

"The battery is the technology of our time." - The Economist

inno

TRENDS AND SITUATION OF BATTERY INDUSTRY IN EUROPE

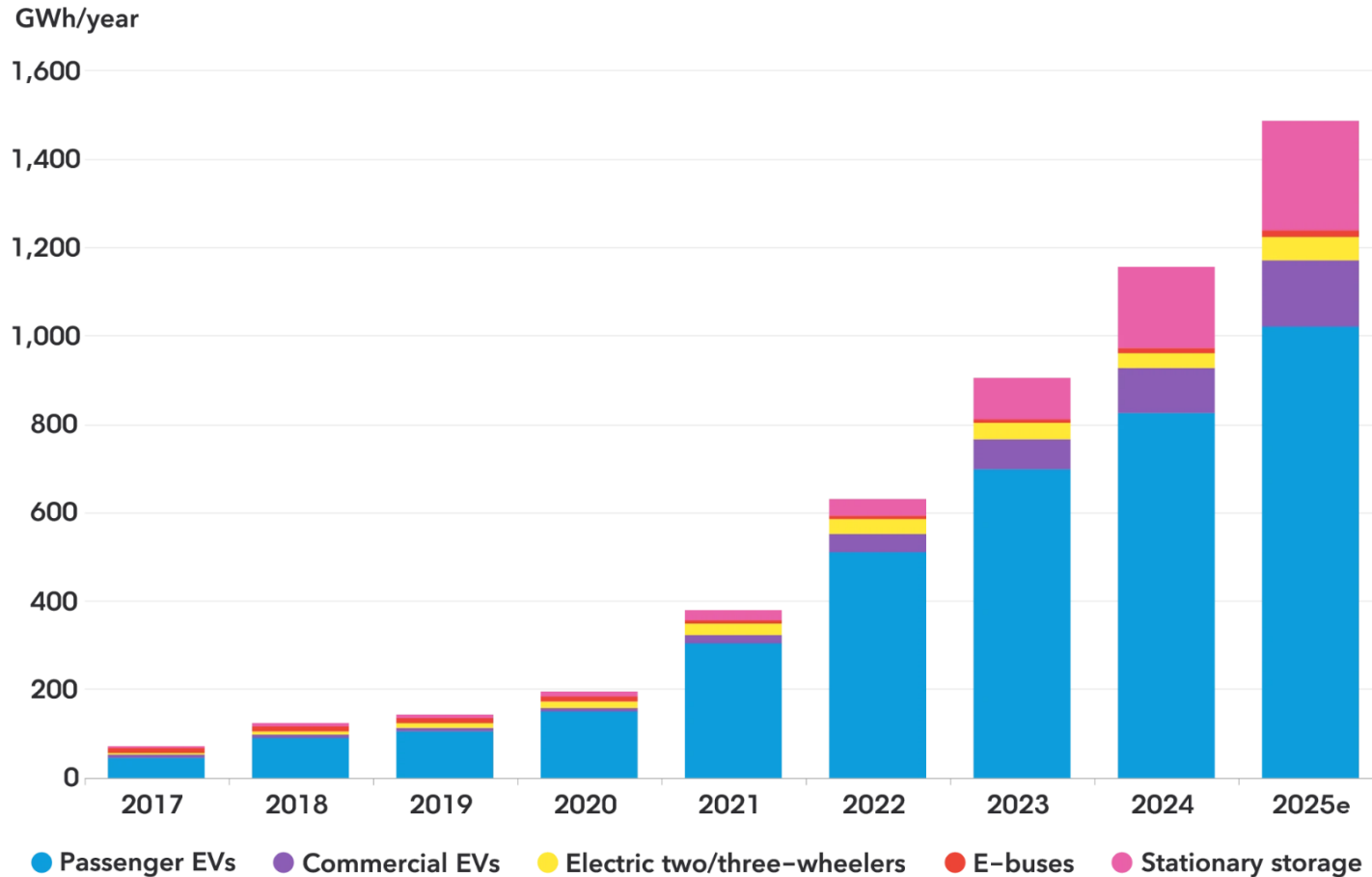
NORDIC BATTERY SUMMIT TAMPERE MAY 18, 2026

BO NORMARK

Battery Market

Batteries, market and cost

Annual lithium-ion battery demand by application



Source: BloombergNEF

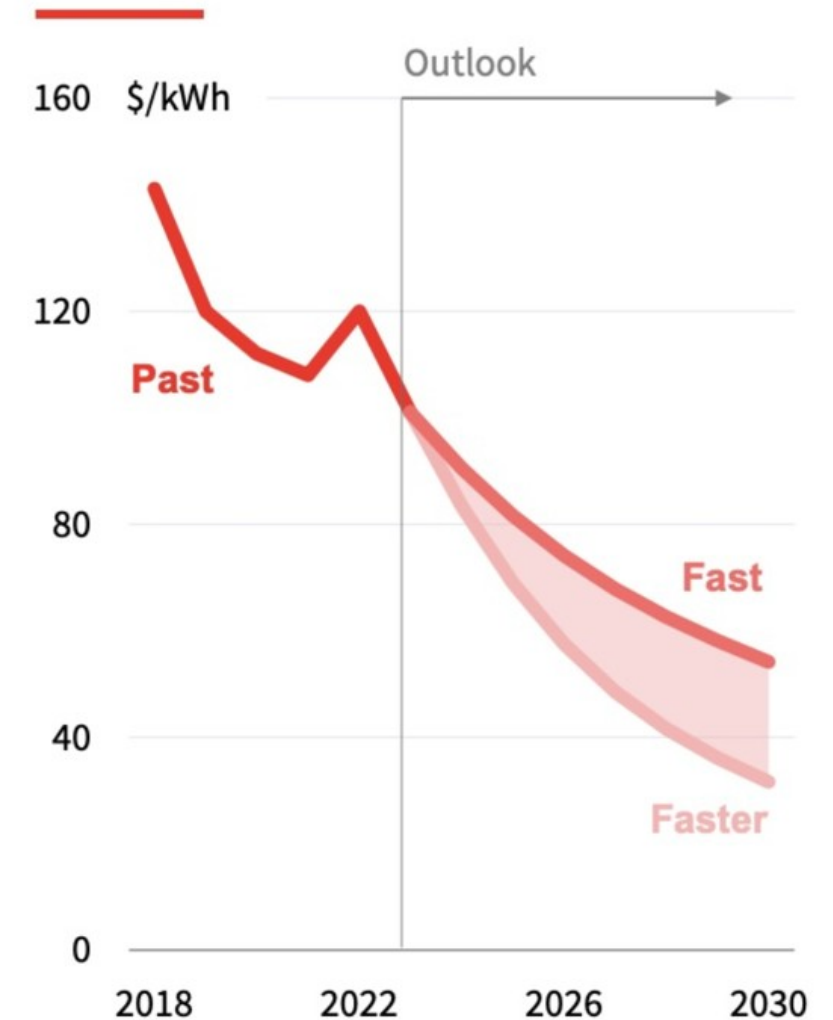
CEEC's 7 GWh battery storage cell procurement sees low end prices at \$47/kWh

China's latest large-scale battery energy storage cell procurement has established new pricing benchmarks for both $\geq 314\text{Ah}$ and $\geq 500\text{Ah}$ lithium iron phosphate (LFP) cells.



By Marija Maisch | May 12, 2026

Battery costs



How China came to dominate the EV and Battery industries

2010, The new three introduced in the five year plan..

The 'new three': How China came to lead solar cell, lithium battery and EV manufacturing

Government support, economies of scale and constant innovation have helped propel China in key transition industries

The concept of the “new three” – or xin san yang – speaks directly to China’s “old three” that were once the pillars of its exports: clothing, home appliances and furniture.

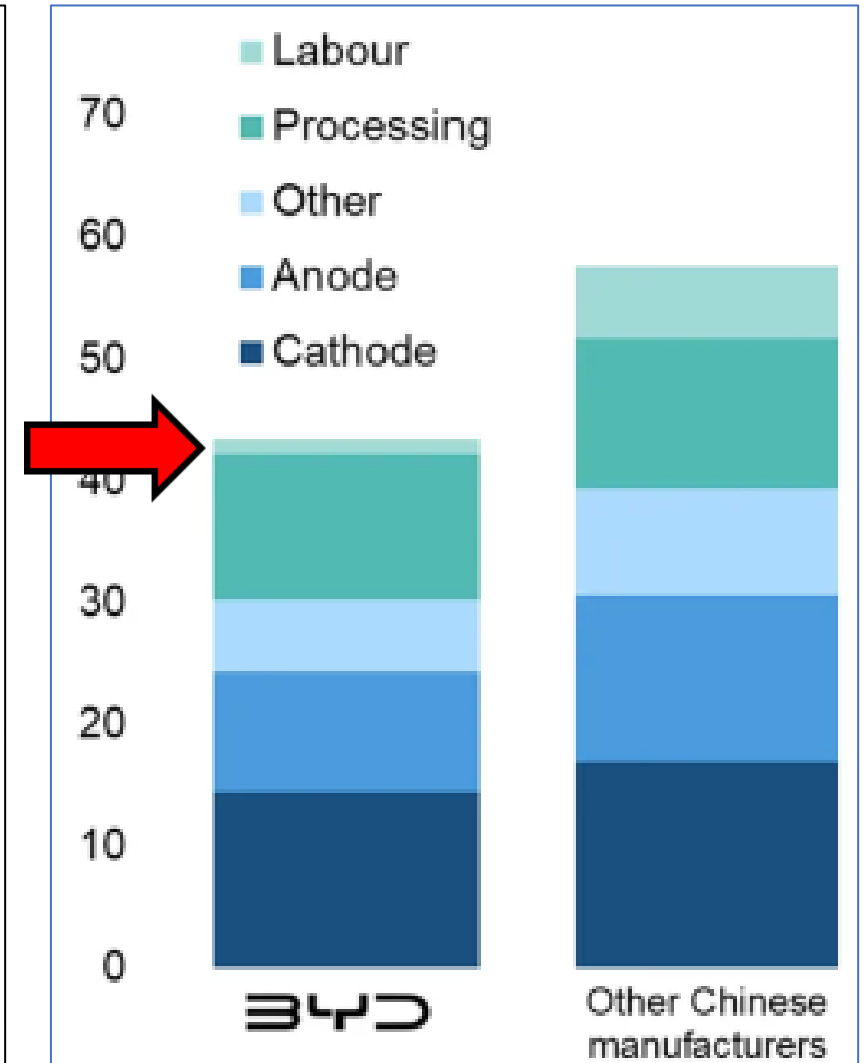
The drivers behind the surging trio are consistent government support, an early start, strong and low-cost domestic supply chains, and a massive home market driving economies of scale.

Efficient design and manufacturing excellence

BYD electric SUV teardown shocks Japan: 'How can it be produced at such a low cost?'



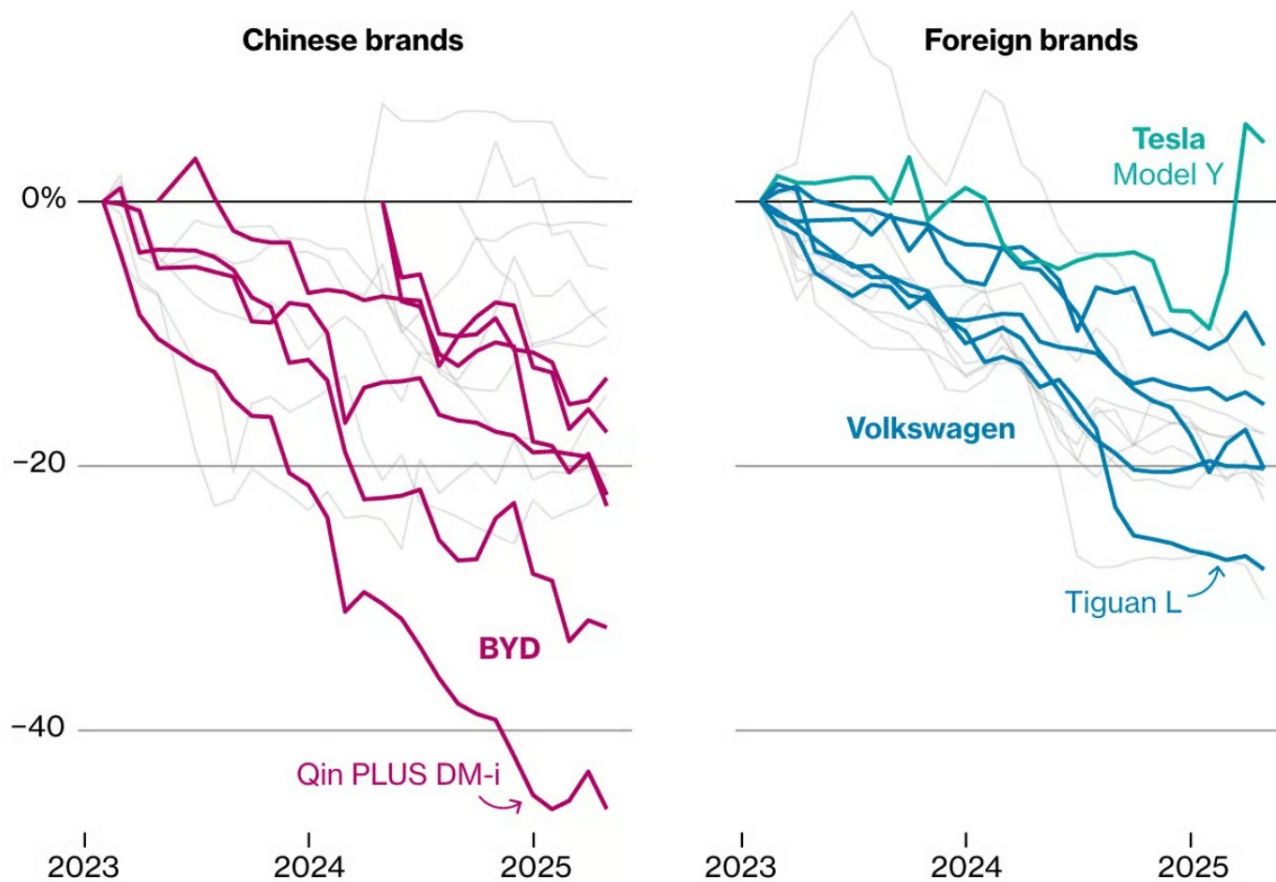
Peter Johnson | Oct 22 2024 - 10:54 am PT | 235 Comments



Fierce competition in EV:s among Chinese EV suppliers

Chinese Automakers Discounting Heavily Within China

Change in car prices since 2023 of the 30 best-selling models



**“Only 7 of 170
Chinese Automakers
Will Survive”**

Source: China Automotive Technology and Research Center

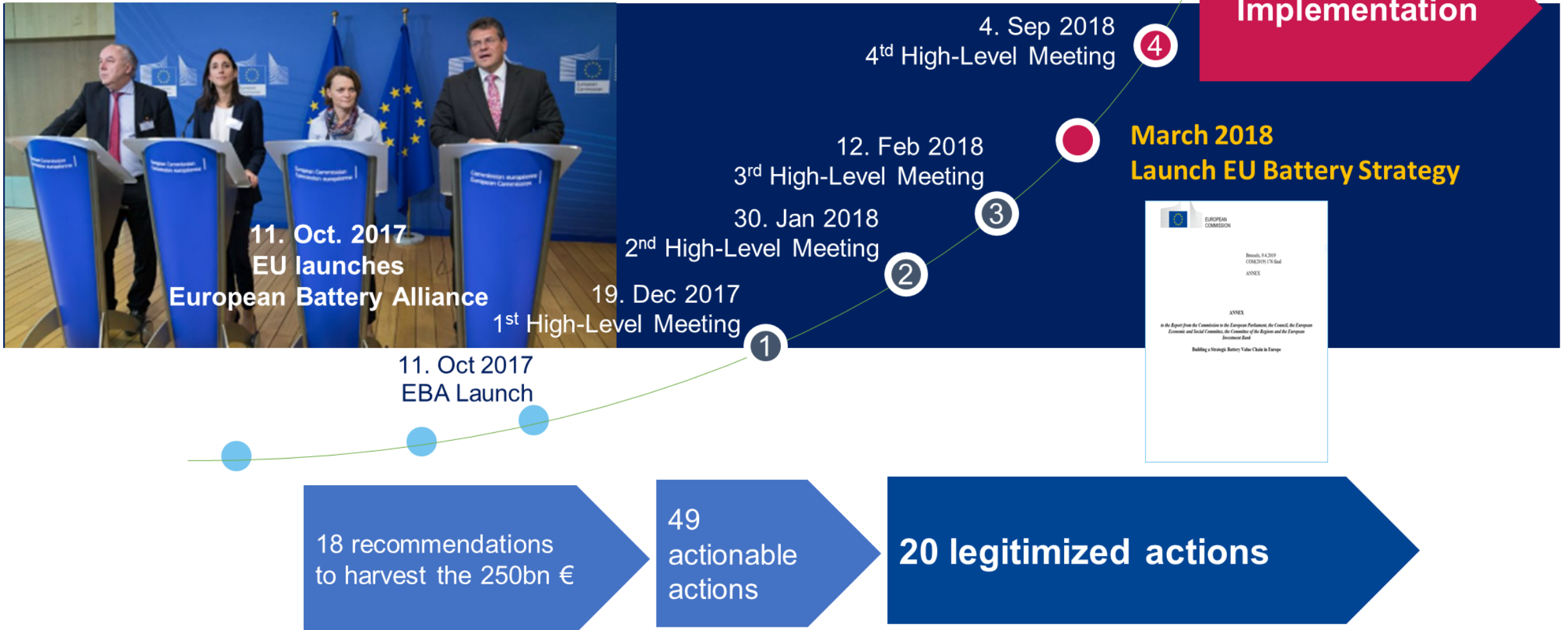
Note: For models released after 2023, chart shows change in price since launch month. Top 30 models as of April 2025.

Price reductions at Chinese and foreign brands (Source: Bloomberg)

European battery industry 2017 - 2024

European Battery Alliance, unique initiative 2017

• Timeline European Battery Alliance



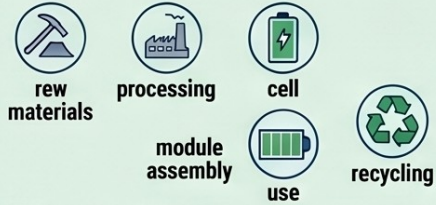
Building Europe's Battery Powerhouse: A Roadmap of EU Strategic Initiatives (2017-2031)

2017: Launch of the European Battery Alliance (EBA)



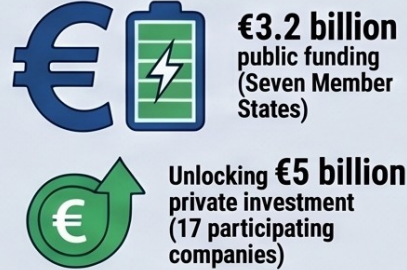
Established to bring together over 100 stakeholders to create a competitive and sustainable battery ecosystem in Europe.

May 2018: Strategic Action Plan for Batteries



Shifted EU focus from sectoral to a value-chain approach, identifying batteries as a strategic imperative for clean energy transition.

Dec 2019: Approval of the First IPCEI on Batteries



€3.2 billion public funding (Seven Member States)

Unlocking €5 billion private investment (17 participating companies)

2020: Strengthening the Value Chain (ERMA & ALBATTs)



ERMA
(Raw Material Alliance)
to secure access to critical minerals

ALBATTs
(Skills Gap Program) to address emerging industrial skills

Jan 2021: Launch of "EuBatin" (Second Battery IPCEI)



Coordinated by Germany, involving 12 Member States and 42 companies, integrating mining, cell production, and recycling.

2022: REPowerEU Plan



Accelerated transition to clean energy sources, significantly increasing long-term demand for domestic battery storage solutions.

March 2023: Temporary Crisis and Transition Framework



Adopted to speed up investments in clean-tech production in response to global geopolitical shifts and energy price volatility.

July 2024: Mandatory Carbon Footprint Declarations



The EU Battery Regulation began requiring mandatory carbon footprint declarations to give European manufacturers a competitive edge.

Dec 2024: First Dedicated Innovation Fund Battery Call



Launched to specifically support innovative electric vehicle (EV) battery cell manufacturing.

June 2025: Clean Industry State Aid Framework (CISAF)



Simplified national support rules, allowing Member States to provide faster, more flexible assistance for industrial decarbonization.

March 2025: Adoption of 47 Strategic Projects



Under Critical Raw Materials Act, projects selected covering Lithium, Nickel, Cobalt, and Graphite to diversify supply chain.

July 2025: €852 Million Awarded to Pioneering Projects



Six strategic EV battery projects in France, Germany, Sweden, and Poland selected to scale sustainable manufacturing and reduce import reliance.

Q2 2026: Proposal for an Industrial Decarbonisation Bank



Funded by ETS revenues to provide grants, guarantees, and contracts for difference (CFDs) for clean-tech.

July 2027: Maximum Carbon Threshold Enforcement



Final step of Battery Regulation: meeting specific carbon thresholds becomes mandatory condition for placing batteries on EU market.

2031: Targeted Completion of Initial IPCEI Projects

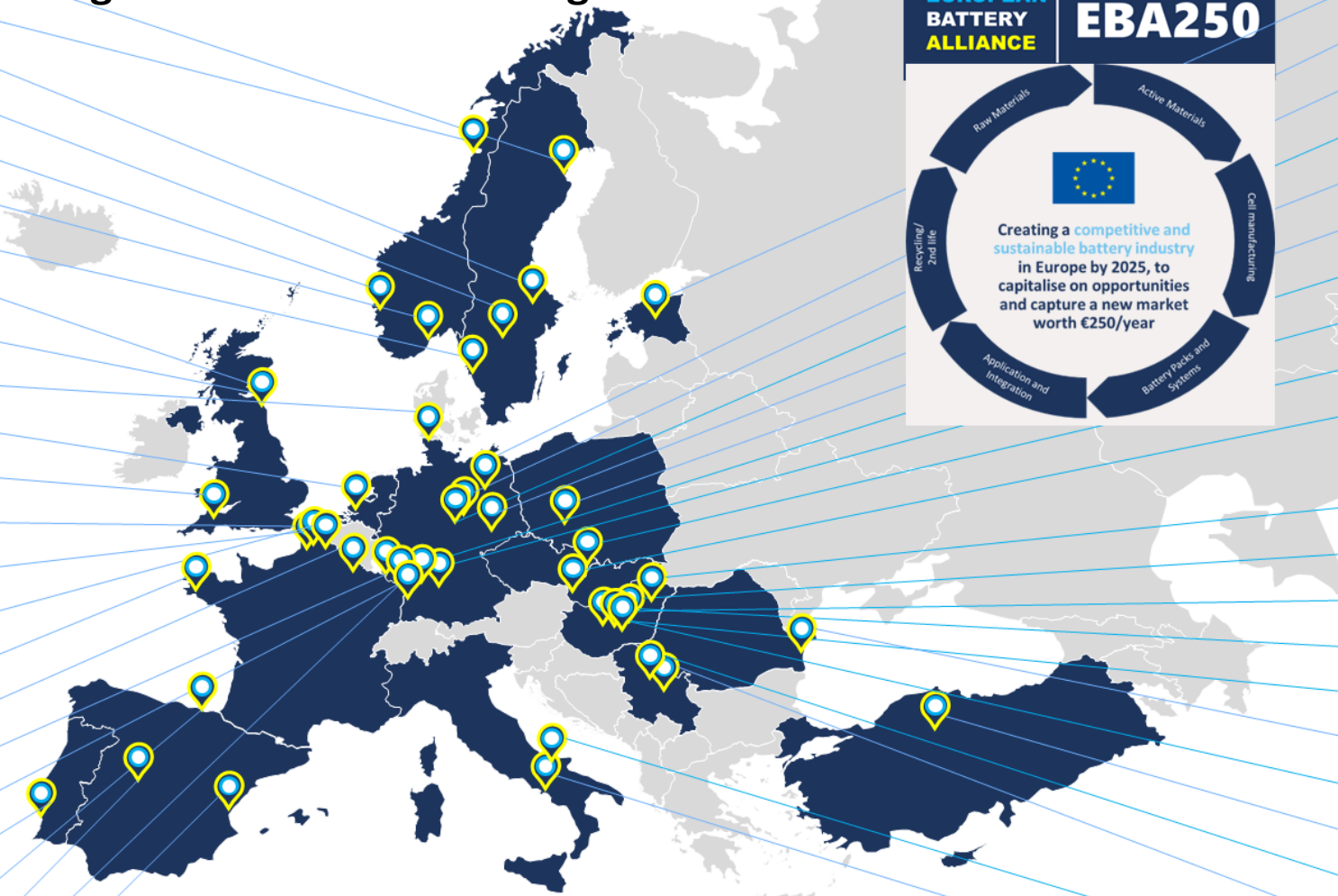


Full realization of first pan-European battery ecosystem, marking transition from development to a mature industrial base.

Status Europas Battery Industry 2022 and 2026

Tesla Increases Battery Cell Production
Target in Grünheide to 18 Gigawatt-Hours

| |
|--|
| XXXX NORTHvolt/ETT In operation, up to 60 GWh |
| XXXX Northvolt Announced, planned start 2024, up to 29 GWh |
| XXXX NORTHvolt Labs In operation, up to 5 GWh |
| XXXX Volkswagen Announced, planned start 2025, up to 10 GWh for HDV |
| XXXX BMW Announced, planned start 2025, up to 10 GWh |
| XXXX Mercedes Announced, planned start 2025, up to 24 GWh |
| XXXX NOVO (Northvolt/ Volvo Cars) Announced, planned start 2025, up to 50 GWh |
| XXXX ENVISION AESC In operation, up to 1.9 GWh |
| XXXX ENVISION/ Renault/ Nissan Announced, planned start 2025, up to 24 GWh |
| XXXX NORTHvolt/ Grünheide Announced, planned start 2026, up to 60 GWh |
| XXXX EVG Announced, planned start 2022, up to 45 GWh |
| XXXX EVG Announced, planned start 2022, up to 40 GWh |
| XXXX Prisma Announced, planned start 2025, up to 45 GWh |
| XXXX VERKOR/ Renault 20230, up to 50 GWh |
| XXXX ENVISION/ Renault Announced, planned start 2025, up to 24 GWh |
| XXXX Bluebird Announced, planned start 2025, up to 1.5 GWh |
| XXXX ACC, France IPCEI project, start 2025, up to 40 GWh |
| XXXX ACC, Germany IPCEI project, start 2025, up to 240GWh |
| XXXX ACC Announced, planned start 2025, up to 24 GWh |
| XXXX CALB Announced, planned start 2025, up to 45 GWh |
| XXXX Basque Announced, planned start 2025, up to 10 GWh |
| XXXX Envision AESC Announced, start 202X, up to 30 GWh |
| XXXX Leclanché/ Eneris Small scale operation (0.3 GWh) for niche appl. |
| XXXX VW Announced, up to 20 GWh |



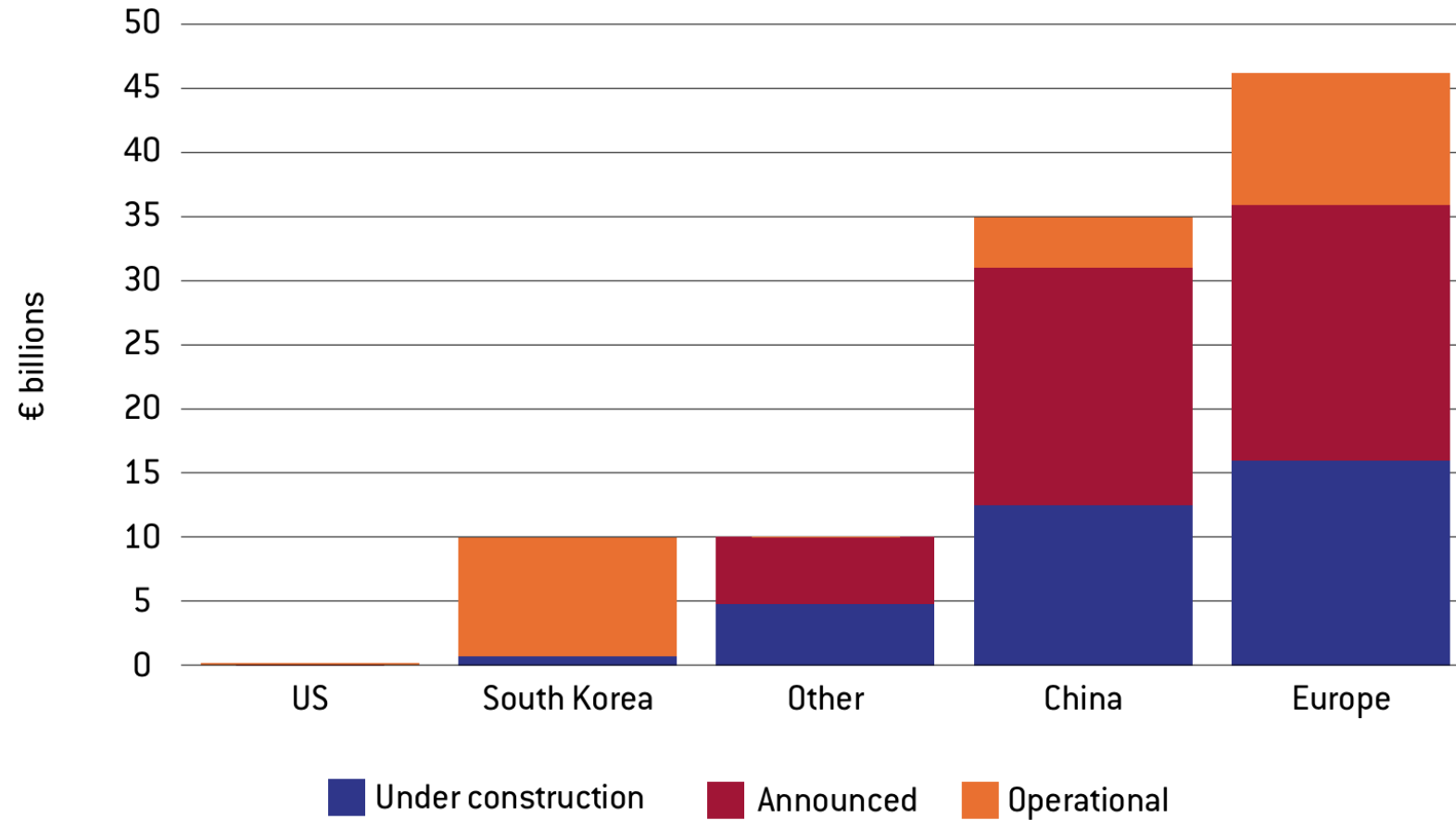
| |
|--|
| XXXX Alstom Announced, planned start 2025, up to XX GWh |
| XXXX Northvolt In operation, up to 150 GWh |
| XXXX CATL In operation, up to 80 GWh |
| XXXX Volkswagen Start 2022, up to 40 GWh |
| XXXX SK Innovation Announced, start 2025, up to 16 GWh |
| XXXX LG ES In operation, 24 GWh, up to 67 GWh |
| XXXX SK Innovation Announced, start 2025, up to 1.3 GWh |
| XXXX VARTA IPCEI project, Start 2021, up to 5 GWh |
| XXXX MES Started 2020, up to 15 GWh |
| XXXX INOBAT Announced, up to 2 GWh |
| XXXX GOTIC/ INOBAT Announced, start 2025, up to 40 GWh |
| XXXX EVE Energy Announced, start 2028, up to 30 GWh |
| XXXX SAMSUNG Start 2018, up to 30 GWh |
| XXXX SK Innovation In operation, 7.5 GWh |
| XXXX SK Innovation In operation, 9.8 GWh |
| XXXX SK Innovation Announced, start 2025, up to 30 GWh |
| XXXX PRIME In operation, 2 GWh in 2024, 8 GWh in 2026 |
| XXXX CATL Construction started, up to 100 GWh |
| XXXX SK Innovation/ Ford Motor/ Koç Announced, start 2025, up to 30 GWh |
| XXXX ELEVEN ES Announced, up to 16 GWh |
| XXXX SK Innovation Announced, planned start 2032, up to 32 GWh |
| XXXX ACC Announced, planned start 2026, up to 40 GWh |
| XXXX FAAM/FIB IPCEI project, up to 8 GWh |

Under construction/ in operation
Planned, partially financed
Announced, financial status unclear

Source: EBA250 Observatory monitoring of public announcements on Li-Ion cell production capacity

Who has been investing in the European battery value chain ?

Figure 2: Battery investment in Europe by source, 2020-2024



Sources: Bruegel. Notes: investment statistics are at the plant level (ie a company at a specific location). Europe refers to EU27, Norway, Switzerland and the UK. Data is expressed in 2023 euros.

European battery industry status and way forward

Europe's Battery Powerhouse: Mapping Capacity & Capital

Context: Since 2017, EU transitioned to major industrial pillar, mobilizing capital. By 2025, region reached 252 GWh of nominal production capacity across 34 gigafactory projects, though output often lags.

The Financial Architecture (2017-2025)



€127 Billion
Total Commitment

Total capital committed across 111 major industrial battery projects along the entire European value chain.



€38 Billion
in Manufacturing

Specific corporate investment dedicated to the physical construction of battery cell factories.



89%
Demand-Side Bias

Consumer EV Incentives
Direct Industrial Manufacturing



Foreign-Driven Growth:

Top five manufacturers (all foreign-owned) account for 95% of total actual production output.



252 GWh Total Capacity

Poland, Hungary, and Germany serve as the primary engines, hosting the continent's largest gigafactories.

Germany
Tesla, CATL, VW PowerCo
Capacity: ~50+ GWh
(Focused on automotive integration)

Poland
LG Energy Solution
Capacity: ~86 GWh
(Largest single site in EU)

Hungary
SK On, Samsung SDI, CATL
Capacity: ~177 GWh
(Operational + Under Construction)

2025
9% of global battery production
30 % of battery supply to European OEM:s

EU Battery Industry 2025: The Industrial Reality of the Ramp-Up

2025 DEMAND TARGET: **400 GWh**



xEV Sector
(85% of Total Demand)



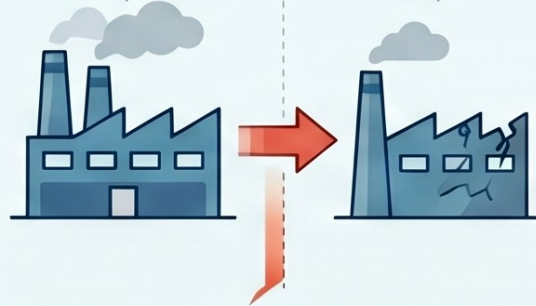
EUROPEAN INDUSTRY DEMAND IS DOMINATED BY THE xEV SECTOR

85%

NAMEPLATE CAPACITY vs. ACTUAL OUTPUT REALITY

Theoretical Maximum Annual Volume: 252 GWh

Operational Output in 2025: 150-200 GWh



GAP: 20% TO 40% LOWER THAN INSTALLED NAMEPLATE CAPACITY DUE TO RAMP-UP DELAYS AND INEFFICIENCIES

THE UTILIZATION GAP: EU vs. ASIA

NEW EUROPEAN GIGAFACTORIES (First 24-36 Months)

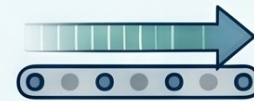
ESTABLISHED ASIAN COMPETITORS



Typically operate at 50% utilization



Often exceed 90%



THE "SCRAP RATE" HURDLE



15-30%
Scrap Rate (15-30%)

MATURE PLANTS TARGET UNDER 5% SCRAP

NEW EU FACILITIES REPORT INITIAL SCRAP RATES OF 15-30% DURING COMPLEX FINE-TUNING OF PRODUCTION LINES

THE €17 BILLION IMPORT DEPENDENCY

Imports: Primarily China, South Korea

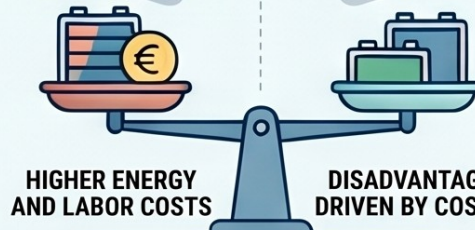


BECAUSE DOMESTIC OUTPUT LAGS, THE EU REMAINS A NET IMPORTER OF BATTERIES

65-75%

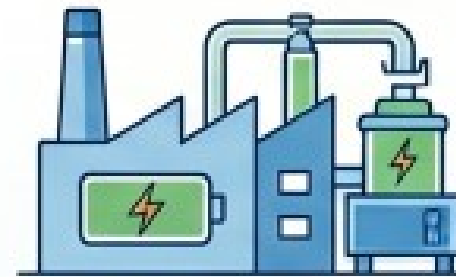
OF CELLS STILL ORIGINATING FROM OUTSIDE THE REGION

THE PERSISTENT COST GAP



HIGHER ENERGY AND LABOR COSTS

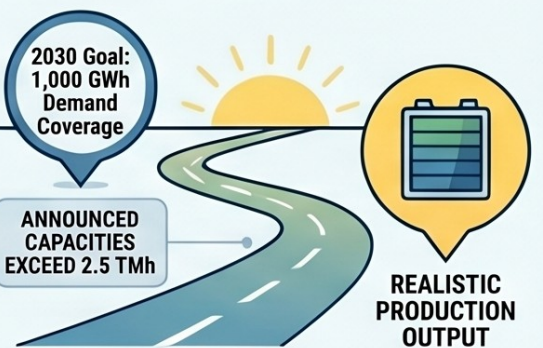
DISADVANTAGE DRIVEN BY COSTS



250 GWh
Manufacturing Capacity

Europe is 2nd largest producer (9% global share).

THE 2030 HORIZON: 1.1 TWh OUTPUT



2030 Goal: 1,000 GWh Demand Coverage

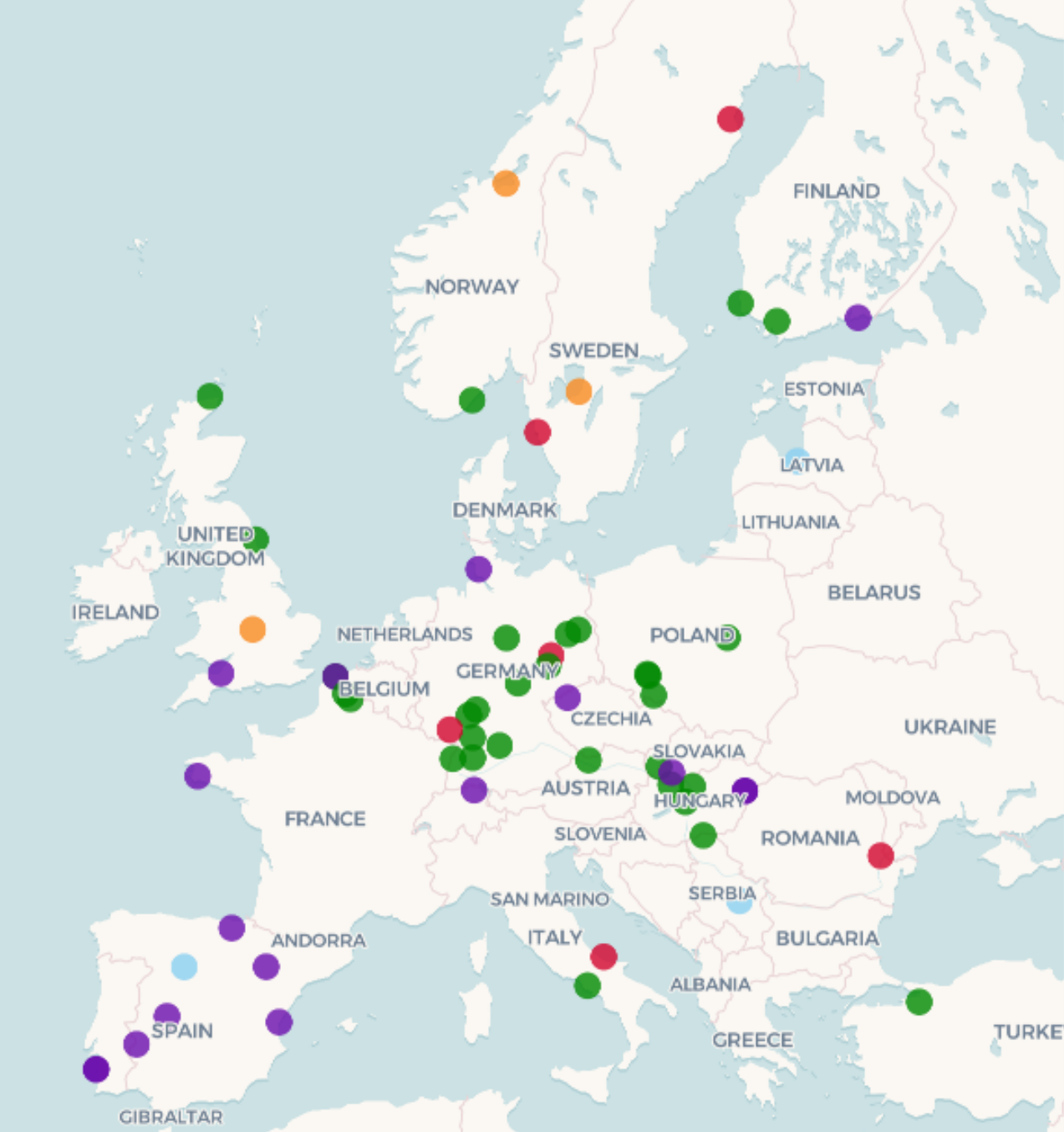
ANNOUNCED CAPACITIES EXCEED 2.5 TWh

REALISTIC PRODUCTION OUTPUT

0.8-1.1 TWh

PROJECTED BY ANALYSTS DUE TO ONGOING DELAYS, REQUIRING SHIFT TO HIGH-PRECISION MANUFACTURING EFFICIENCY

EU Battery Factory forecast



- ✓ Operational
- ✓ Under Construction
- ✓ Permitting Stage
- ✓ Suspended
- ✓ Announced M.O.U.

Strategic Funding Mechanisms implemented

- **IPCEI Framework:** Two "Important Projects of Common European Interest" pooled public aid to de-risk high-level innovation. The 2019 project provided **€3.2 billion**, followed by the 2021 EuBatIn project with **€2.9 billion** targeted at first-industrial deployment.
- **Battery Booster Facility:** Introduced in late 2025, this **€1.5 billion** facility utilizes the EU Innovation Fund to provide interest-free loans. While critical for liquidity, actual capital deployment is not targeted until **2026**.
- **Upstream Mitigation:** The RESourceEU plan (**€3 billion**) and InvestEU (**€6 billion**) aim to bridge the critical raw material (CRM) gap by 2026–2027.

Structural Imbalance in Public Support

A critical geoeconomic failure is observed in the allocation of public capital. In 2024, the EU directed **18 billion** toward demand-side incentives (consumer EV rebates)** and a mere ****2.5 billion** toward supply-side industrial manufacturing. This demand-heavy structure effectively functioned as a pass-through subsidy for foreign competitors; while the EU spent billions to stimulate demand, it simultaneously imported **€22 billion** in battery cells directly from China to satisfy that subsidized consumption.

Ownership Structure and Geopolitical Reliance

- **Foreign Dominance:** Historically, South Korean firms held **82%** of installed capacity, while indigenous European firms controlled only **8%**.
- **The "Top Five" Monopoly:** Five foreign entities—**LG Energy Solution, SK On, Samsung SDI, CATL, and Envision/BYD**—account for **95%** of actual production output.
- **Technological Displacement:** European firms were late to pivot from Nickel Manganese Cobalt (NMC) to Lithium Iron Phosphate (LFP). As the market shifts toward cheaper LFP, cobalt requirements are projected to **drop by more than three-quarters**

Europe at a crossroad



"We need to significantly reorient our policy towards Beijing. If Chinese players want access to the European market — representing 450 million consumers — then a number of necessary technology transfers must be imposed in areas where Europe has fallen behind, but where China is at the forefront, such as batteries."

Stéphane Séjourné

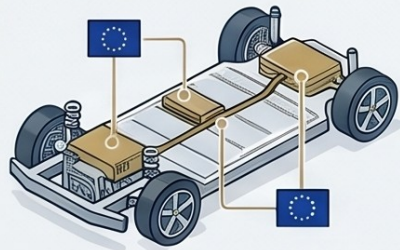
Executive Vice-President of the European Commission for Prosperity and Industrial Strategy. European Commissioner for Industry, SMEs and the Single Market

The Industrial Acceleration Act: Powering a Sovereign European Battery Value Chain

Following major project collapses, the EU shifts from voluntary targets to mandatory "Made in EU" requirements. The Industrial Accelerator Act (IAA) aims to reverse industrial decline, targeting a manufacturing share of 20% of EU GDP by 2035.

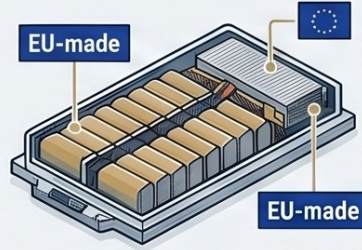
The "Made in EU" Mandate for Batteries

Year 1: Stricter Procurement Entry



EVs must contain at least **three EU-sourced components** to qualify for public incentives.

Year 3: Mandatory Local Cell Production

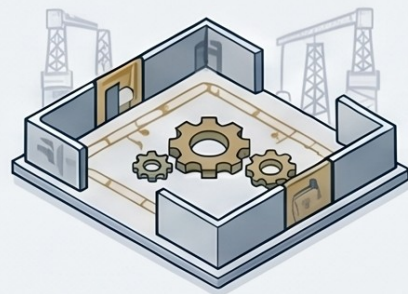


Traction batteries must include **EU-made cells**, cathode active materials, and management systems.



70% Local Component Threshold

Non-battery EV components must reach 70% EU origin for public procurement eligibility.



Strategic Safeguards & Investment Rules

Conditional Foreign Direct Investment (FDI)

>€100M



Dominant Non-EU Countries



Technology Transfer



EU Partnerships

Foreign-backed strategic dominant non-EU countries require technology transfer and EU partnerships.

50% EU Workforce Requirement

50%



Foreign-backed strategic projects must employ at least 50% EU workers to gain approval.

18-Month Permitting "One-Stop-Shop"



Single digital access points will streamline approvals for new battery manufacturing projects.

Implications of Chinese Greenfield FDI – Risks vs. Benefits

Potential Benefits

- **Economic Impact:** Large-scale investments create local jobs and growth.
- **Resilience:** Locating production within the EU reduces the risk of supply chain disruptions.
- **State Support:** Several Member States actively solicit these investments with state aid (e.g., tax breaks, grants) to aid reindustrialization.

Strategic Risks

- **Deepened Dependency:** EU reliance on Chinese firms is deepened as they act within the Single Market.
- **Market Distortion:** Subsidized Chinese firms investing in the EU may unlevel the playing field and dampen growth prospects for EU competitors.
- **Tariff Jumping:** Local production allows Chinese firms to bypass import tariffs.

Elusive Benefits: Positive spillovers may be limited if Chinese firms rely on imported suppliers

Conclusion

- **Balancing Act:** The EU faces a trade-off between partnering for economic growth (FDI jobs) and protecting security (reducing dependencies).
- **Coordination:** There is a need for greater EU coordination on greenfield investments

Way forward

Comeback for European automotive industry



EU EV sales Q1, 2026

| | | | |
|----|------------------------------|--------|---|
| 1 | Tesla Model Y | 51,673 | Germany (Grünheide) |
| 2 | Škoda Elroq | 28,321 | Czechia (Mladá Boleslav) |
| 3 | Tesla Model 3 | 26,488 | China (Shanghai) |
| 4 | Renault 5 (inc. Alpine A290) | 24,369 | France (Douai) |
| 5 | Škoda Enyaq | 21,152 | Czechia (Mladá Boleslav) |
| 6 | Volkswagen ID.4 | 18,987 | Germany (Zwickau / Emden) |
| 7 | Volkswagen ID.3 | 17,665 | Germany (Zwickau) |
| 8 | Volkswagen ID.7 | 15,833 | Germany (Emden) |
| 9 | Leapmotor T03 | 14,471 | China (Hangzhou) / Transitioning to Spain |
| 10 | Mercedes-Benz CLA EV | 14,424 | Germany (Rastatt) |

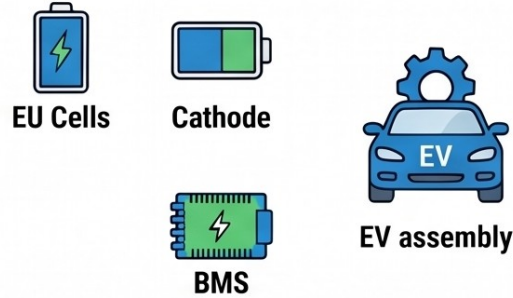
European factories meets 47% of EV battery supply

The EU's Battery Blueprint: Powering Up via the Industrial Accelerator Act (IAA)



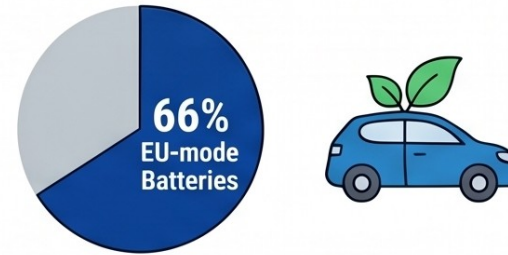
Step 1: Identifying the Strategic Imperative

The IAA focuses on "strategic sectors" like batteries and electric vehicles (EVs) to secure economic sovereignty and ensure that the clean energy transition is built on a homegrown industrial base.



Step 2: Enforcing "Made in EU" Procurement

To receive public support, EVs must initially source three key battery components (including cells) from the EU; within three years, this mandate expands to five components, including cathode active material and battery management systems.



Step 3: Capturing the EV Lead Market

By 2027, the IAA mandates that 66% of all electric cars sold in the EU must use European-produced batteries to qualify for procurement incentives and meet CO2 performance standards.

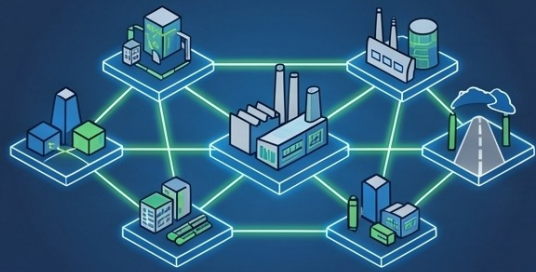


12-18 Months Binding Timelines

Digital "One-Stop-Shop"

Step 4: Streamlining Permit Approval

The Act creates a single digital "one-stop-shop" for all manufacturing permits, imposing binding timelines of 12 to 18 months and introducing "tacit approval" at intermediate stages to prevent administrative delays.



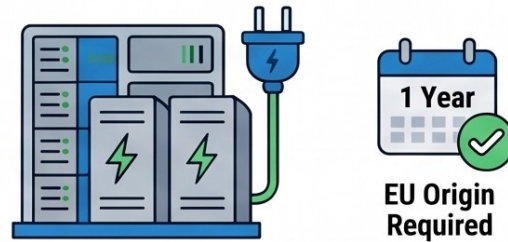
Step 5: Designating Acceleration Areas

Member States must designate at least one "Industrial Manufacturing Acceleration Area" within 12 months, where clusters of projects benefit from pre-issued baseline permits and prioritized infrastructure connections.



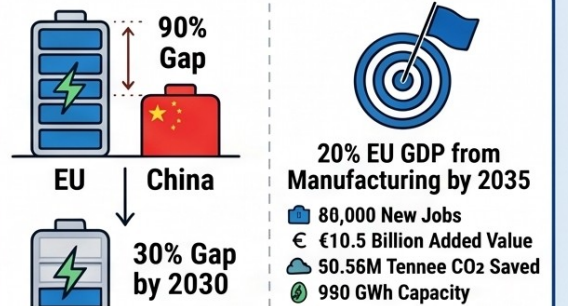
Step 6: Screening Foreign Direct Investment (FDI)

Large investments (>€100M) from countries controlling >40% of global capacity (primarily China) are subject to strict approval; investors must guarantee 50% EU employment and mandatory technology transfers.



Step 7: Transitioning the Energy Storage Sector

One year after entry into force, Battery Energy Storage Systems (BESS) must originate in the EU, with stricter component-level requirements following at the three-year mark.




Step 8: Bridging the "Sovereignty Cost" Gap & 2035 Goal

While EU battery cells currently cost more than Chinese alternatives, the IAA aims to scale production to reduce this cost gap. The final goal is to increase EU GDP from manufacturing.

The New Battery Frontier: Europe's Strategic Roadmap for NMC, LFP, Sodium, and LMNO

Traditional Powerhouses (The Current Landscape)

NMC: The High-Performance Bottleneck

Volatile Cobalt Prices



Conflict Minerals (DRC)

While high-performing, NMC (Nickel Manganese Cobalt) chemistries rely on volatile cobalt prices and ethically concerning supply chains.

LFP: The Chinese-Dominated Standard



Chinese-Dominated





Single-track Lithium Focus

LFP batteries currently dominate the market but represent a "single-track lithium focus" that creates strategic autonomy risks for European industry.

The New Frontier

The Sodium-Ion Revolution




€10 Billion European Market by 2035 

Zero Rare Earth Chemistry
Sodium batteries avoid conflict minerals entirely, using Prussian white cathodes (local iron/sodium) and hard carbon anodes processed from European wood or blowaste.

Climate-Resilient Energy Storage
These batteries operate more efficiently in extreme cold than standard lithium, making them ideal for European grid loads and stationary storage.

The LMNO Breakthrough



Breaking the Cobalt Monopoly
LMNO (Lithium Manganese Nickel Oxide) completely eliminates cobalt and slashes nickel dependency, rewriting the material list to fit Europe's geological profile.

4.7 Volts of High-Voltage Efficiency
LMNO operates at a high voltage, acting as a bridge between high energy density and domestic supply chain resilience.

Seamless Gigafactory Retrofits
LMNO manufacturing is highly compatible with conventional lithium-ion lines, allowing factories like Northvolt to adapt infrastructure with minimal re-tooling costs.

Benchmarking the Strategic Shift

| Battery Type | Material Reliance | European Strategic Advantage | Primary Application |
|--|--|--|---|
|  NMC |  High Cobalt & Nickel |  High energy density (Status Quo) |  Premium EVs |
|  LFP |  Lithium & Iron |  Established baseline for comparison |  Mass-market EVs |
|  Sodium (Na-ion) |  Sodium, iron, Biowaste |  100% localized value chain; No rare earths |  Grid Storage, Urban Mobility, Cold Climates |
|  LMNO |  Manganese & Nickel |  Cobalt-free; EU self-sufficient in Manganese |  Next-gen EVs, Aviation, Circular Economy |

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