

November 2024. Technology Snapshot.

Batteries in Catalonia



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ACCIÓ
Government of Catalonia



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Carried out by

Strategy and Competitive Intelligence Unit of ACCIÓ

Collaboration

Office for the Transformation of the Mobility and Automotive Industry, OPTIMA

Barcelona, November 2024

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Interviews

Executive summary: batteries in the world

Batteries are storage systems made up of several electrochemical cells that store energy and create an electrical charge. Lithium-ion batteries are the most widespread thanks to their high energy density.

Segmentation of the value chain



1. Raw materials
2. Active materials
3. Component production
4. Cell production
5. Packs and systems
6. Application and integration
7. Charging points
8. Recycling and second life

Demand Sectors



↑↑ Mobility

- Automotive
- Light/heavy mobility
- Charging infrastructures

↑↑↑ Energy storage

- Renewable energy
- Housing
- Industry

↑ Electronics

- Electronic devices
- Mobile phones
- Medical devices

Opportunities

- Industrial value chain
- New chemicals
- Advances in RDI
- Stationary batteries
- Recycling

Challenges

- Concentration of supply
- Charging infrastructure
- Talent
- Regulation
- Waste management



World Market

The global battery market will reach a value of **\$423,900 M** in 2030, with a cumulative annual growth of **13.1%**.

The manufacturing capacity of the global lithium-ion battery market will reach the **6.8 TWh** in 2030.

China concentrates more than **70%** of manufacturing capacity, while the share of the **United States** and **Europe** will increase.

Lithium-ion battery prices have fallen by **90%** during the last decade.

Globally, Asian countries (**China, Japan** and **South Korea**) lead battery development. The **United states** and the **European Union** are also major players.

↑ This shows the expected growth by sector of demand

Executive Summary: Batteries in Catalonia

Catalonia has the **industrial, business and research fabric** to position itself as a key player in a growing European battery sector.

267 companies along the value chain



26% growth compared with 2022.

With a turnover of **1.04 billion euros (53%)** and **4,476 workers (49%)**.

35% are engaged in the application and integration of batteries.

67% of the companies are exporters and **17%** are startups.

56% are exporters and **29%** are subsidiaries of foreign companies.

Leading companies: SEAT, Ficosa, Wallbox, Silence, QEV Technologies.

Attractive for international companies



No. 1 region in **southern Europe** by the number of **foreign investment** projects in the last five years (2019-2023).

In total, there have been **9 foreign investment projects** that have resulted in an injection of **€971 million** and the creation of **1,291 jobs**.

The investments of **Lotte** and **SEAT** stand out.

Research activities as part of Horizon Europe



As part of the Horizon Europe program (2021-2023), Catalonia has secured **26 projects** in electric batteries with a funding of **€13.2 M**.

With **3.2%** of the funding received, Catalonia stands **5th** in the ranking of European regions.

1. Definition of batteries

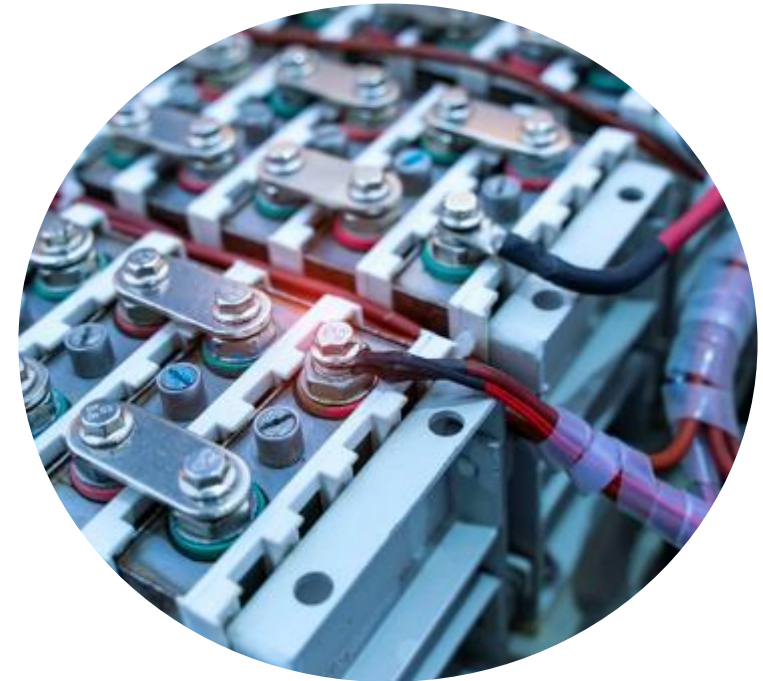
Definition of batteries

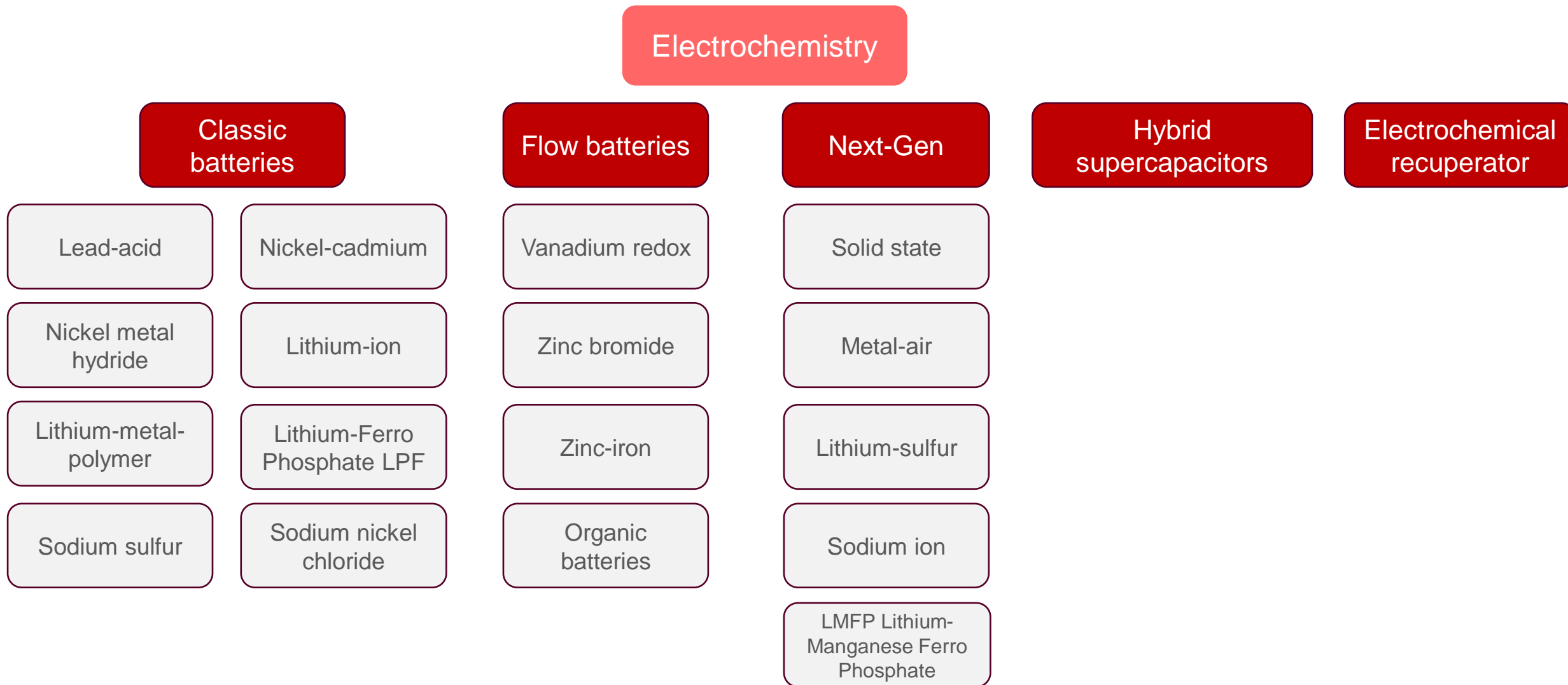
Batteries are storage systems made up of several electrochemical cells that store energy and create an electrical charge.

Through oxidation and reduction processes, batteries allow chemical energy to be transformed into electrical energy (and vice versa).

- In the oxidation process, with the release of electrons, chemical energy is stored, transformed into electricity, and the battery is charged.
- In the reduction process, electrons are captured and the battery is discharged so it can use this electrical energy as an energy source.

Lithium-ion batteries are the most widespread thanks to their high energy density, which is the amount of energy stored in a given space. Being smaller and lighter than other types of batteries, they are considered a vital part for the integration of renewable energies in the electricity grid and for the electrification of mobility.





Source: European Association for Storage of Energy (EASE), IREC

Components of lithium-ion battery cells

The four basic elements of lithium-ion battery cells are the anode, the cathode, the electrolyte, and the separator. The battery is charged when lithium ions move from the cathode to the anode and discharged by releasing energy when the ions from the anode move back to the cathode.

Anode

1

Space where electrically charged lithium is stored. The materials determine the charging speed and useful life of a battery; they usually include graphite, although research is being done to make them out of silicon.

Electrolyte

2

Facilitates the movement of lithium from the anode to the cathode, and vice versa, and must have high ionic conductivity, electrochemical stability and a high ignition point. Electrolytes are made up of lithium salt, solvent and additives; currently they are liquid materials, but solid ones are now being developed (solid state batteries).

Separator

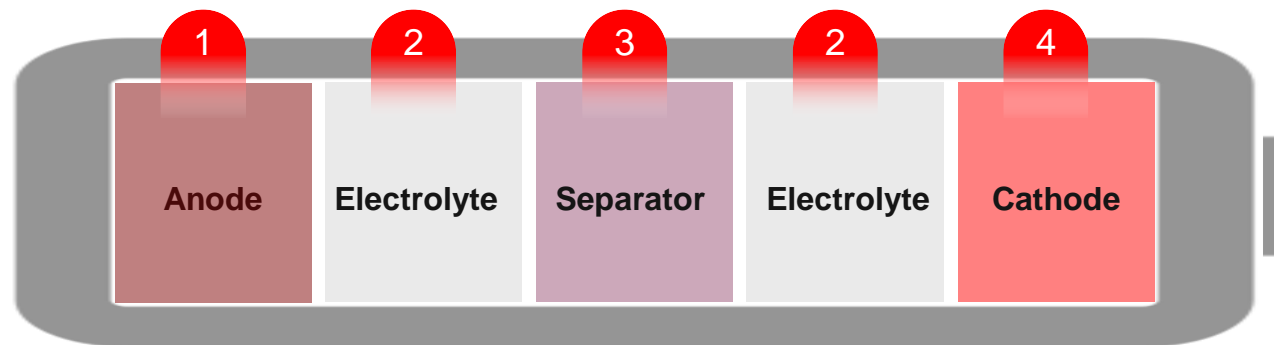
3

It prevents physical contact between the anode and the cathode and facilitates the movement of lithium ions between the two. The separator must have high thermal stability and electrical insulation properties, pores of uniform size, and must be both thin and strong.

Cathode

4

Space where lithium is stored without electrical charge. Materials determine battery capacity and voltage, as well as price. It contains cobalt, which, due to its geographical concentration (D. R. of the Congo) and price volatility is known as "white oil". It also contains nickel, aluminum or manganese.

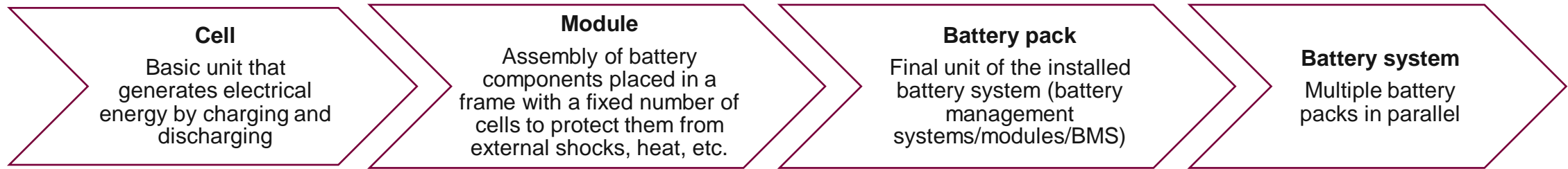


Source: LG "Ensolpedia 2023"

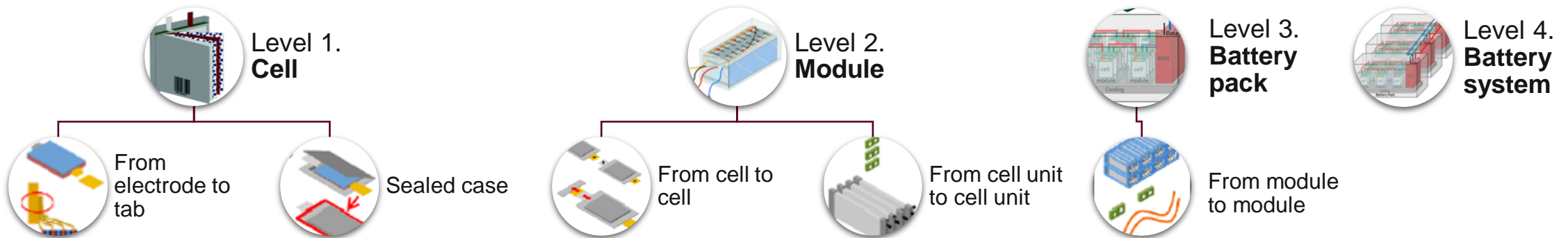
Breakdown of a lithium-ion battery

All lithium-ion batteries, as energy storage systems, have the same structure of cells joined together to form a module which, together with other modules, form an assembly package. Accordingly, the operation consists of a series of processes or levels of union aimed at creating an electrical charge.

Conceptual relationship



Connection levels of a battery

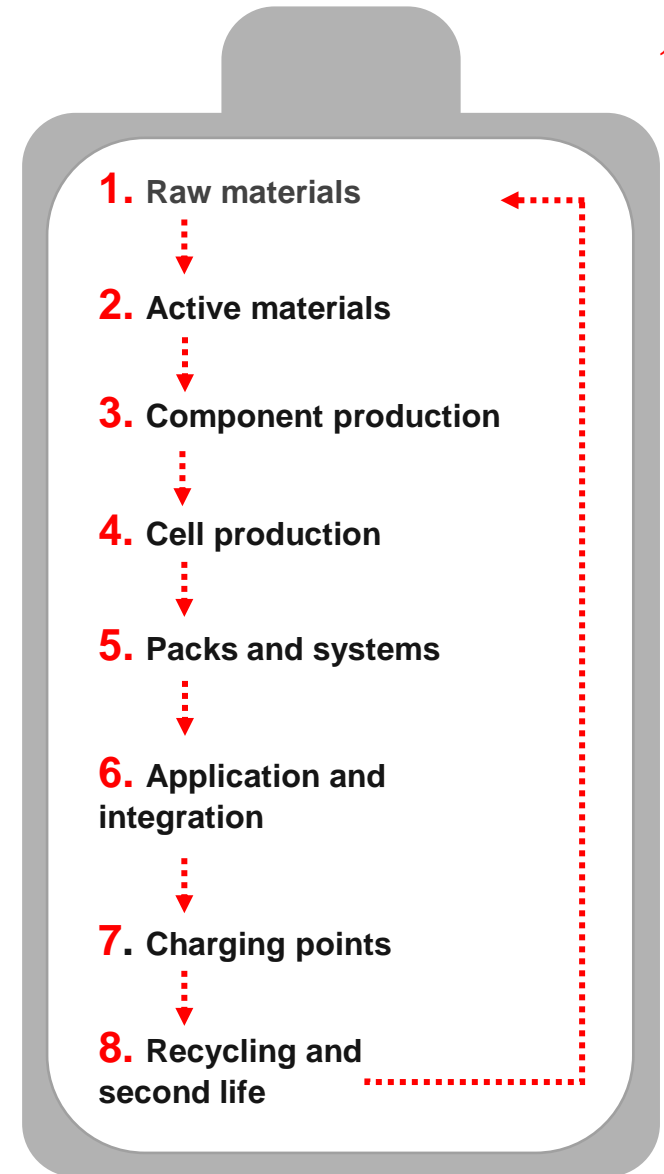


Sources: ScienceDirect, Samsung, Springer, Wendel

Segmentation of the battery value chain

8 segments

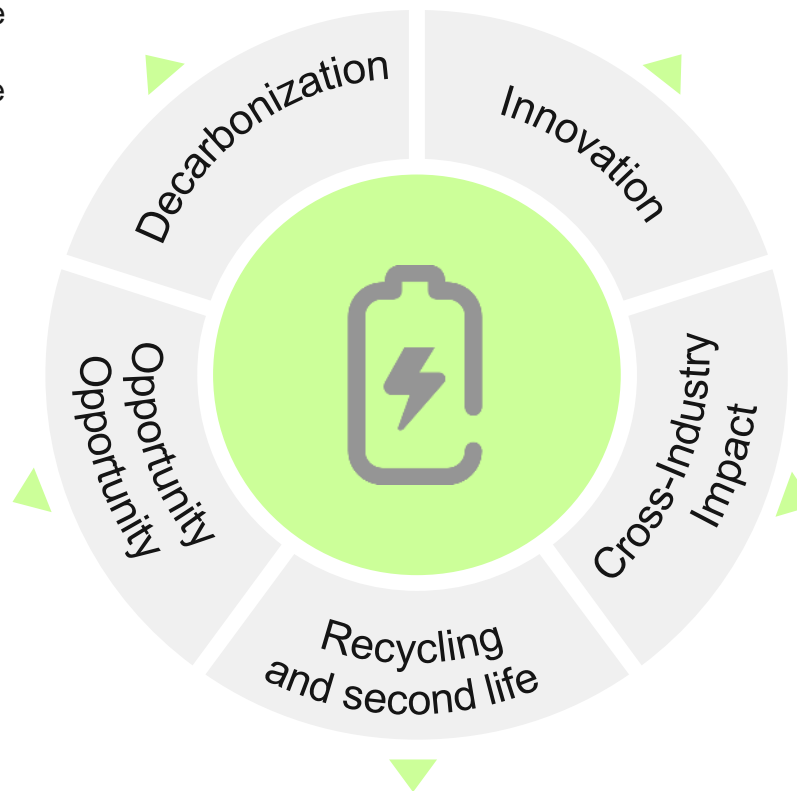
- 1.** The most commonly used batteries are the lithium-ion batteries, which use critical materials such as lithium and cobalt. Many of the materials are geographically concentrated in a few countries.
- 2.** Material that reacts chemically to produce electrical energy when the cell is discharged.
- 3.** Manufacture of anodes, cathodes, electrolytes, membranes and separators.
- 4.** Production or assembly of individual cells.
- 5.** Individual cells are connected in series or parallel in modules. Several modules and other electrical, mechanical and thermal components are assembled into one *pack*. Each pack has a different design depending on the required performance or features.
- 6.** Integration of the battery in the electric vehicle or in its application. Connections to vehicle wiring for engine control and load management system.
- 7.** The charging point infrastructure is essential to maintain the electric vehicle ecosystem. There are different types: portable, wall or pole-mounted.
- 8.** Cell recycling: hydro or pyrometallurgical processes and recovery of raw materials (especially nickel, cobalt, aluminum and copper).
Second life: use in other areas such as stationary energy storage.
Remanufacturing: subsequent use of individual components.



Importance of batteries for industry

Batteries are a key technology to move towards decarbonisation: on the one hand, they facilitate the integration of renewable energy into productive processes and provide stability and resilience to the electricity system; on the other hand, they are a fundamental element for the decarbonisation of the transport sector, especially with electric vehicles.

New business models are emerging around batteries and the electrification of demand. Notable examples include charging systems, remanufacturing, and adaptation for second-life applications.



The growing demand and continuous improvement of services drive R&D&I efforts to explore new techniques, chemical processes, and materials. The goal is to enhance energy production, capacity, durability, charging and discharging efficiency, as well as the subsequent recycling processes.

Batteries are used in a large number of devices that are already essential in our lives, from mobile phones and laptops to electric vehicles and industrial instruments.

Battery recycling is key, both to minimize the environmental impact of batteries and to extract critical components and raw materials that are scarce. Additionally, the utilization of electric vehicle batteries for stationary use can extend their useful life.

Source: ACCIÓ

Batteries in Catalonia

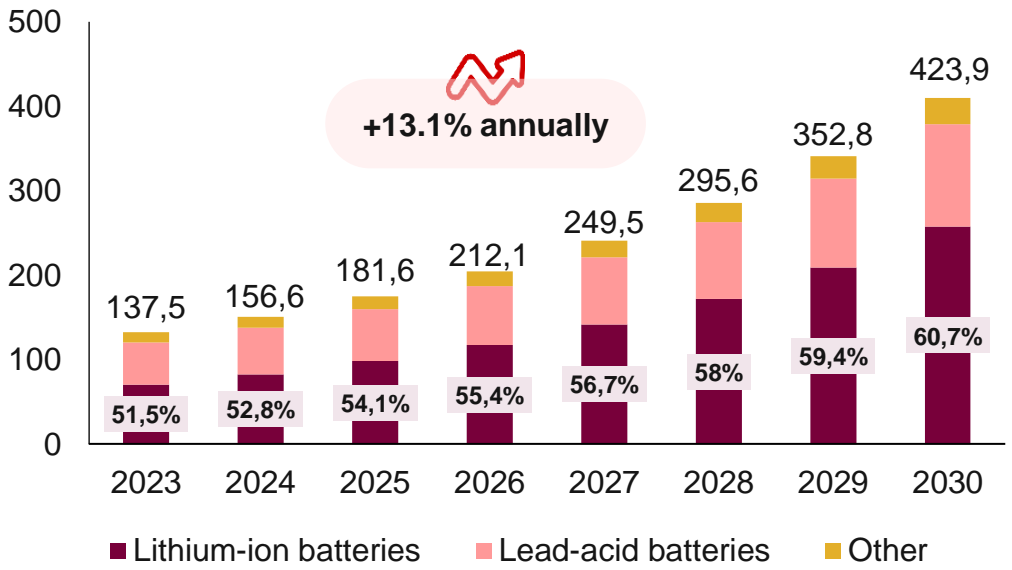
2. The world battery market

World market of lithium-ion batteries

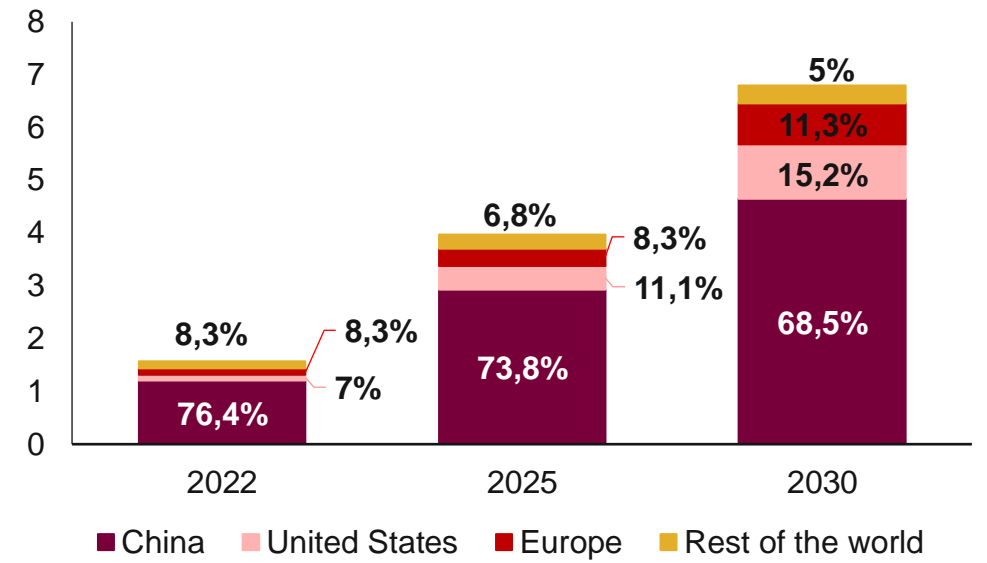
- The global battery market will reach a value of **\$423.9 billion** in 2030, with a cumulative annual growth of **13.1%**.
- Lithium-ion batteries are the most widely used, and their market share is expected to surpass **60%** of the total market share in the coming years.

- The manufacturing capacity of the global lithium-ion battery market will reach the **6.8 TWh** in 2030.
- China leads global manufacturing capacity with more than **70%** of market share, while the share of the United States and Europe will increase until the end of the decade.

Battery market size, by technology (billions of dollars and % of Li-ion batteries of total)



Lithium-ion battery manufacturing share, by country (TWh and % of the total)

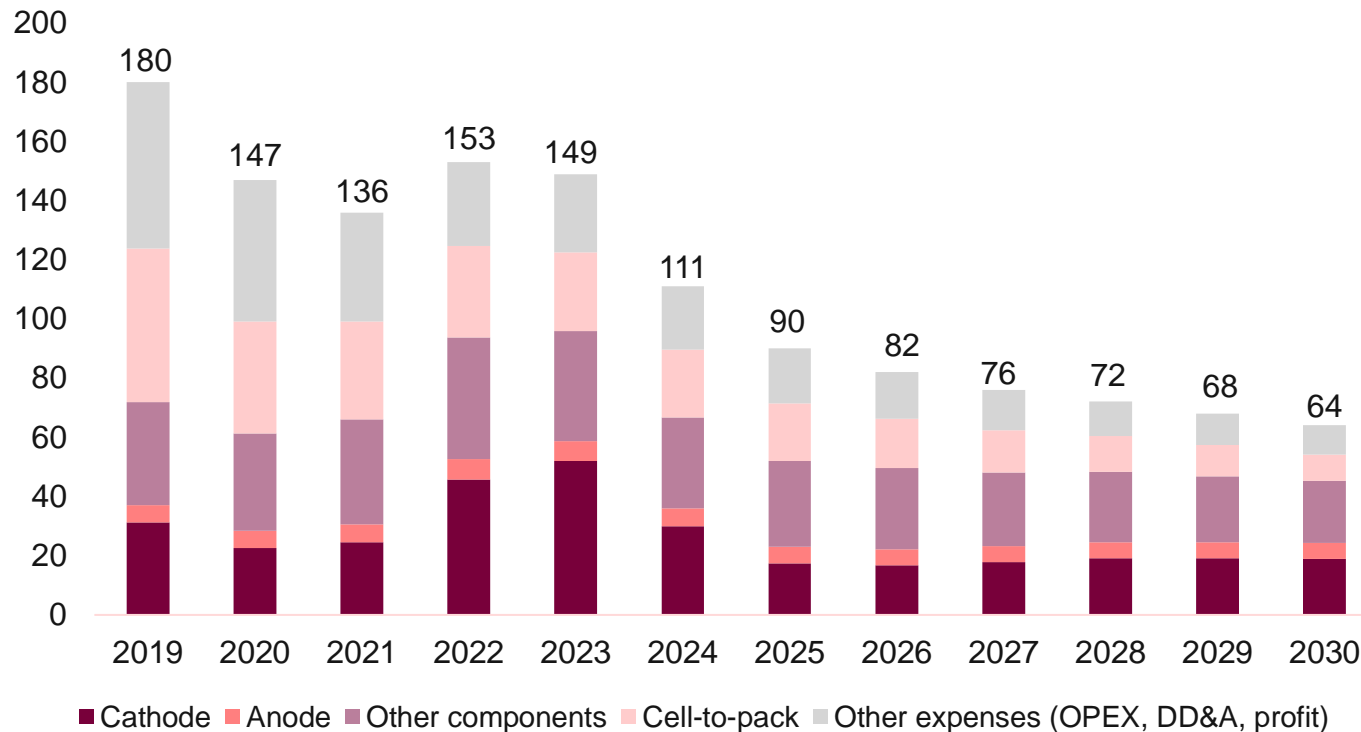


Sources: Statista and S&P Global

Evolution of the price of lithium-ion batteries

Lithium-ion battery prices have decreased by around **90%** over the past decade, and will do so even more as next-generation technologies reach the commercialisation stage.

Evolution of world prices of battery packs, by components (2019-2030, \$ per kwh)



From **\$780** per kwh in 2013, the price is expected to drop to **\$90** in 2025 and until **\$64** in 2030.

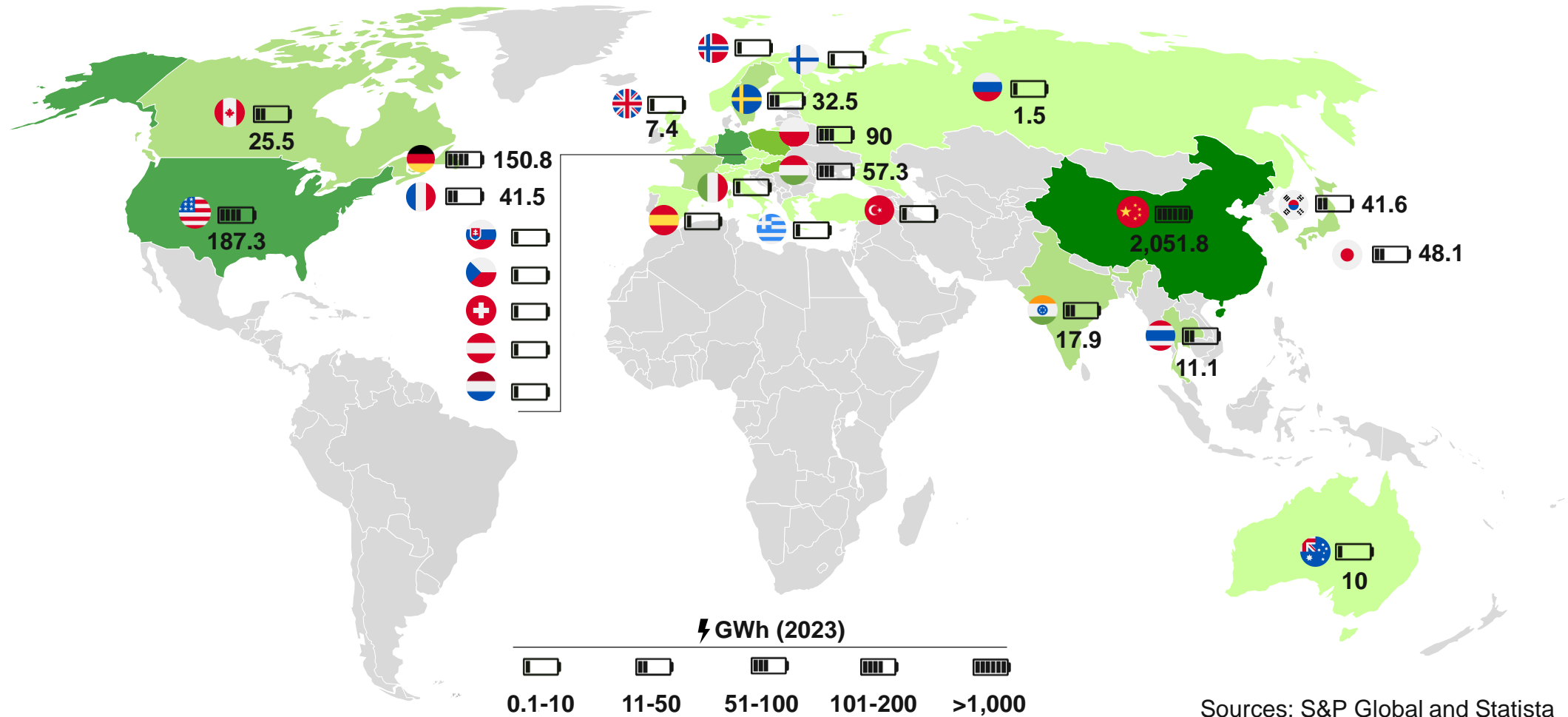
Turbulence in the metal markets (**greenflation**) caused the cost of batteries to increase by 2022, especially for cathode materials (cobalt, manganese and nickel) and lithium.

The decline in future prices is driven by **innovations** that will enter the commercialization phase. However, it will also be essential to secure the value chain of the metals and their refinement so that **low commodity prices** are maintained.

Source: Goldman Sachs

Lithium-ion battery production markets

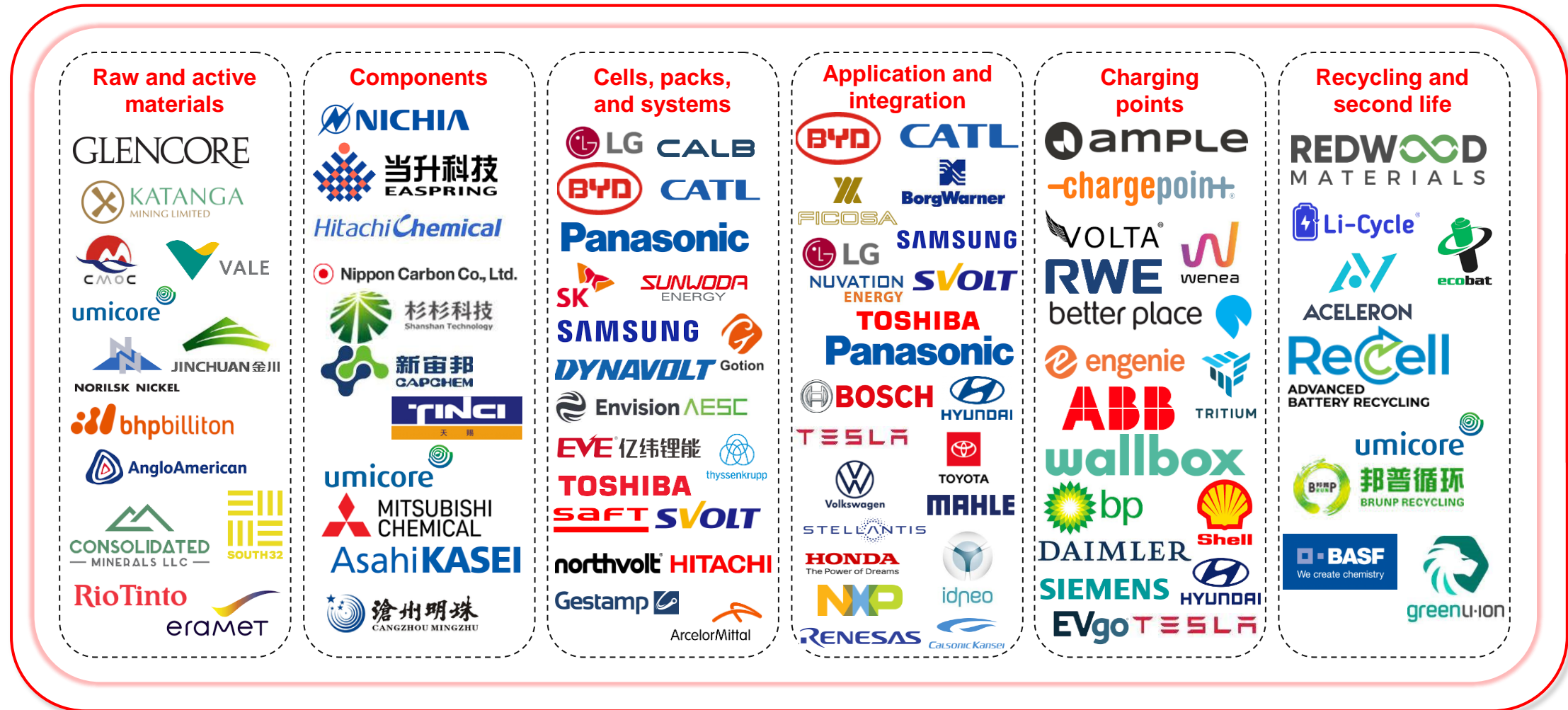
China leads very prominently in the production of lithium-ion batteries, well ahead of **Europe** and the **United States**.



Sources: S&P Global and Statista

Main companies in the battery market

Asian companies dominate much of the battery value chain.



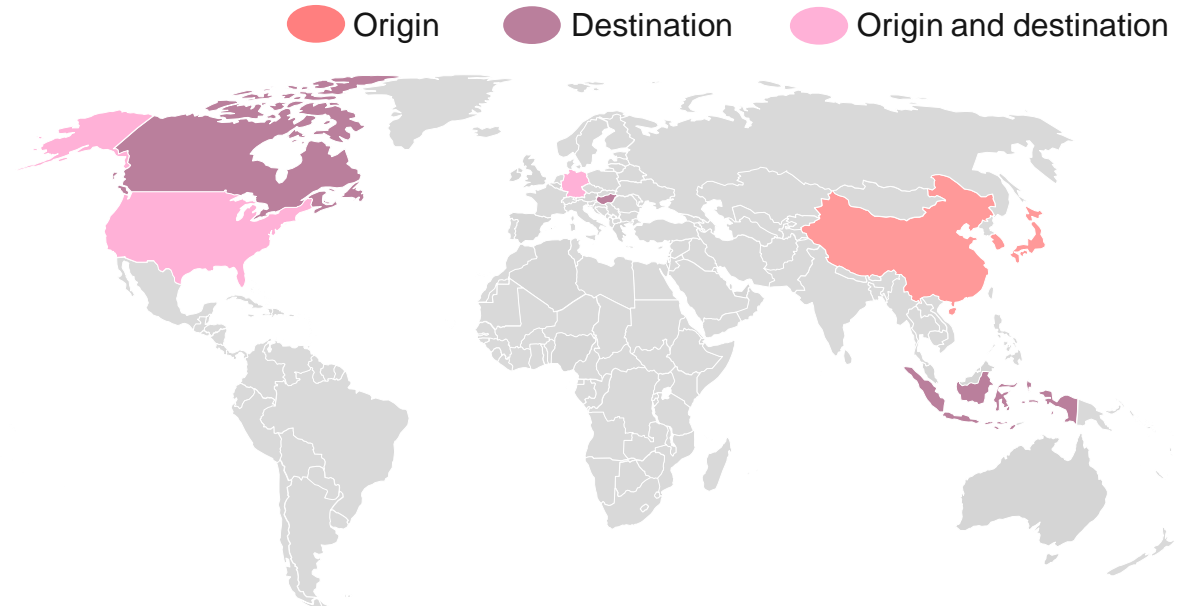
Foreign Direct Investment (FDI) in the battery value chain

FDI in batteries increased between 2019 and the first half of 2024, with a total investment of **€305 billion**, and a high concentration in mobility. Companies from **South Korea**, **China** and **Japan** are the most active, while the **United States** is the main recipient of investment.

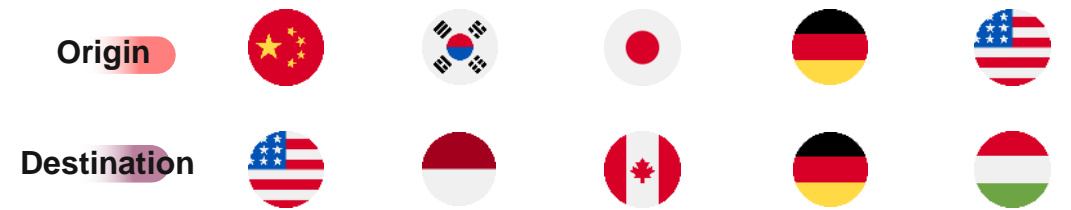
FDI in batteries (2019-1st half 2024)

Year	Projects	Invested capital (€M)	Employment created
First half 2024	99	22,676.0	35,104
2023	269	102,150.2	151,502
2022	181	96,429.6	108,464
2021	128	44,950.3	55,872
2020	61	16,012.7	21,080
2019	91	22,568.0	41,181
Total	829	304,786.9	413,203

Main countries of origin and destination of FDI (2019-1st half 2024)



Main investment companies and invested capital (2019-1st half 2024)



Source: the authors, based on fDi Markets

3. Global initiatives related to batteries

Main global regions in the battery sector

The **Asian countries** lead in the development of batteries throughout the entire value chain.



Asia

Leading region in the development of battery technologies

The most prominent nations are **China**, which leads in global battery market share since 2022, **Japan**, which is increasing production capacity after losing the leading position, and **South Korea**, which has a clear R&D focus on lithium-sulfur, solid-state and lithium-metal technologies.



North America

Policies to encourage technological development in the region

The **United States** has invested to strengthen its position in the value chain, especially through the Inflation Reduction Act, with the aim of gaining more independence from competitors. **Canada** seeks to leverage its competitive advantage in mineral reserves, which include all the resources needed to produce advanced electric vehicle batteries.



Europe

Ambitious goals for the promotion of sustainability throughout the value chain

The **EU** has set ambitious goals for battery sustainability and recycling and aims to become a leading supplier of sustainable battery technologies. **Germany** stands out, and in 2023 the country renewed its battery strategy to support the development of battery cell production.



Source: Fraunhofer



Batteries in the EU: goals

The European Commission has set **ambitious goals** to carry out the energy transition and secure the European battery value chain.

2030

90% of the EU's annual demand for batteries must be met by European production, which means a manufacturing capacity of at least **550 GWh**. (Net-Zero Industry Act).

The extraction capacity within the EU of the critical minerals contained in batteries will need to be **10%** of its annual consumption, **40%** in its processing and **25%** in its recycling (Critical Raw Materials Act).

Reduction of **55%** in net emissions of greenhouse gases (compared to data from 1990) and of **100%** by 2050 (European Climate Act).

2035

100% of new cars and vans registered in Europe will need to be emission-free (Fit for 55).



Sources: European Commission and Fraunhofer



Batteries in the EU: initiatives

The European Commission has launched several **instruments** to be able to fulfill its **ambitious goals** of carrying out the energy transition and **securing the European battery value chain**.



Regulation

The EU adopted the new **Regulation 2023/1542 on batteries** in 2023, which seeks to minimize the environmental impact of batteries, promote the circular and clean economy, and strengthen the strategic autonomy of the EU.



Institutions

The **European Commission and the agents of the battery ecosystem** have launched a series of platforms and associations that coordinate and drive the deployment of strategies around batteries along the entire European value chain.



Incentives

- Two **IPCEIs** (Important Projects of Common European Interest) in batteries have been established (2019 and 2021).
- **Horizon Europe** drives RDI projects for batteries; the past framework program (2014-2020) allocated €1.34 billion.
- The **Next Generation EU** outlines that 37% of the budget must go to the ecological transition through the promotion of renewable energies or sustainable mobility.
- The **Innovation Fund** provides funding for the demonstration of innovative low-emission technologies.

Sources: European Commission and Fraunhofer



Batteries in the EU: institutions

The **European Commission and the agents of the battery ecosystem** have launched a series of platforms and associations that coordinate and promote the deployment of strategies throughout the entire European value chain of batteries.

European Battery Alliance (EBA250)

Launched in 2017, the **European Battery Alliance (EBA250)** brings together more than 800 industrial actors to facilitate collaboration and build a competitive European battery industry. Driven by **EIT InnoEnergy**, it seeks to promote clean mobility and sustainable solutions.



Batteries Europe

Batteries Europe is the European Technology and Innovation Platform (ETIP) that brings together all the major actors of the European battery research and innovation ecosystem with the aim of developing and supporting a competitive battery value chain in Europe.



Batteries European Partnership Association

The **BEPA** is a private association that brings together the main players in the field of batteries in Europe. Its main activity is to inform the European Commission in order to identify RDI priorities for Horizon Europe calls, within the framework of the **BATT4EU** initiative.



BATT4EU

BATT4EU is a public-private partnership between the European Commission and BEPA under the umbrella of Horizon Europe. It seeks to establish a competitive and sustainable battery value chain in Europe to boost electric mobility, renewable energies and the European energy transition.



Battery2030+

Battery2030+ is an EU initiative that brings together key actors in R&D to support the development of sustainable batteries. It is aligned with the European Green Deal, the UN Sustainable Development Goals and the European Action Plan on Batteries.



Upcell Alliance

UPCELL Alliance is a private association created in 2022. The aim of the alliance is to establish a leading European ecosystem in electric batteries to promote industrial autonomy. It brings together battery manufacturers, machinery suppliers, chemical companies, research centers and other key sectors of the value chain.



Sources: European Commission and Fraunhofer

Energy Storage Strategy

Strategy drawn up in 2021 which envisages having a total capacity of 20 GW of energy storage in 2030 and 30 GW in 2050. It includes 66 initiatives structured around 10 lines of work.



National Integrated Energy and Climate Plan (PNIEC) 2023-2030

It sets the objectives of reducing greenhouse gas emissions, penetration of renewable energies and energy efficiency. It increases the target of 20 GW of energy storage to 22.5 GW by 2030, and sets a target of achieving a fleet of 5.5 million electric cars in the same year



PERTE

VEC

Creation of the necessary ecosystem for the development and manufacture of electric and connected vehicles.

ERHA

Promotion of renewable energies, renewable hydrogen and storage.



BatteryPlat

This is the Spanish Technology and Innovation Platform for Energy Storage. It aims to bring together the main Spanish players working in energy storage technologies to promote a common vision, develop a strategic research agenda and accelerate innovative development.



4. Applications by sectors

Battery applications by sector



Automotive



Light mobility



Heavy mobility



Charging infrastructures

Mobility

With the electrification of mobility, batteries have become a key element, as they are already applied in cars, light mobility vehicles (bicycles and electric scooters) and heavy mobility vehicles (trains, trucks, ships and planes). The development of new technologies for batteries in the transport sector, together with automation, will reduce costs and increase its performance.



Renewable energy



Housing



Industry

Energy storage

Stationary batteries are designed with the aim of offering a constant amount of current for a long period of time, as well as being able to discharge completely several times. Stationary batteries are suitable for applications within the fields of telecommunications, wind and photovoltaic systems, alarms and security, remote controls, ATMs, telephone exchanges, power supplies and medicine.



Electrical and electronic devices



Mobile phones



Medical devices

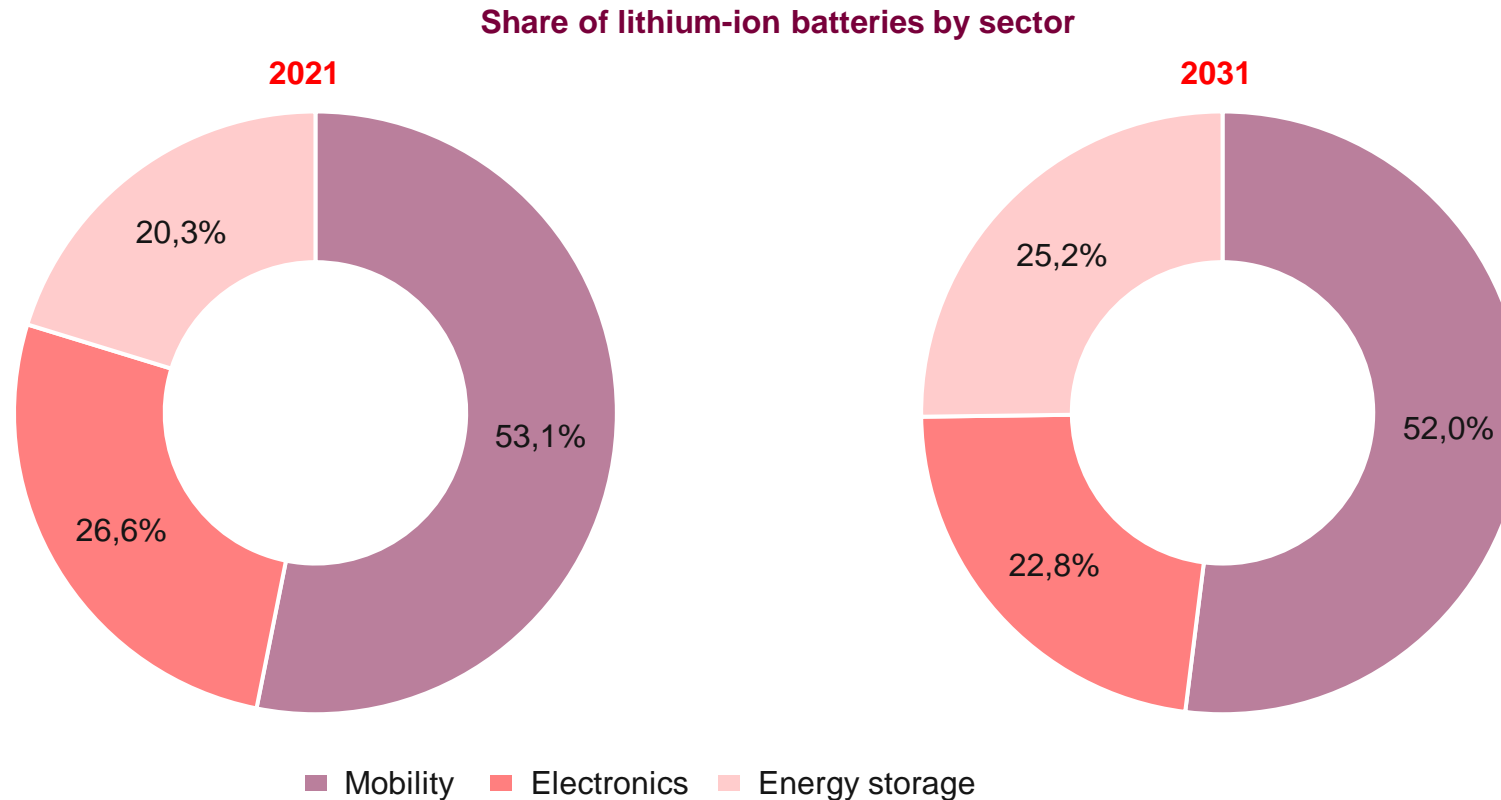
Electronics

The evolution of battery technologies is directly linked to the miniaturization of mobile electronics such as mobile phones, laptops, tablets, medical devices or robotics and drones. In electronics, lithium-ion batteries currently stand out, as its technology has made it possible not only to meet the need for ever smaller batteries, but also to offer greater density and energy efficiency for batteries compared with technologies such as Ni-Cd and Ni-MH.

Sources: Frost & Sullivan, International Energy Agency

Share of battery applications by sector

Mobility is and will continue to be the main application sector for batteries, accounting for more than **50%** of the total market share. **Energy storage** will increase from 20.3% to **25.2%** in 10 years, overtaking electronics because of the boost of renewable energies.



Source: BIS Research

Batteries in Catalonia – Applications by sector

4.1. Batteries in mobility

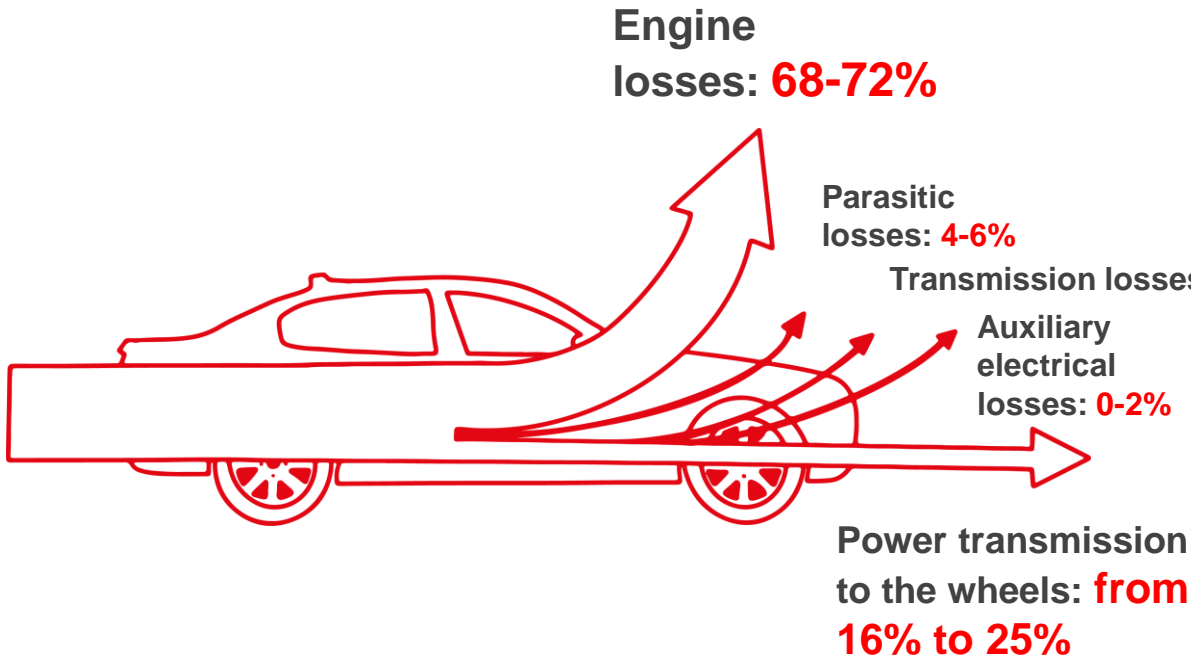


Electric vehicle efficiency

Electric vehicles are **more efficient** than vehicles with an internal combustion engine

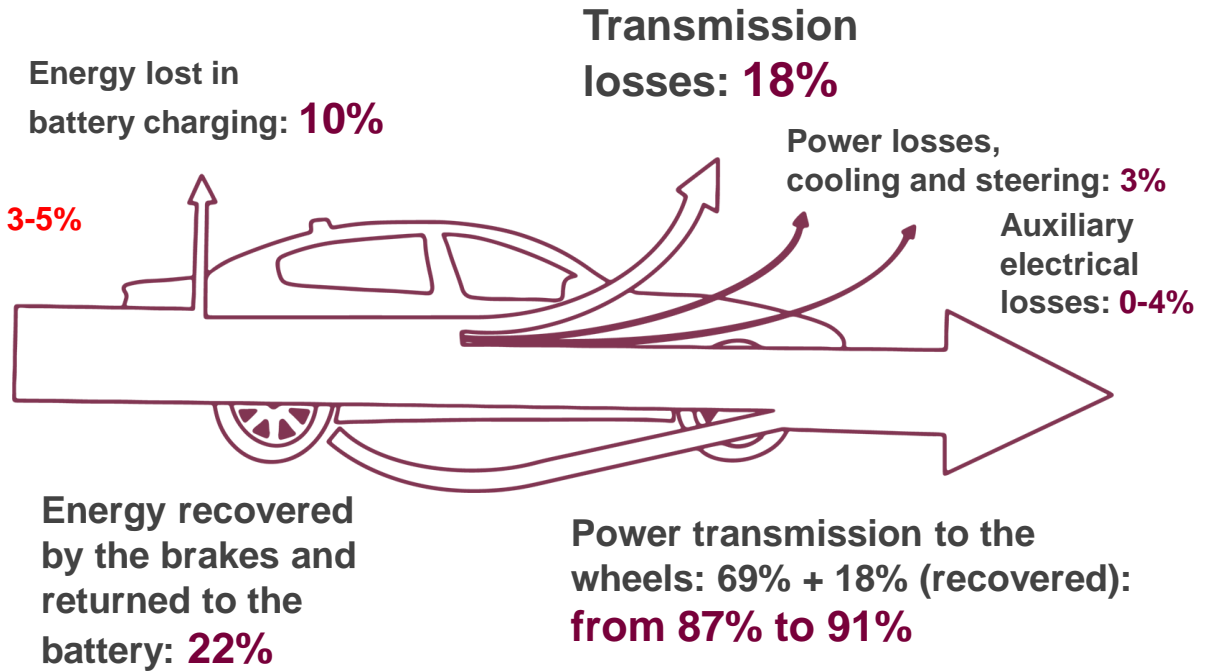
Vehicle with internal combustion engine

With internal combustion engine vehicles around **80%** of the energy is lost due to various inefficiencies



Vehicle with electric battery

With electric vehicles around **11%** of the energy is lost (the original energy loss is 31-35%, but 22% of that energy is successfully recovered)



Sources: Canada Energy Regulator, Enerlink, Yale Climate Connection

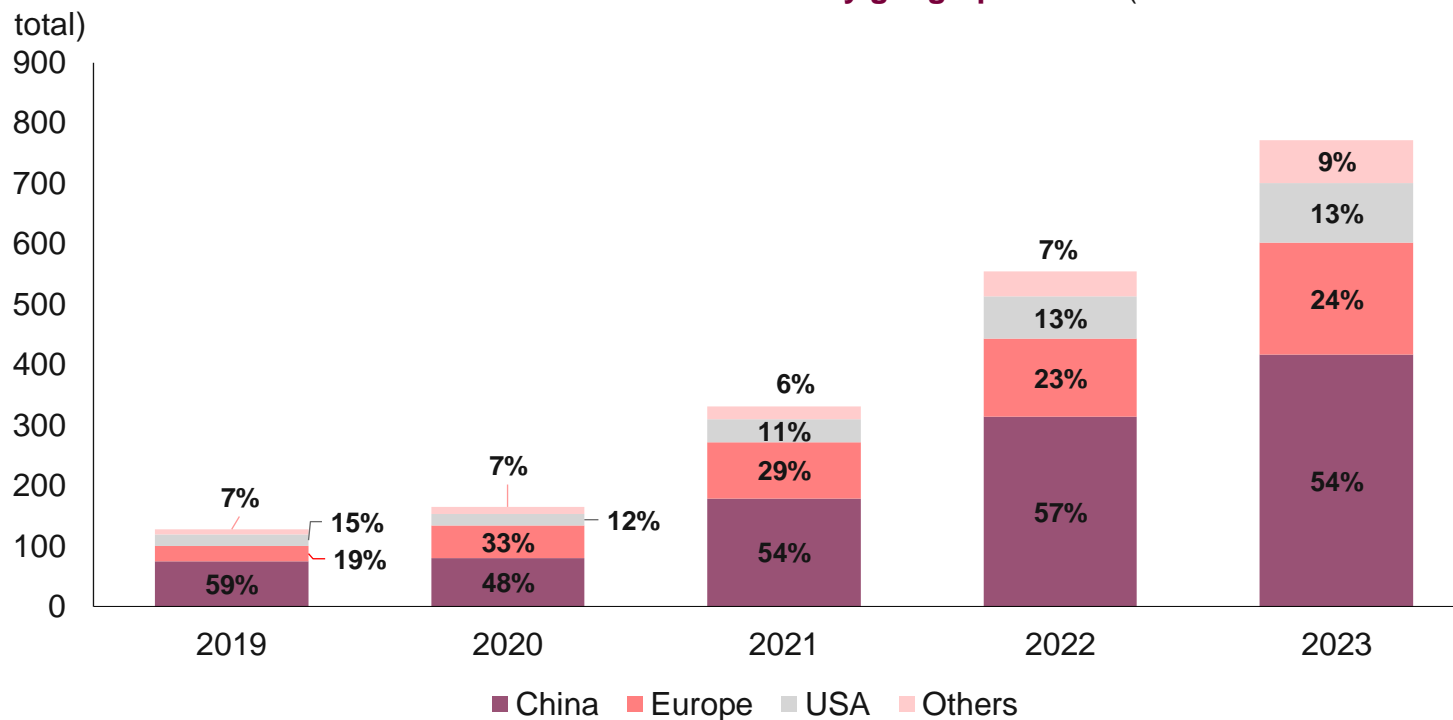
Demand of batteries for electric vehicles

The demand for batteries for electric vehicles in 2023 has **multiplied by 6** in the last 5 years.

The vast majority of EV battery sales in 2023 were in China (**54%**), Europe (**24%**) and the United States (**13%**).

Electric vehicles accounted for **18%** of total sales in 2023, compared with **14%** in 2022 and only **2%** in 2018.

Demand for lithium-ion batteries for electric vehicles by geographic area (in GWh and % of the total)

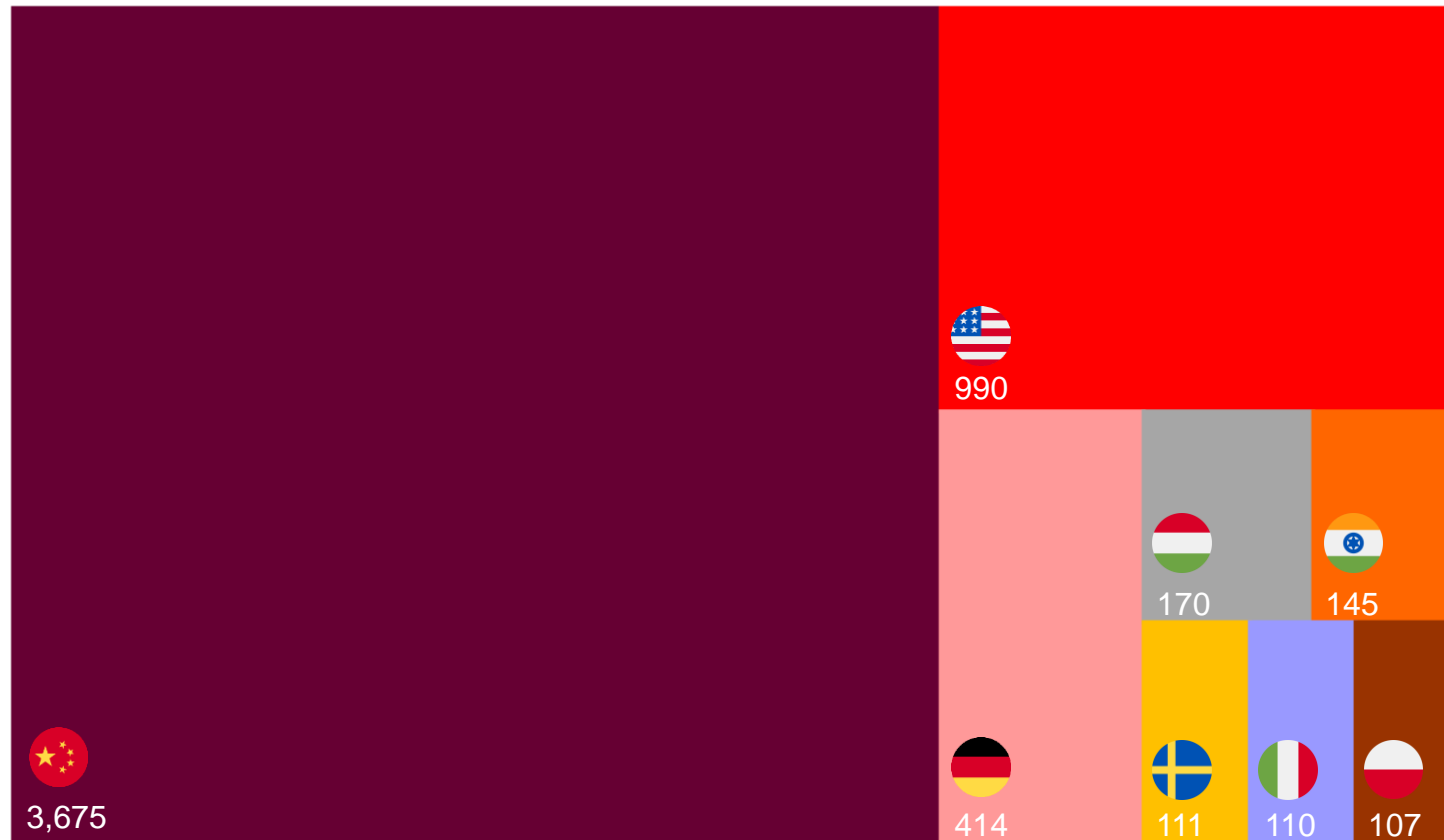


Sources: Bloomberg NEF i IEA

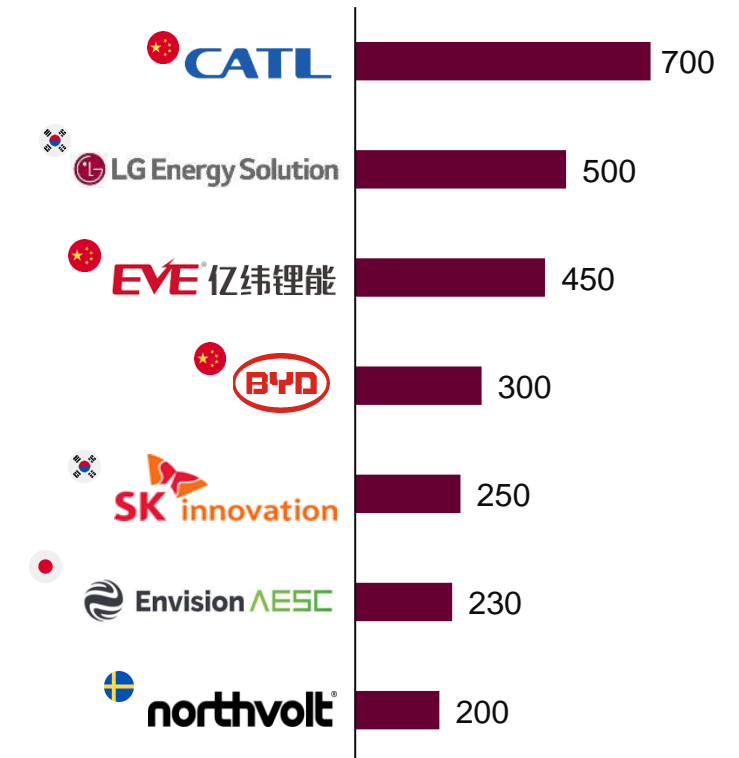
Leading global manufacturers of batteries for electric vehicles

China will lead the world production of batteries for the electric vehicle, with more than **60%** of market share in 2030.

Top EV battery producing countries in 2030 (in GWh)



Main battery manufacturing companies in 2030 (in GWh)



Source: S&P Global

Batteries in Catalonia – Applications by sector

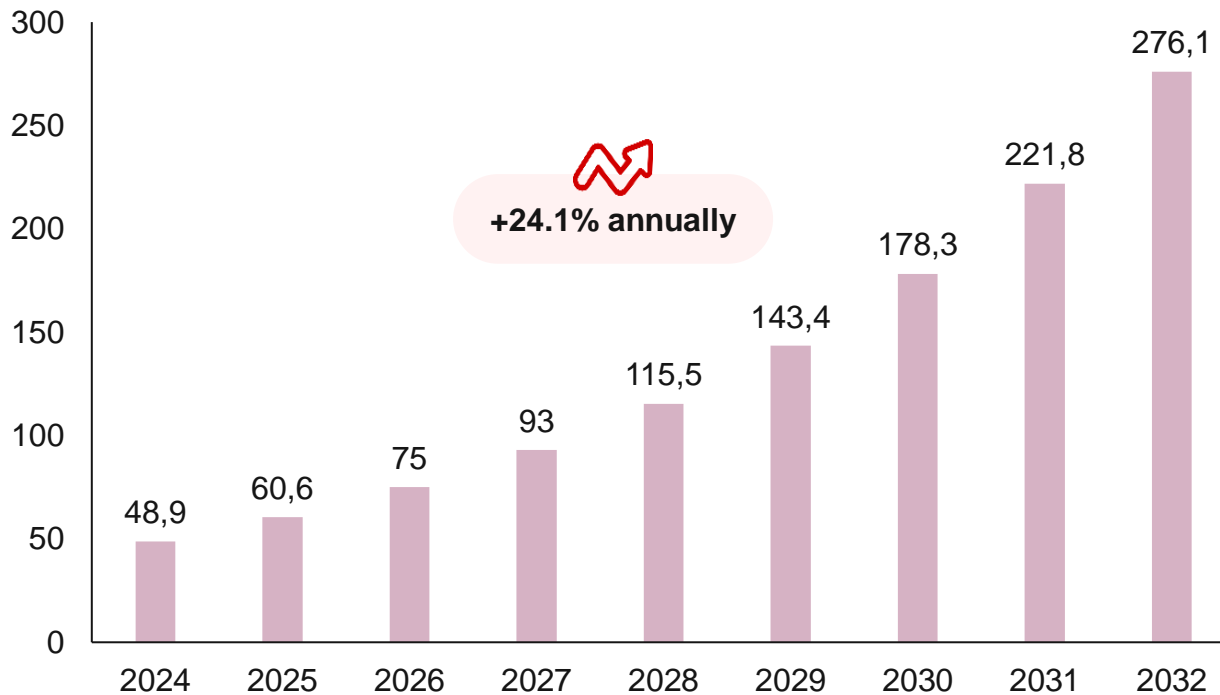
4.2. Stationary batteries



Evolution of demand for stationary batteries

A **growing** and **high-demand application sector for batteries** is **stationary storage**, driven by the increasing demand for electricity in the global energy transition process, the implementation of renewable energies, and the electrification of the economy. Stationary storage with batteries will provide stability to supply and demand in energy markets (peak shaving).

Evolution of the global stationary energy storage market, 2024-2032 (in billions of US dollars)



The stationary energy storage market is expected to grow exponentially, potentially surpassing **\$178 billion** by 2030, with an expected annual growth rate (**CAGR**) of **24.1%** between 2024 and 2032

This growth will be driven by the gradual replacement of fossil fuels with green alternatives such as renewable energy for domestic and industrial use, mainly in microgrids (local energy production and distribution networks capable of operating independently when disconnected from the main grid), by large scale battery storage projects and by increasing concerns about the security of energy supply.

In North America, growth will be led by the United States and Canada. In Asia, key players will include China, India, and Japan. In Europe, developments in this sector will be spearheaded by the United Kingdom, Germany, and France.

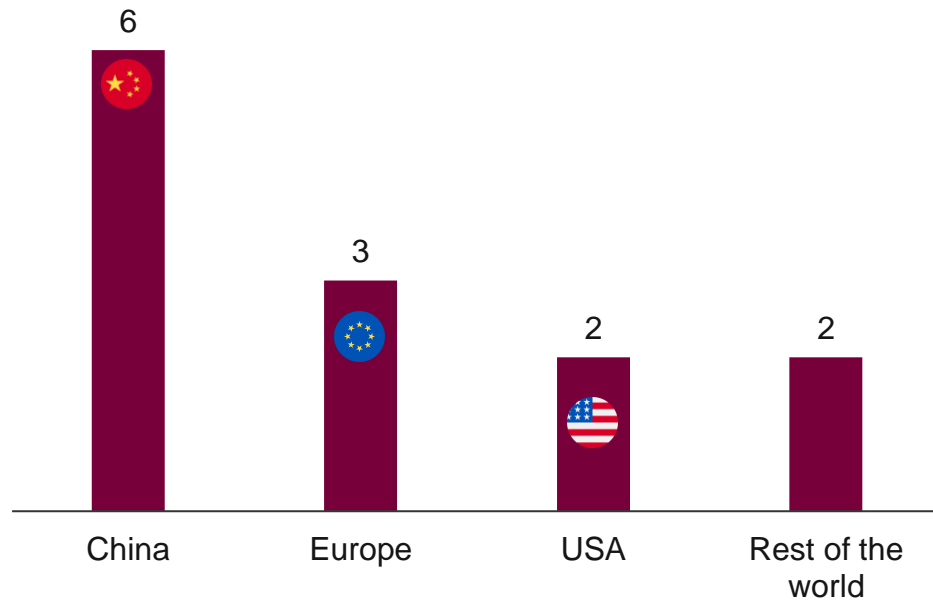
Sources: Precedence Research, BASF i PowerTech

5. The recycling of lithium batteries

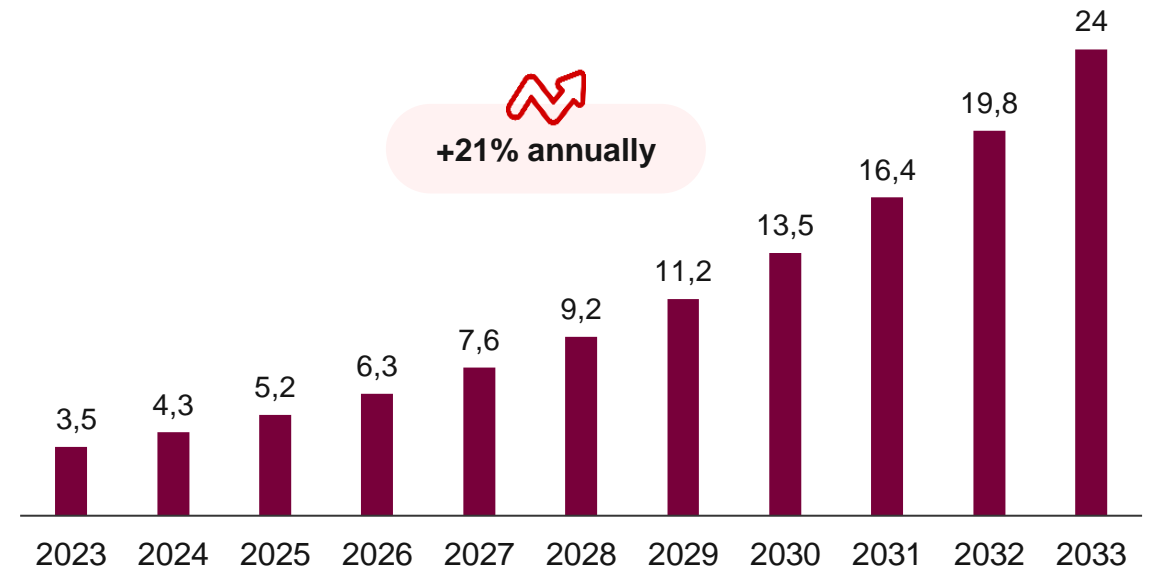
Projection of the global market for recycled lithium-ion batteries

The **market of recycled batteries** is gradually growing. As global demand for lithium-ion batteries continues to increase, the mining industry must increase lithium production, and lithium-ion battery recycling capacities will need to expand significantly to serve as an alternative to traditional extraction methods. The recycling market is expected to be mainly dominated by China, with half of the world's market share.

Revenue Opportunities in Lithium-Ion Battery Reuse and Recycling in 2030, by main world regions (in billions of US dollars)



Global lithium-ion battery recycling market value evolution from 2023 to 2033 (in billions of US dollars)

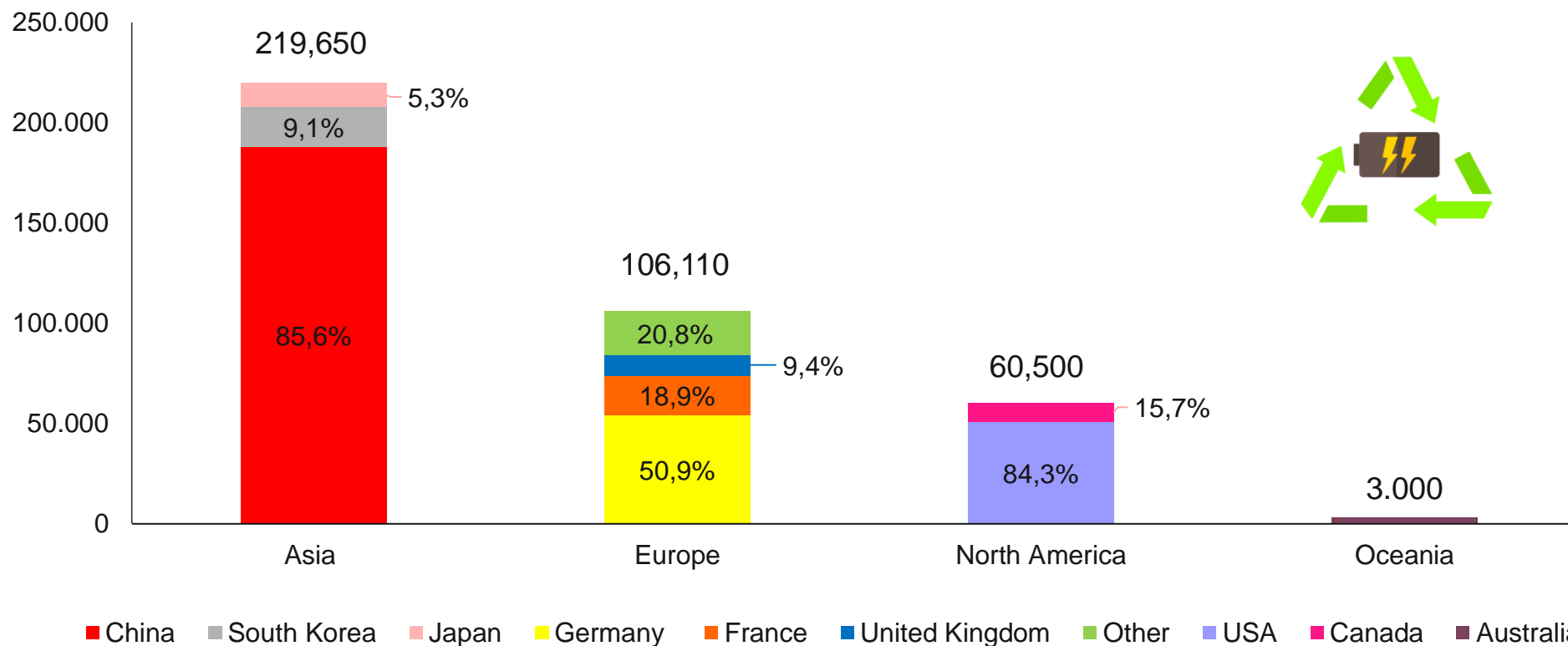


Source: Statista

Main countries in battery recycling

Not all regions or countries in the world are recycling batteries at the same rate. **Asia**, with **China** at the forefront, is leading lithium-ion battery recycling and is well ahead of **Europe** and **North America**.

Existing and planned recycling capacity of lithium-ion batteries in 2021 (in tons per year and % for each country of the regional total)



Source: Canary Media

Regulations for recycling batteries in the European Union



Regulation 2023/1542 relating to batteries and their waste

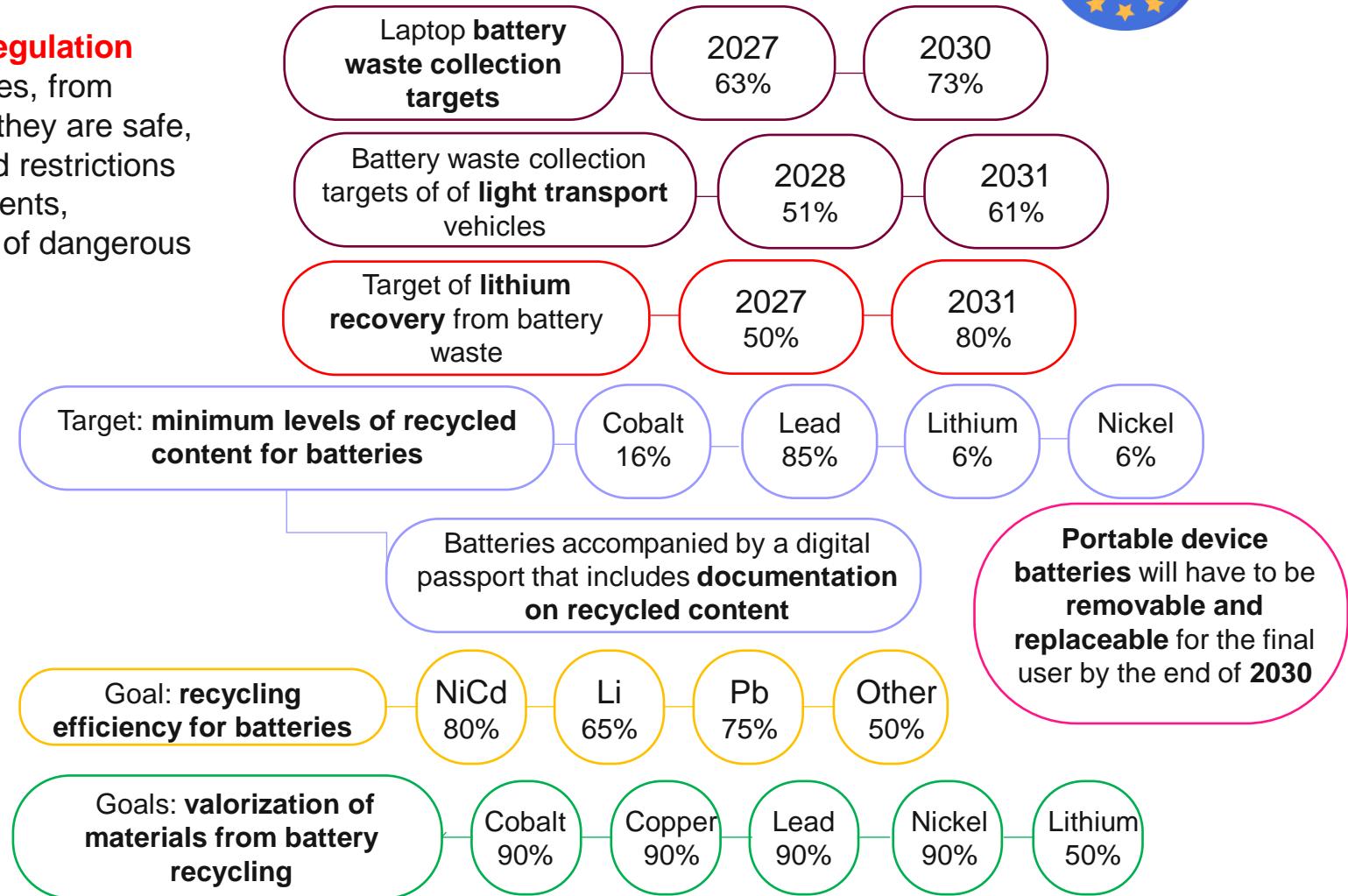
In 2023, the European Union approved a new **Regulation** governing the entire life cycle of cells and batteries, from production to reuse and recycling, ensuring that they are safe, sustainable and competitive. It includes rules and restrictions on operations, labeling and information requirements, sourcing standards for raw materials, prohibition of dangerous substances, etc.

Scope of application

All batteries and cells, including their waste.

Objectives

Goals set in terms of collection, reuse of materials and extended responsibility of the producer. The aim is to promote circular economy throughout the life cycle of batteries and reduce their negative environmental and social impact.



Batteries in Catalonia

6. Batteries in Catalonia

Mapping the battery ecosystem in Catalonia








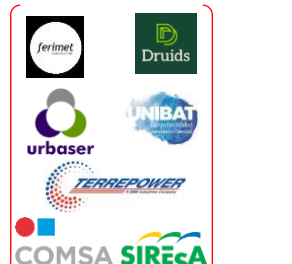



















By segments, **35.2%** of companies are engaged in the application and integration of batteries (more than half of which are engaged in mobility), **21.0%** in batteries and systems, **16.9%** provide engineering and consulting services, and **15.4%** in the manufacture or management of chargers for electric vehicles.

*Baseline data: the mapping data from 2022.



Segmentation of companies in the battery market in Catalonia

<h3>Active materials</h3>	<h3>Batteries and systems</h3>	<h3>Application and integration</h3>	<h3>Charging points</h3>	<h3>Recycling, second life and scrap</h3>
	<h4>Fuel cells</h4>  <h4>Systems</h4> 	<h4>Mobility</h4>  <h4>Energy</h4>  <h4>Other</h4> 		
<h3>Cells and components</h3>				
<h3>Cells</h3>				
<h3>Components</h3>				
				

<h3>Engineering Consultancy</h3>		
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Players in the battery ecosystem in Catalonia

Technological centers and research institutes



Universities and training centers



Associations and Clusters



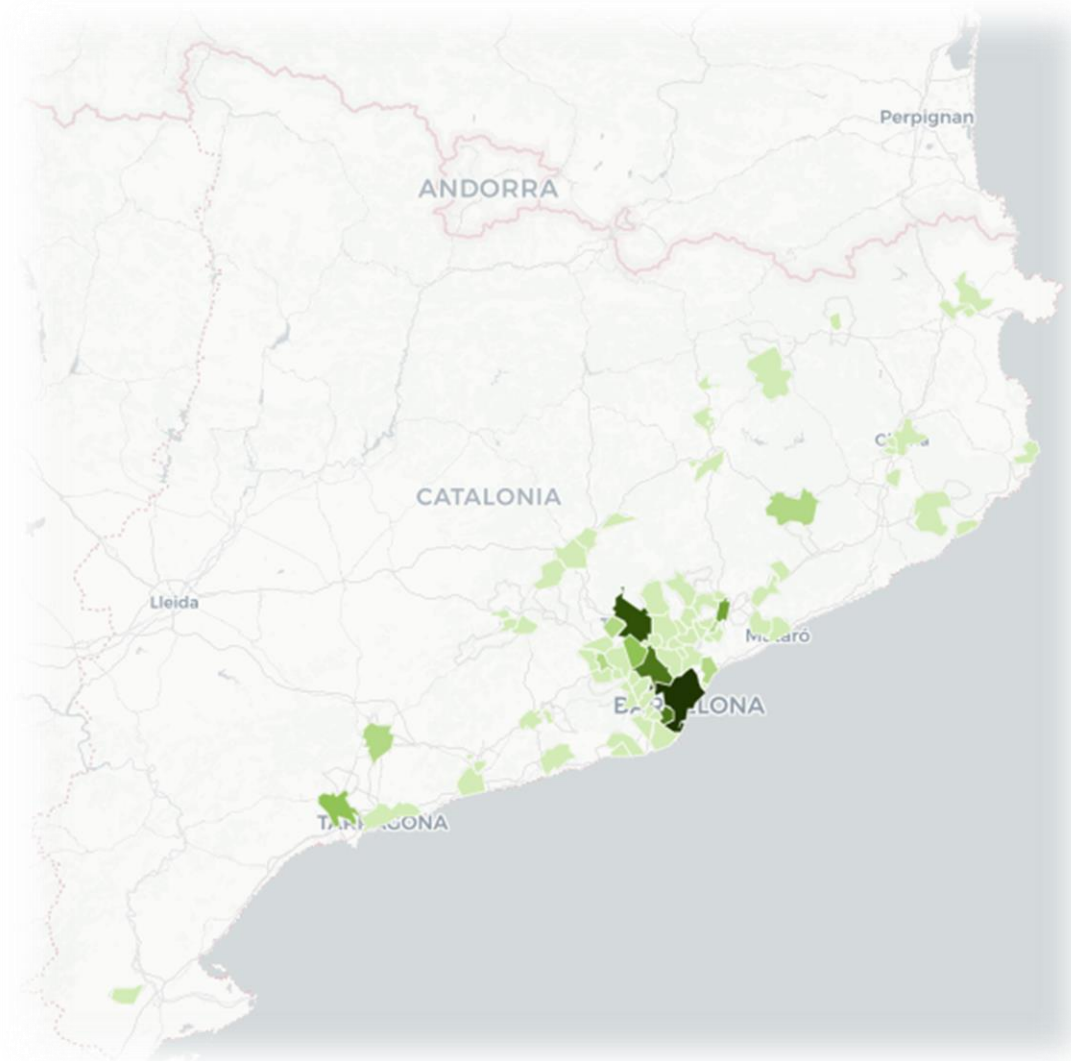
Institutions and public administration



Location of companies in the battery value chain in Catalonia

- Most companies in the battery value chain in Catalonia are concentrated in **the Barcelona area** and **the Barcelona Metropolitan Area**. By county, the following stand out: **Barcelona** (with **37.8%** of the total number of companies), **Vallès Occidental** (**18%**), **Baix Llobregat** (**14.6%**), and **Vallès Oriental** (**7.9%**). There is also some dispersion of companies in the provinces of Tarragona and Girona.
- As for municipalities, the following stand out: **Barcelona** (with **87** companies of the total), Terrassa (**9**), Cornellà de Llobregat (**7**) and l'Hospitalet de Llobregat (**7**), Sant Cugat del Vallès (**6**), Badalona (**5**), Granollers (**5**), Tarragona (**5**) Barberà del Vallès (**5**).

County	No. of companies	% of the total
Barcelonès	101	37.8%
Vallès Occidental	48	18%
Baix Llobregat	39	14.6%
Vallès Oriental	21	7.9%
Tarragonès	8	3%
Bages	7	2.6%
Gironès	5	1.9%
Others	38	14.2%
Total	267	100%



Source: the authors



Catalonia has been the **No.6 European region and No. 1 in southern Europe** in number of foreign investment projects in the battery value chain in the last five years.

Ranking by projects

- 1 Hungary
- 2 Bavaria
- 3 North Rhine-Westphalia
- 4 Baden-Württemberg
- 5 Hesse
- 6 Catalonia**

Lotte plans to invest up to €1.2 billion by 2028 in Montroig del Camp for the installation of three elecfoil factories. Elecfoil is a component with sheets of copper, which is essential in the manufacture of batteries. The first plant will launch in 2025. It is expected that 600 new jobs will be created.



SEAT has invested more than 300 million euros to open a new battery assembly plant in Martorell. It is expected to start production in 2025 and will create 400 new jobs.



Outstanding investors in Catalonia and their investment



€395 M



€342 M



9 projects



970.7 million euros



1,291 jobs created

Note: the data refer to the 2019-2023 period.

EU projects related to electric batteries in Catalonia

Electric battery projects in Catalonia

26 projects

13.2 million euros

3.2% of the EU total
23.7% of the total in Spain

Ranking by regions

- 1 Île-de-France
- 2 Basque Country
- 3 Trøndelag
- 4 Upper Bavaria
- 5 Catalonia**
- 6 Brussels region
- 7 Vienna
- 8 East Flanders
- 9 Community of Madrid
- 10 Helsinki-Uusimaa

Under the Horizon Europe program, Catalonia has secured **26** projects in electric batteries with a total funding of **13.2** million euros.

With **3.2%** of the total funding received, Catalonia stands **5th** in the ranking of European regions.



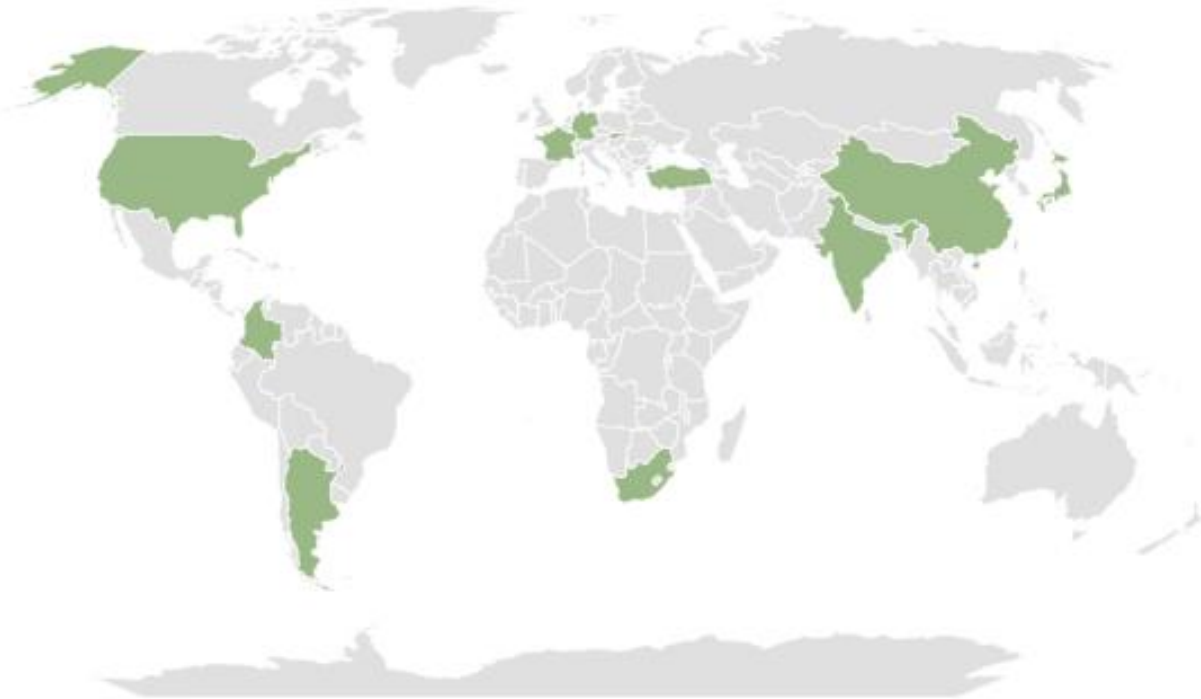
12 Catalan institutions





Note: this includes Horizon Europe (2021-2023) projects


Source: Horizon Europe


International opportunities for Catalan companies





 **Argentina**
19 million tons of lithium to exploit


 **Montenegro**
The energy sector in Montenegro needs modernization


 **South Africa**
Growing renewable energy and vehicle market


 **Turkey**
Turkey, a major production hub and consumer of electric cars


 **Germany**
Innovative solutions in automotive and renewable energy


 **India**
100% of public vehicles in India will be electric by 2030


 **France**
A country committed to the decarbonisation of industry

 **China**
China pushes for carbon neutrality with batteries and green technology

 **Slovakia**
Automotive auxiliary sector in Slovakia

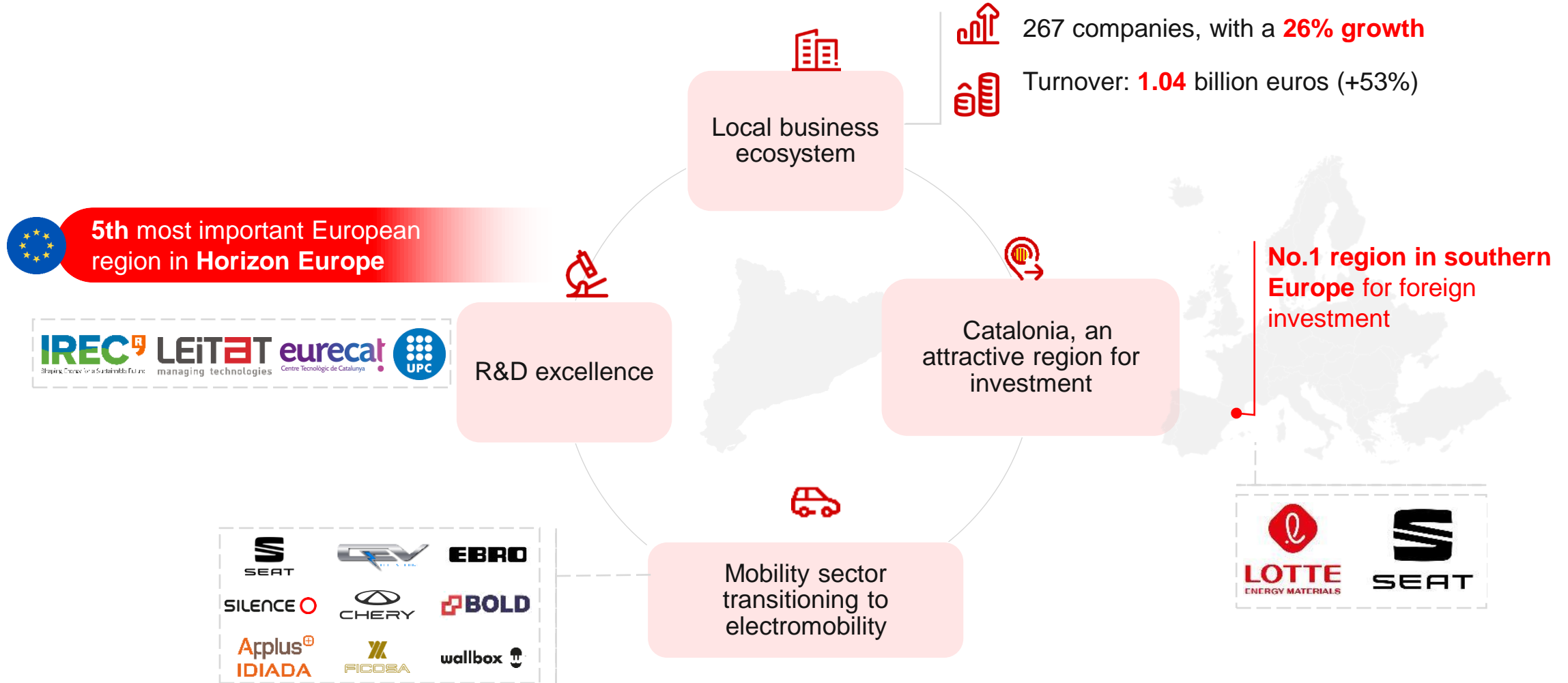
 **Japan**
Japan, an automotive powerhouse heading towards the vehicle of the future.

 **United States**
Sustainable automotive industry: investment and digitalization for an eco-friendly future

 **Colombia**
Colombia connects with regional mobility

Source: Global map of international business opportunities

Catalonia, a dynamic battery ecosystem



Source: the authors

SWOT of batteries in Catalonia

Strengths



Strong presence of the automotive industry, with potential to integrate batteries into their electric vehicle production lines.



Major R&D effort in batteries.



Presence of research centers and universities.



An attractive region for investments in the battery value chain.

Weaknesses



Limited number of companies specialized in cell and battery manufacturing.



Little effectiveness of grant funding for the deployment of batteries in both the industrial and electric vehicle sectors.



Limited adoption of electric vehicles, charging points and renewable energies.



Lack of battery factories and recycling plants.

Opportunities



A firm commitment to climate neutrality in the EU: batteries are key to the electrification of demand.



Next Generation EU grants to battery projects can help scale up technologies.



Development of technologies applied to the value chain, alternative materials, battery design, waste treatment, material recovery and second life.



Recovery of critical materials through battery recycling.

Threats



Shortages of critical materials for battery manufacturing, which are concentrated in a few countries, as well as refining processes.



Need for professional adaptation and reskilling of workers in the automotive sector.



Absence of battery validation infrastructure.



EU requirements for battery recycling and circularity.

Source: the authors

Batteries in Catalonia

7. Success stories in Catalonia

Success stories on Catalonia



NAPPTILUS BATTERY LABS produces quick charging lithium-free batteries.



MAHLE manufactures coolers for electric vehicle batteries.



STARK has received EU funding for manufacturing electric motorcycles.



APPLUS IDIADA has opened its battery safety laboratory.



BOLD manufactures electric batteries for vertical takeoff passenger aviation.



MARBEL is an EU project of modular and reusable batteries for electric vehicles.



COBRA is an EU project focused on cobalt-free batteries for future automotive applications.



LOTTE
ENERGY MATERIALS

LOTTE will produce electrofoil, essential for batteries, at its future manufacturing plant in Mont-roig del Camp.



ABO ENERGY will build a stationary energy storage park with lithium batteries in Vilademuls.



LEITAT develops solid-state batteries with 3D printing.



SEAT will open a new battery assembly plant for electric vehicles in Martorell.



FICOSA is launching new control and battery management units for electric vehicles.



EURECAT is implementing a robotic solution for the advanced recycling of electric vehicle batteries.



HYBRIS is a hybrid storage project with batteries for microgrids and "behind-the-meter" applications.

Interviews with companies and institutions

We would like to sincerely thank all the participating companies for their generosity, both for their time and for sharing their valuable knowledge.



A E P I B A L



CataloniaConnects

Thank you

More information about the sector, news and opportunities:

<https://catalonia.com/key-industries-technologies/mobility-transportation/battery-industry-in-catalonia>



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