ECGA
European Advanced Carbon and Graphite Materials Association

Industrial Decarbonisation Accelerator Act

Union Origin requirements for batteries should cover cathode ***and anode*** active materials

The European Carbon and Graphite Advanced Materials Association (ECGA) welcomes the Commission's reported intention to establish Union origin requirements for batteries in the amended Net-Zero Industry Act. However, **the proposed Union origin requirements for batteries, under both generic battery energy storage and specific electric vehicle provisions, structurally exclude anode active materials (AAM) from ever being sourced locally.** Since the current AAM supply situation is the most dire of all battery cell components, this outcome is inconsistent with the Act's own objectives.

A Two provisions, one blind spot

The IAA introduces Union origin requirements for batteries through two distinct amendments to the NZIA, each applying to different product categories. Neither creates a credible incentive for the localisation of anode active materials.

Battery energy storage systems (generic public procurement, auctions, and other public intervention): Beyond battery cells and a BMS, manufacturers need only localise one additional component. **A rational manufacturer will select a current collector or BTMS. These components are cheaper, simpler to integrate, and already produced at scale in Europe.**

Electric vehicles: Traction batteries must contain at least five Union-origin main specific components, of which cells, CAM, and BMS are compulsory. The remaining two may be freely chosen. While more demanding than the BESS requirement, **this provision still leaves AAM as the least likely selection, for the reasons set out below.**

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B The structural problem: AAM will be the rational last choice

The Commission's approach of leaving battery manufacturers free to choose two additional components from the list assumes that market forces will deliver a balanced localisation across the supply chain. Yet, based on a peer-reviewed cost-sensitivity analysis about a bottom-up cost model for GWh-scale Li-ion cell productio[1]n, we demonstrate why this assumption fails for anode active materials.

The table below ranks the non-compulsory components by the order in which a rational battery manufacturer would choose to source them locally, considering three factors: cost sensitivity (impact on final cell cost of a 50% input price increase), ease of integration, and current EU supply status.

Pick order	Component	Cost impact (±50%, €/kWh)	EU supply status
1	Aluminium current collector	~€1	Established supply
2	Copper current collector	~€5	Established supply
3	Battery thermal management system	~€2	Robust, scaling EU industry
4	Electrolyte	€4.55	Scaling up
5	Separator	€5.90	Existing capacity
6	Anode active material	€4.04	No meaningful EU production; high integration risk

From a pure cost basis, AAM might be cheaper to supply from within the EU. For example, based on the cost analysis from Lechner et al…, the total cost impact of a 50% anode material price a 60 kWh battery pack (e.g. BYD Dolphin) would increase the final price for battery manufacturer by approximately €242. This is less than the impact of separators (€354) or electrolytes (€273). This means the cost burden of

[1] Lechner, M., Nanz, F., Keilhofer, J., Kollenda, A. and Daub, R. (2025), „Cost Model for the Footprint Planning of Production Environments in Lithium-Ion Battery Production". *Energy Technol.*, 13: 2402311. https://doi.org/10.1002/ente.202402311

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sourcing AAM locally is among the lowest of all electrochemically active components. Yet, notwithstanding this marginal cost advantage towards similarly pricy components of a battery cell, AAM will not be chosen absent a compulsory requirement. This is because some other components are much easier to integrate and qualify:

- **Current collectors** (aluminium and copper foils) are inexpensive, simple to integrate, and already produced at scale in Europe. They are the obvious first pick.
- **Battery thermal management systems** have very low cost sensitivity. They are plug-in components with minimal qualification risk, and benefit from an established European industrial base.
- **Electrolytes**, while similarly priced to AAM on a per-kWh basis, are easier to integrate chemically and benefit from existing and scaling EU production capacity.
- **Separators** have a higher cost sensitivity (€5.90/kWh) than anode materials (€4.04/kWh), but will nonetheless be preferentially sourced locally for a reason the sensitivity analysis alone does not capture: **separators are extremely costly to transport**. Due to their fragility and low density, separator rolls are essentially shipped as air. This creates a strong natural economic incentive for local sourcing that does not exist for anode active materials, which are dense powders that can be shipped globally at low cost per kilogram.
- **Anode active materials** combine the worst of all factors: no meaningful EU production base, high integration complexity as an electrochemically active component (qualification cycles costing up to €10 million and lasting at least a year per customer), and no natural transport cost advantage favouring local sourcing.

In short, the battery manufacturer's rational calculus will exhaust every alternative before turning to AAM. Thus, the IAA's domestic content requirements, under their current shape, will allow manufacturers to satisfy their obligations with current collectors, BTMS, and one of either electrolytes or separators, without ever qualifying a European anode supplier.

C AAM satisfies all criteria under Article 28h

If the policy rationale for requiring Union-origin CAM is supply security and industrial resilience, the same rationale applies with equal or greater force to AAM.

C.1 (a) Union industry producing below capacity

Our members currently have 4kt of installed battery-grade graphite capacity. This is negligible compared to projected demand, and utilisation is extremely low due to the absence of offtake contracts. Only pilot plants are currently running (in France and Norway). Scaling these to full commercial output would bring European capacity to 110 kt within a year. Additional projects in Spain, Finland, and Sweden could raise it to 170 kt by 2030, and in the best case, 720 kt by 2035.

However, investment decisions depend on credible demand signals. Qualification cycles for battery-grade graphite cost up to €10 million per customer and take at least a year, meaning offtake contracts below 30 kt are generally insufficient to make projects bankable. Without a clear domestic content requirement, European battery manufacturers have no incentive to begin qualifying European anode material suppliers.

C.2 (b) Contribution to economic security and resilience

According to our consultancy Wood Mackenzie, the EU depends on China for over 95% of its processed battery-grade graphite. This concentration exceeds even the dependency levels for cathode active materials. It is one of the most acute single-country vulnerabilities in the EU's raw materials supply chain. Battery-grade graphite is listed as a strategic raw material by the EU precisely for this reason. NATO's assessment has also flagged graphite as a critical raw material.

C.3 (c) Technological progress

According to the International Energy Agency, silicon-graphite composite anodes are progressively gaining market share, with approximately 30% of anodes now containing silicon. However, **even the most advanced silicon-doped anodes contain at least 85% graphite by weight.** Graphite is therefore projected to remain the primary anode material until at least 2035. Sodium-ion batteries, the only commercially emerging chemistry that avoids graphite entirely, remain limited to low-energy-density applications such as urban vehicles and stationary storage, with global manufacturing capacity at barely 100 GWh compared to approximately 1,500 GWh for lithium-ion.

C.4 (d) Demand for the relevant net-zero technologies

According to Wood Mackenzie, global demand for battery-grade graphite is projected to grow approximately sixfold between 2025 and 2050. **Cumulative investment of €14–18 billion would be**

required in the EU alone by 2035 to meet the Critical Raw Materials Act's 40% local content processing target for anode active materials. Excluding anode materials from Union origin requirements removes the demand signal that would justify this investment.

C.5 (e) Share of product in total production value of the downstream sector

The sensitivity analysis by Lechner et al. (2024) demonstrates that anode active materials account for a moderate share of total cell cost. A 50% increase in AAM price increases final cell cost by only €4.04/kWh. This is less than the impact of cathode active materials (€13.27/kWh), separators (€5.90/kWh), or electrolytes (€4.55/kWh). For a 60 kWh battery pack, this translates to approximately €242, compared to €796 for cathode materials, €354 for separators, and €273 for electrolytes.

This limited cost share is significant in two respects. First, it means that **the cost burden of a compulsory AAM origin requirement on battery manufacturers would be lower than that of the already-mandated cathode active materials.** This undermines any argument that AAM inclusion would be disproportionately costly. Second, **this same limited cost share is precisely what makes AAM the component most likely to be deprioritised under a voluntary system**: battery manufacturers will focus their localisation efforts on components where cost, logistics, or supply considerations already favour EU sourcing, not on the component with the weakest market pull.

C.6 (f) Impact on competitiveness, costs, and greenhouse gas emissions

Impact on costs. The sensitivity analysis referenced above confirms that the downstream cost impact of sourcing AAM locally is contained. Even under an extreme scenario where EU-sourced anode material carries a 50% price premium over Chinese imports, **the impact on a 60 kWh battery would be approximately €242, or roughly 2–3% of total pack cost. This is well within the range that public procurement premiums and auction design parameters can absorb**, and it is a fraction of the cost impact that the already-compulsory cathode active material requirement imposes.

Impact on greenhouse gas emissions. The CO_2 footprint of European battery-grade graphite is a fraction of its Chinese counterpart, at below 3 kg CO_2-equivalent per kilogram compared to 15–25 kg. This discrepancy is primarily due to the widespread use of legacy and less efficient processes in China, but also partly explained by the country's coal-dependent electricity grid.

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