystem Capabilities



A. Thurso



AMTE Power

B. St Andrews



Pilot Line

C. North East



2GWh AESC Plant 1



11GWh AESC Plant 2 (under construction)



Chemical processing



National Battery Training & Skills Academy (Newcastle University)



Lithium exploration and refining



Centre for Process Innovation UK



Automotive manufacturing

F. West Midlands



UK Battery Industrialisation Centre



Warwick Manufacturing Group Energy Innovation Centre



The Manufacturing Technology Centre



National Electrification Skills Framework & Forum (Coventry University)



Electric Revolution Skills Hub (Coventry University)



Digitally Enhanced Battery Ubiquitous Training (DEBUT) West Midlands (University College Birmingham)



Automotive manufacturing

G. South Wales



Nickel refining

D. North Wales/ North West



Chemical processing



Graphene Engineering Innovation Centre



Automotive manufacturing

H. South West



Lithium processing, extraction and exploration

E. East Midlands



Graphite processing



Automotive Manufacturing

Location TBC



40GWh Tata Agratas Plant

Source: DBT mapping based on stakeholder engagement

What is the Scale of the Opportunity?

There is a significant opportunity for the UK economy as global demand continues to increase for green products and the batteries that power them.⁴⁵ In particular, the global transition to EVs will continue to drive battery demand through this decade and beyond.

The global transition to EVs means that lithium-ion batteries are expected to dominate the rechargeable battery market for the next decade.⁴⁶ About 70% of global lithium-ion battery demand in 2030 will be from passenger EVs, with the remainder from electric buses, consumer electronics, grid stationary storage, and commercial EVs.⁴⁷ The value of lithium-ion batteries from mining through to recycling, could see global demand grow by over 30% every year, to reach a value of more than \$400 billion and a market size of 4.7TWh by 2030.⁴⁸ The Government has set out regulations for all new cars to be zero emission by 2035, providing clarity to manufacturers while safeguarding UK jobs.⁴⁹

The annual demand for UK battery manufacturing capacity is forecast to reach over 100GWh in 2030, predominately for private cars and light commercial vehicles (LCVs), as shown in Figure 2.⁵⁰ By 2040, nearly 200GWh of capacity will be needed in the UK to satisfy demand for batteries for private cars, commercial vehicles, HGVs (heavy goods vehicles), buses, and grid storage.⁵¹ Figure 3 shows how global demand will also increase rapidly, to over 3,500GWh in 2030 and over 5,500GWh by 2035, also dominated by private cars⁵². Further information on the projected battery demand and the scale of opportunity in the UK is available in Annex III.

Batteries will enable us to use energy in a more flexible way that supports decarbonisation goals by helping to balance the system, maximise the usable output from renewable energy, and avoid the need for new generation capacity.⁵³ As batteries become lighter, smaller, and more efficient, the aerospace, rail, marine, and defence sectors are expected to increase their use of these technological advances.

⁴⁵ McKinsey Battery Insights Team. '[Battery 2030: Resilient, Sustainable and Circular](#).' 2022.

⁴⁶ Government Office for Science. '[Rapid Technology Assessment: Novel Batteries](#).' 2023.

⁴⁷ The Faraday Institution. '[UK Electric Vehicle and Battery Production Potential to 2040](#).' 2022.

⁴⁸ McKinsey Battery Insights Team. '[Battery 2030: Resilient, Sustainable and Circular](#).' 2022.

⁴⁹ HM Government. '[Transitioning to zero emission cars and vans: 2035 delivery plan](#).' 2021.

⁵⁰ Advanced Propulsion Centre UK. '[Q2 2023: Automotive Industry Demand Forecast](#).' Quarterly Demand Reports. 2023.

⁵¹ The Faraday Institution. '[The Gigafactory Boom](#).' Faraday Insights: Issue 2, 2022.

⁵² See Figure 3: Future Global Demand for GWh by End Use

⁵³ Government Office for Science. '[Rapid Technology Assessment: Novel Batteries](#).' 2023.