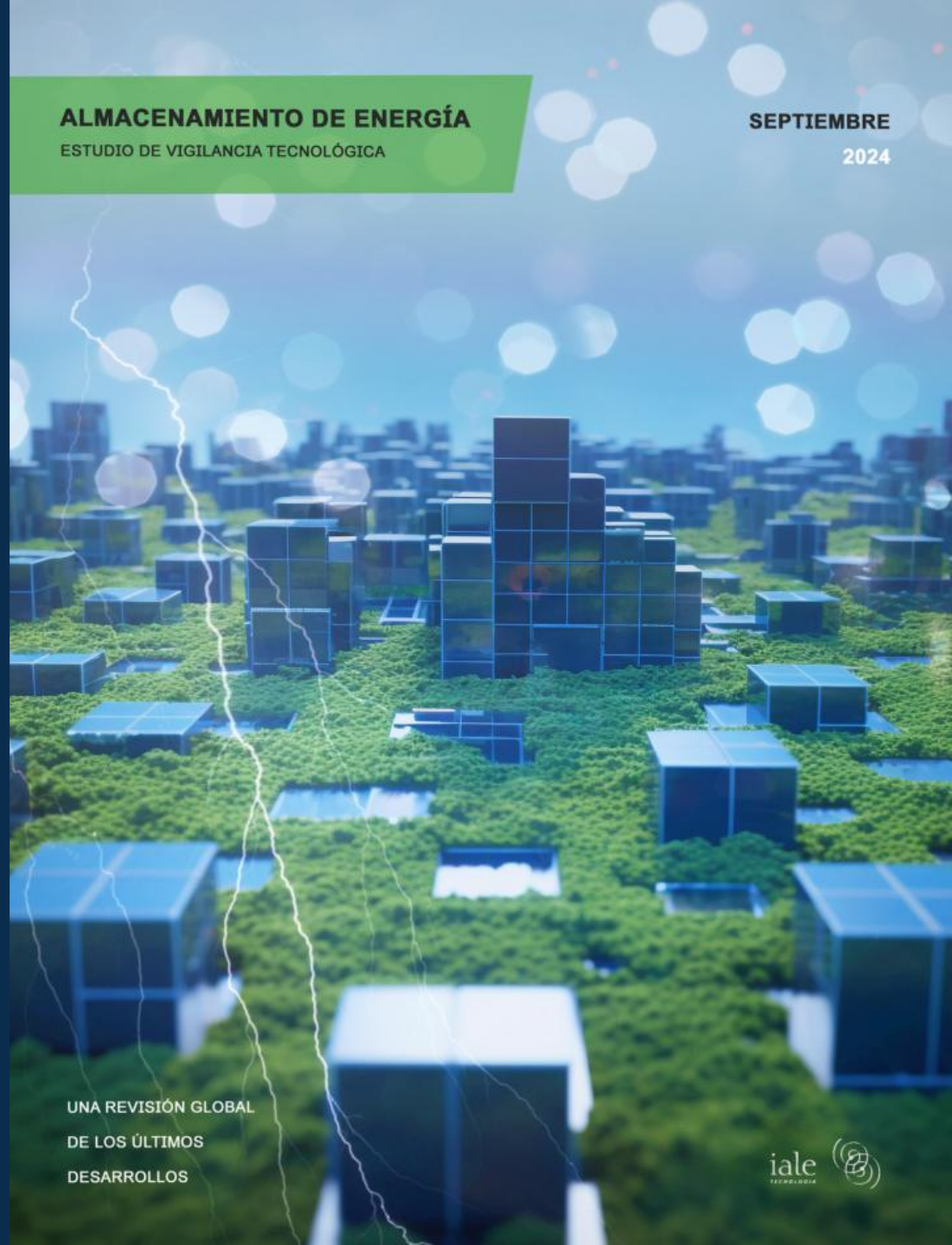
R&D&I in energy storage in Spain

BatteryPlat contribution through taxonomy, technology intelligence and capability mapping



BatteryPlat

A storyline from technology maturity to Spanish capabilities

Three complementary products connect global technology trends with national R&D&I action.

1. Technology maturity

A common taxonomy and a multifactorial method to compare maturity across storage families.

2. Technology intelligence

Patents, companies and value-chain intelligence to identify actors and areas of innovation.

3. Capability map

A BatteryPlat internal map to locate entities, technologies and regional capacities in Spain.

Output: a structured reading of where technologies stand, where innovation is being projected, and where Spanish capabilities are located.

Why storage matters for R&D&I in Spain

Energy storage is a flexibility asset and a cross-cutting industrial and research opportunity.



Grid flexibility: storage supports high renewable penetration and system stability.

Industrial opportunity: batteries, thermal storage, hydrogen and BESS create demand across the value chain.

Innovation agenda: materials, safety, digital control, integration and recycling remain active R&D&I fields.

BatteryPlat role: connect public strategy, technology evidence and ecosystem capabilities.

Spain has an Energy Storage Strategy; BatteryPlat adds technology intelligence and ecosystem mapping to support its implementation.

Source: BatteryPlat taxonomy report; Spanish Energy Storage Strategy referenced in the report.

What BatteryPlat has produced

Three assets provide a coherent knowledge base for the Spanish storage ecosystem.





Internal capability map

Excel-based classification of BatteryPlat entities by region, type, technology and value chain.

5
storage families covered

7,904
patent documents retrieved

128
consolidated BatteryPlat entities

Together they turn dispersed information into an actionable map of maturity, innovation and capabilities.

Sources: BatteryPlat taxonomy report (2024), IALE/BatteryPlat VT&IC study (2024), BatteryPlat capabilities analysis (2026).

Taxonomy: a multifactorial view of maturity

The taxonomy moves beyond subjective TRL labels by using five quantitative indicators.

- **C** Total installed capacity
- **P** Total installed power
- **N** Number of installations
- **A** Age of installations
- **I** Annual increase in installed capacity

Data sources used by the taxonomy

DoE project list: 1,693 references across 4 technology families and 30 subtypes.

European storage technologies and facilities database: 969 references across 4 families and 20 subtypes.

The method applies only where industrial or demonstration plants are sufficiently documented.

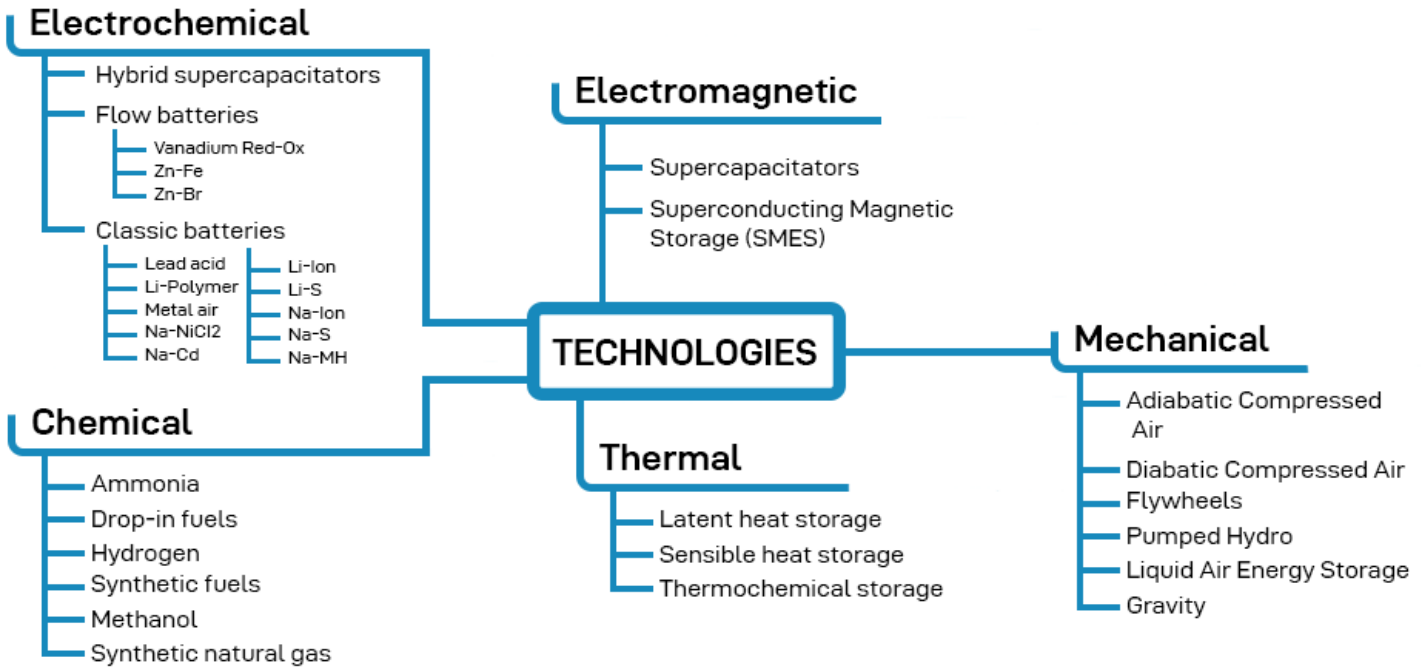
BatteryPlat contribution: a common, evidence-based language for comparing technologies.

$$M = f(C, P, N, A, I)$$

Source: BatteryPlat taxonomy report, methodology section.

Taxonomy: storage as a portfolio of technologies

The report structures storage into five main families and multiple subtypes.



No single technology fits every storage need.

Mechanical and thermal solutions are relevant for long-duration and system applications.

Electrochemical storage is the most dynamic area for batteries, BMS, safety and recycling.

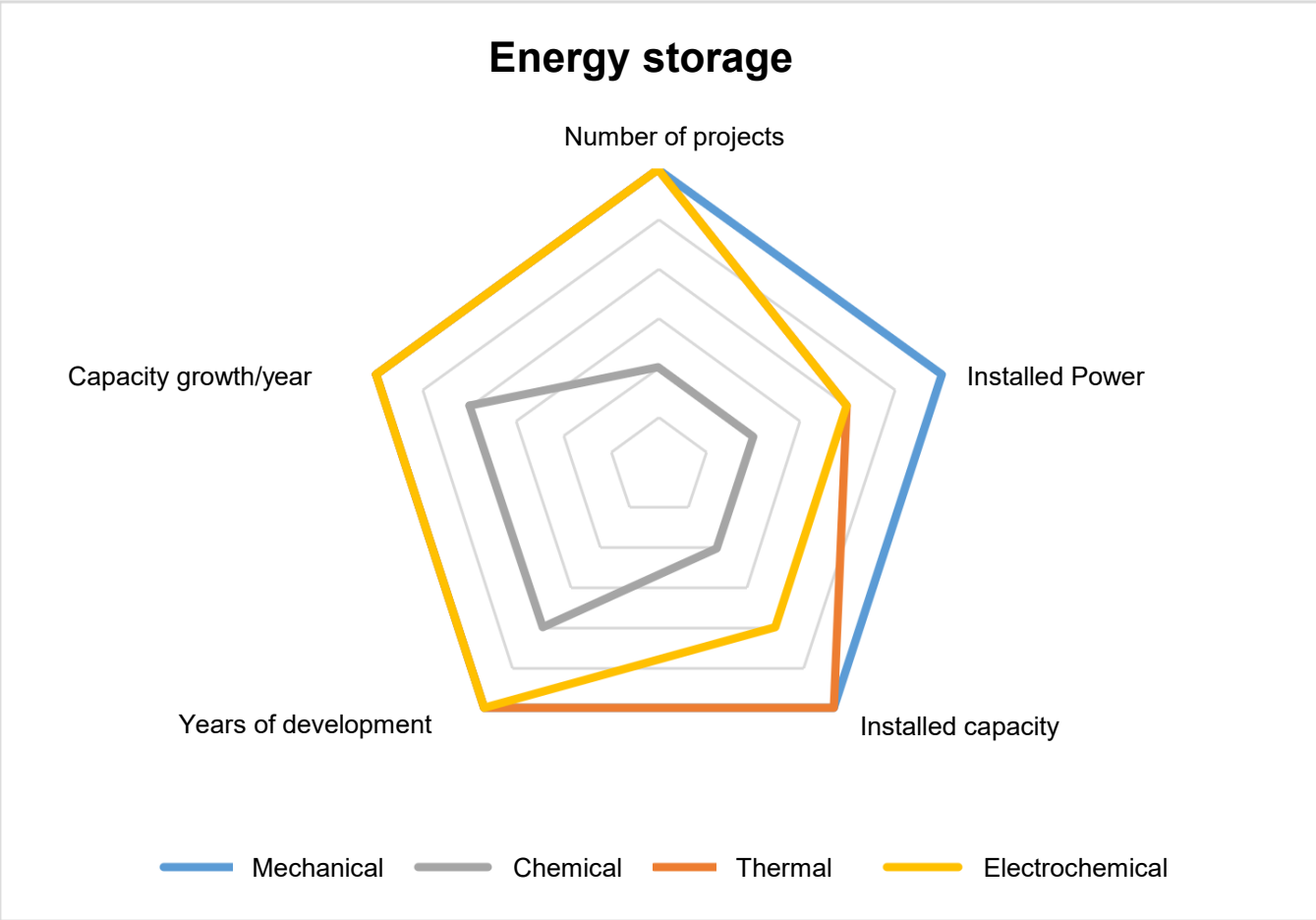
Chemical storage connects storage with hydrogen and power-to-X pathways.

The taxonomy provides the vocabulary needed to classify both global trends and Spanish capabilities.

Source: BatteryPlat reference presentation and taxonomy report.

Maturity differs by family and by indicator

The taxonomy shows that maturity is not a single dimension: scale, installed power, installations and time all matter.



The farther a technology is from the centre, the higher its maturity on that indicator.

Families show different maturity profiles: power, installed capacity and time do not always evolve together.

The method helps distinguish mature deployment from emerging or demonstration-stage technologies.

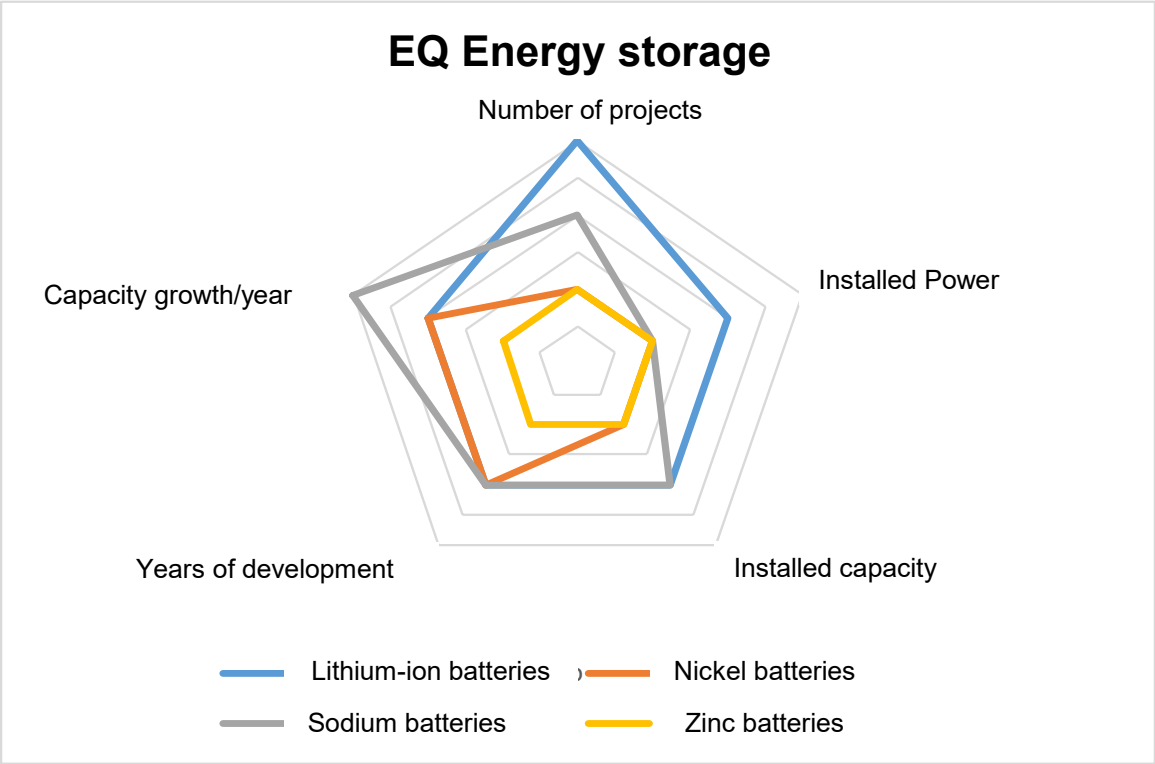
For R&D&I, this means that mature technologies can still require innovation while emerging ones need scale-up pathways.

Reading across families helps prioritise research, demonstration, regulation and industrial collaboration.

Source: BatteryPlat taxonomy report and reference presentation, comparative maturity figure.

Focus on electrochemical storage: broad, dynamic and strategically relevant

Battery technologies connect materials research, manufacturing, system integration and end-of-life.



Li-ion remains a key reference but does not exhaust the innovation agenda.

Sodium, flow, zinc, metal-air and beyond-Li-ion technologies open different application niches.

Critical R&D&I topics include safety, degradation, thermal management, BMS, integration and recycling.

This focus bridges the taxonomy with patent intelligence and the internal capability map.

BatteryPlat contribution: translate a complex battery landscape into a shared framework for Spain.

Source: BatteryPlat taxonomy report, electrochemical storage section.

VT&IC: from patents to competitive intelligence

The study monitors recent technology developments and the competitive landscape over the last five years.



7,904
patent documents retrieved

2019-2023
analysis period

583
companies mapped

Identify active patent holders and collaboration patterns.

Compare global activity by region, country, technology and value-chain stage.

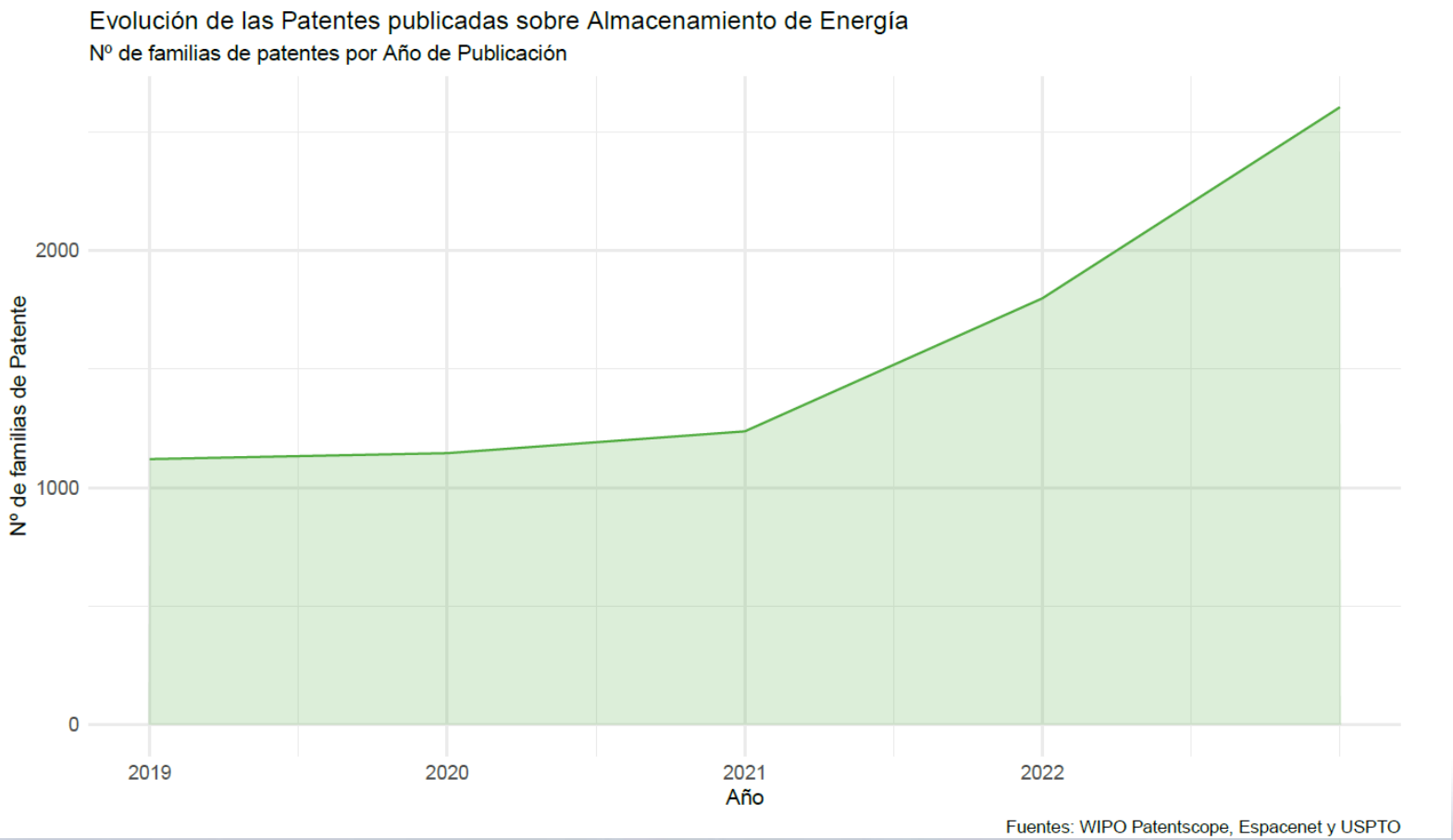
Extract a Spain-focused view of companies, research centres and territorial concentration.

Patents are a signal of current R&D&I effort and potential future market positioning.

Source: IALE/BatteryPlat VT&IC study, presentation and patent methodology sections.

Global patent activity confirms growing R&D&I pressure

The number of patent families published in energy storage increased over the analysed period.



Trend: increasing protection of energy-storage inventions.

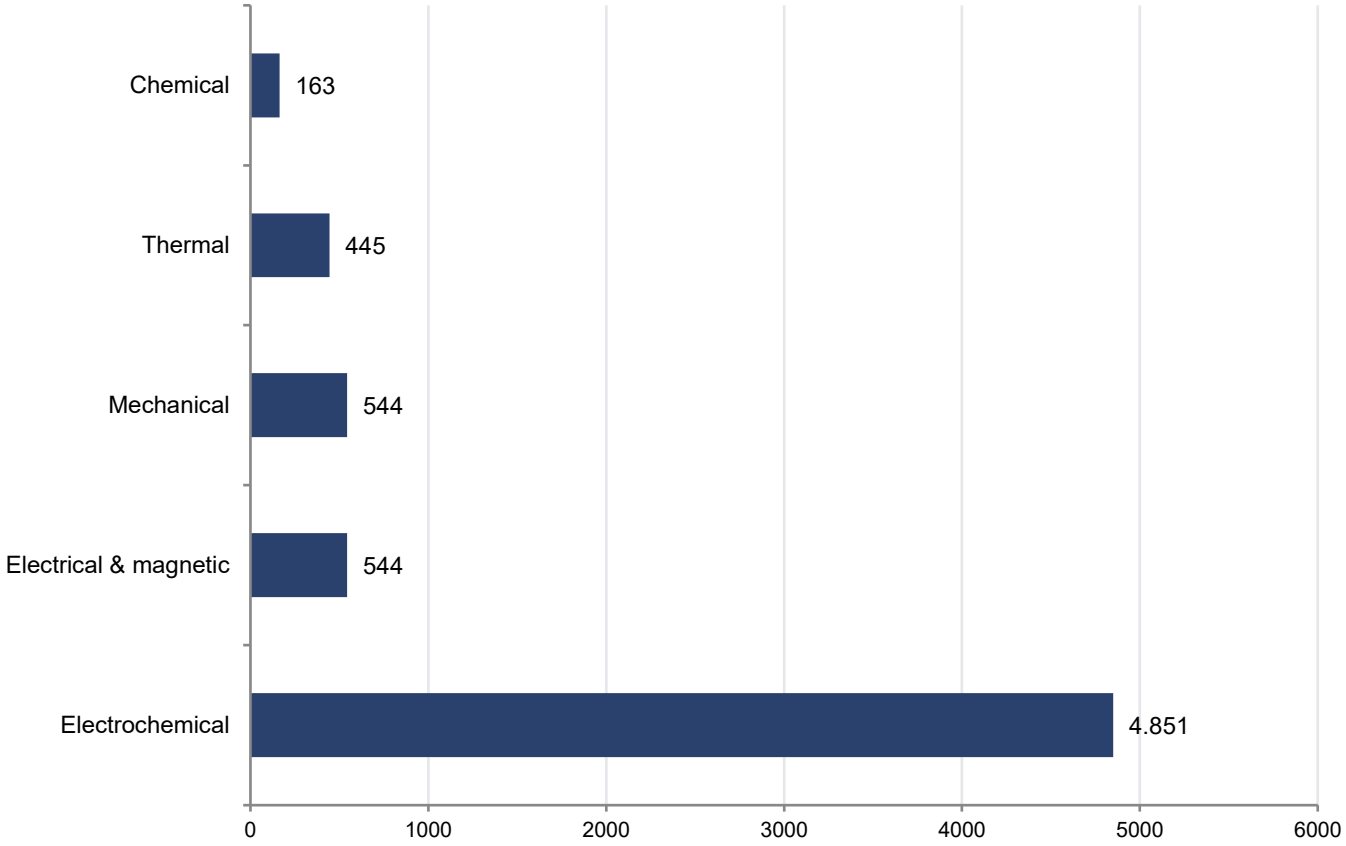
The acceleration reflects competition for technology positioning.

Battery and electrochemical developments explain a large part of the pressure.

For BatteryPlat, it justifies continuous technology watch and knowledge transfer.

Batteries concentrate the largest share of protected innovation

Electrochemical storage accounts for most patent families in the study.



4,851

electrochemical patent families

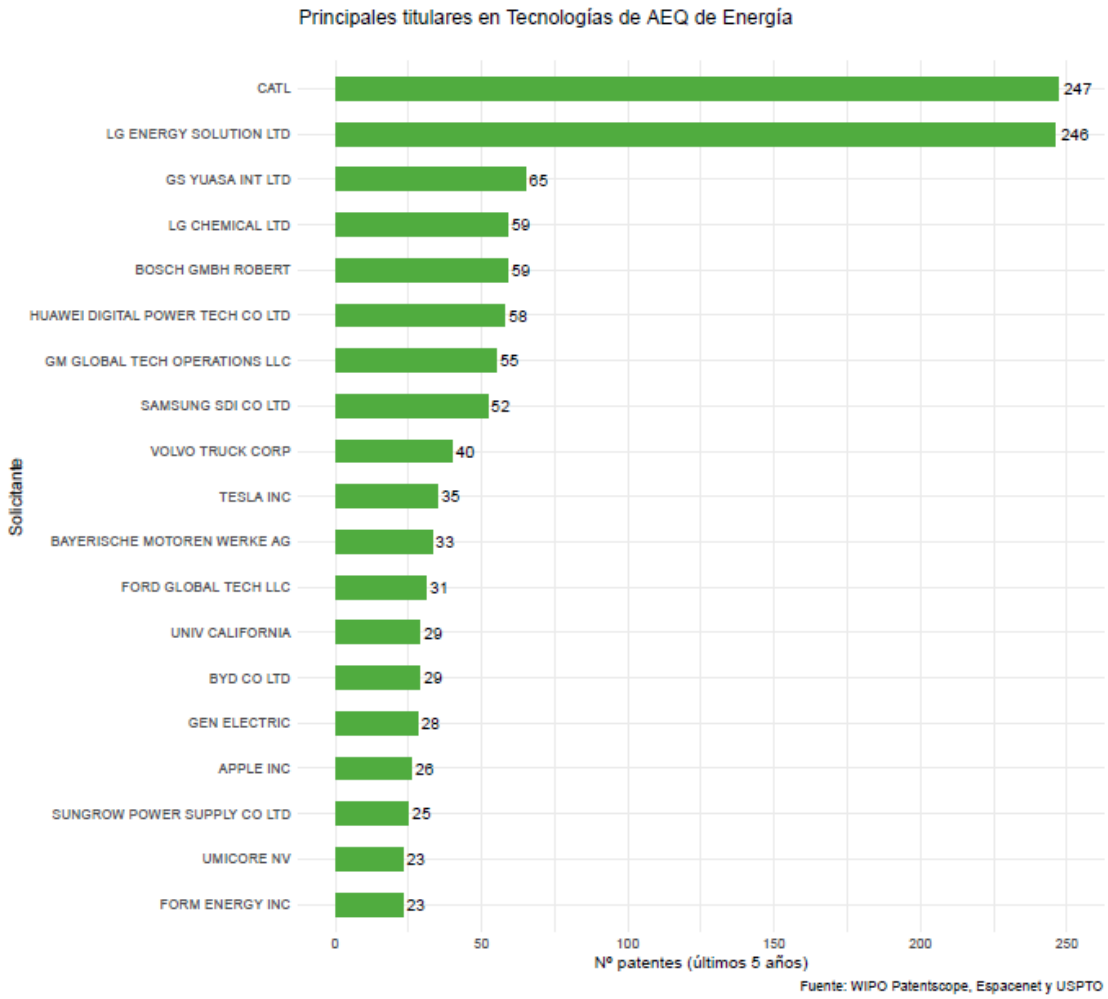
More than 60% of retrieved patent families relate to batteries or electrochemical storage.

Implication: Spain needs a detailed view of electrochemical capabilities while keeping a portfolio perspective.

Source: IALE/BatteryPlat VT&IC study, patents by storage ype.

Who leads patented R&D in electrochemical storage

Global leadership is concentrated in large battery manufacturers, electronics firms and OEMs.



CATL and LG Energy Solution exceed 200 inventions in the period.

Asia dominates at the top of the patent ranking.

European actors appear through Bosch, BMW, Volvo, Valeo and other specialised companies.

Spanish actors:

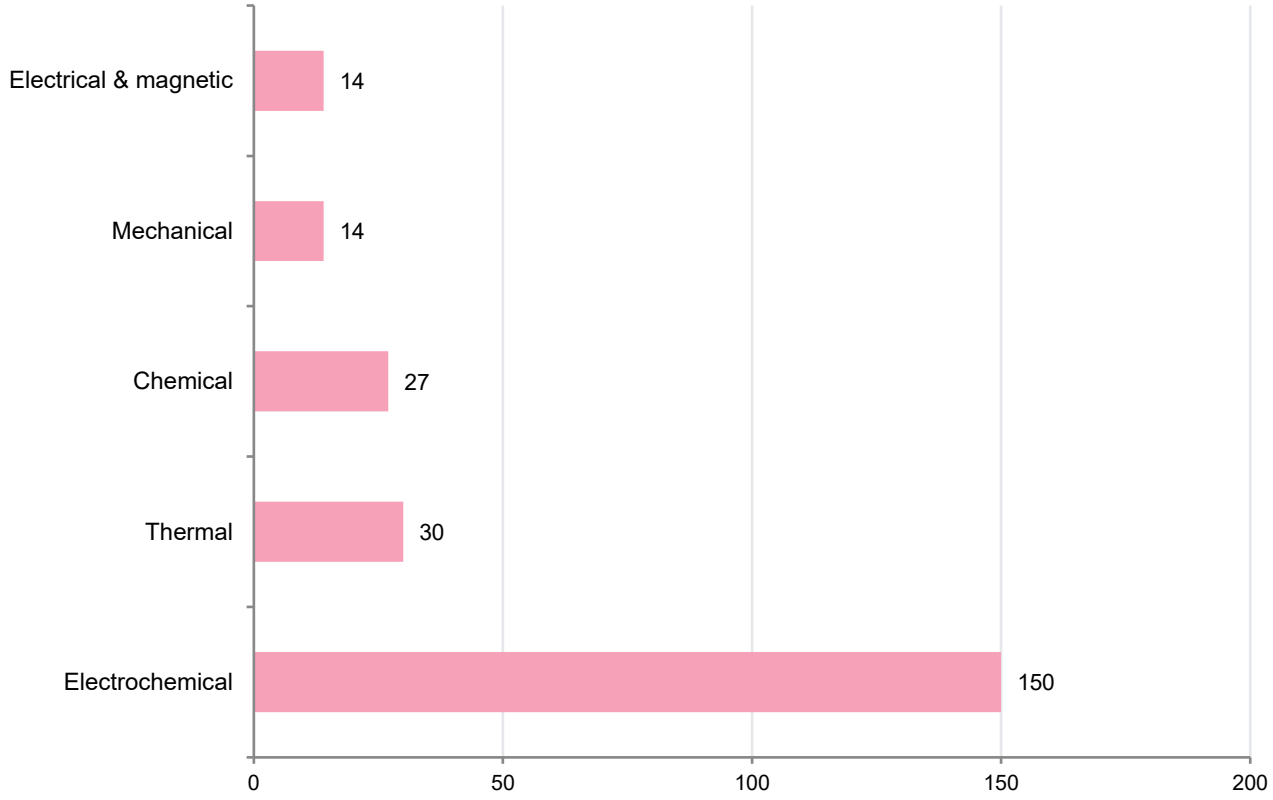
- **General Electric Renovables España**
- **Siemens Gamesa**
- **SEAT**
- **Ferrovial**
- **Turbo Energy SL**
- **Cesnia Desarrollo SL**
- **ALBUFERA ENERGY**
- **Isberoal STORAGE SL**
- **Diggia**

This is a patent intensity ranking, not a market-share ranking.

Source: IALE/BatteryPlat VT&IC study, main applicants in electrochemical storage.

Spain in the VT&IC study: electrochemical storage is dominant

The Spanish competitive landscape mapped by the study includes 185 active companies.



Electrochemical/BESS activity represents roughly two thirds of mapped companies.

Thermal and chemical storage remain relevant for industrial applications and long-duration needs.

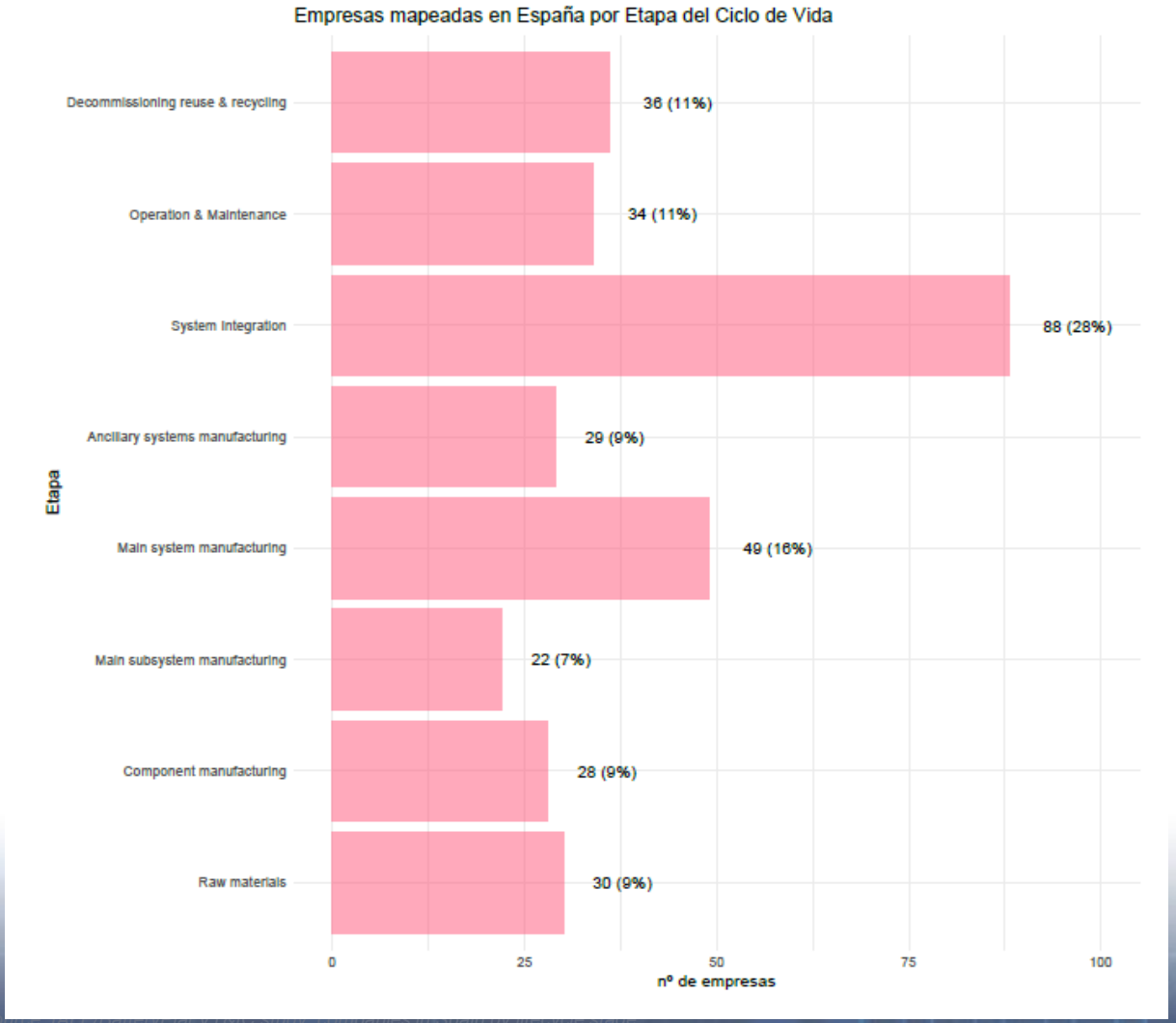
Mechanical and electrical/magnetic storage appear as narrower but strategic niches.

Message: Spain has a strong BESS profile, but BatteryPlat should keep a diversified technology agenda.

Source: IALE/BatteryPlat VT&IC study, companies in Spain by storage type.

Spain by value chain: strength in system integration

The Spanish landscape shows a strong presence in integration, deployment and system-level activities.



System integration is the strongest mapped stage.

Main system manufacturing, O&M and end-of-life are also visible.

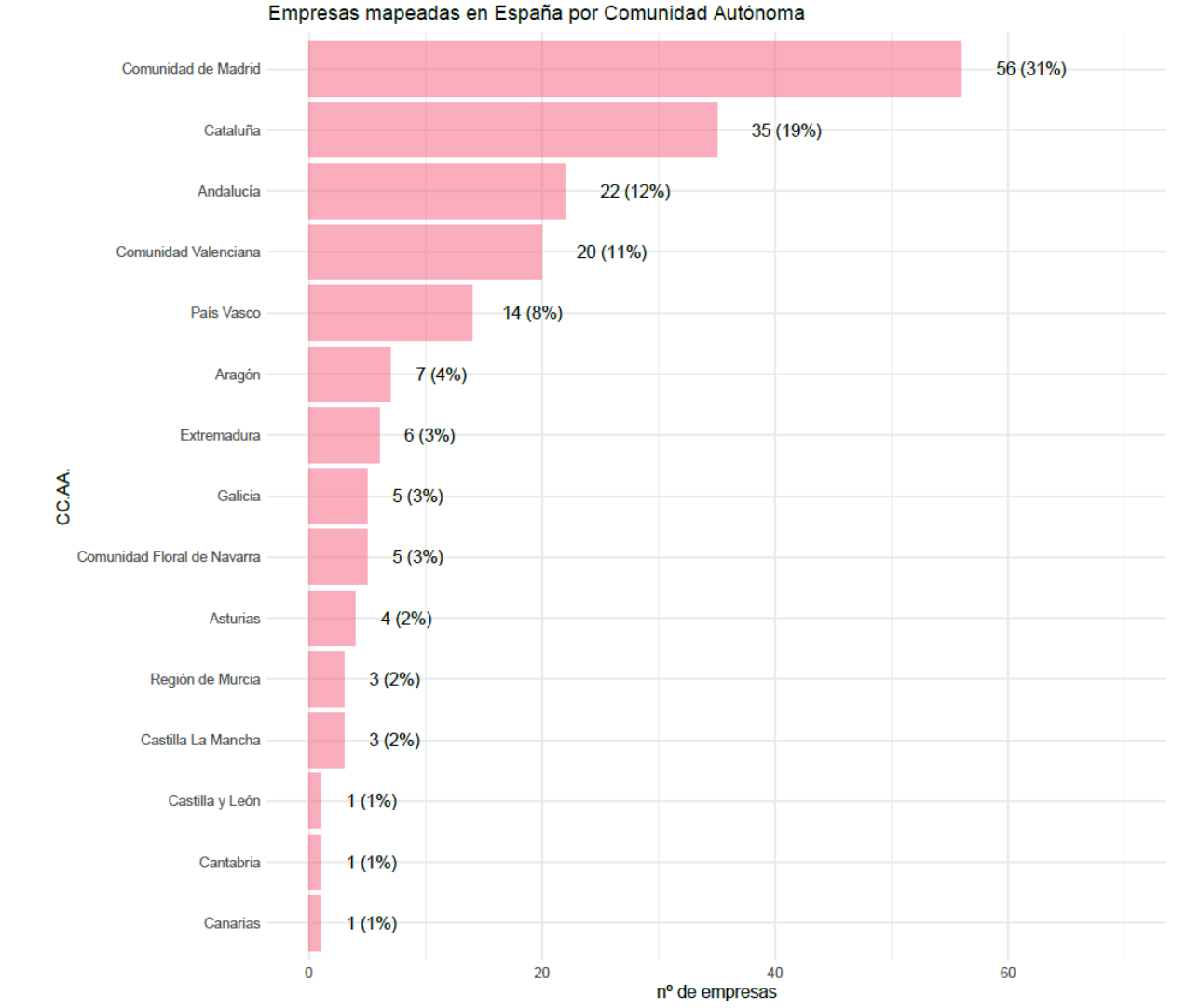
This suggests strengths in deployment, engineering and system delivery.

The picture also points to the need for stronger links with materials and component R&D.

BatteryPlat can connect R&D capabilities with integration, demonstration and scale-up needs.

Spain by region: territorial concentration and complementary poles

The company map reveals regional clusters that can guide BatteryPlat actions.



Madrid concentrates more than 30% of mapped companies.

Catalonia, Andalusia, the Valencian Community and the Basque Country form complementary poles.

The territorial view supports targeted events, outreach and matchmaking.

BatteryPlat role: connect regional capacities with technology families and value-chain needs.

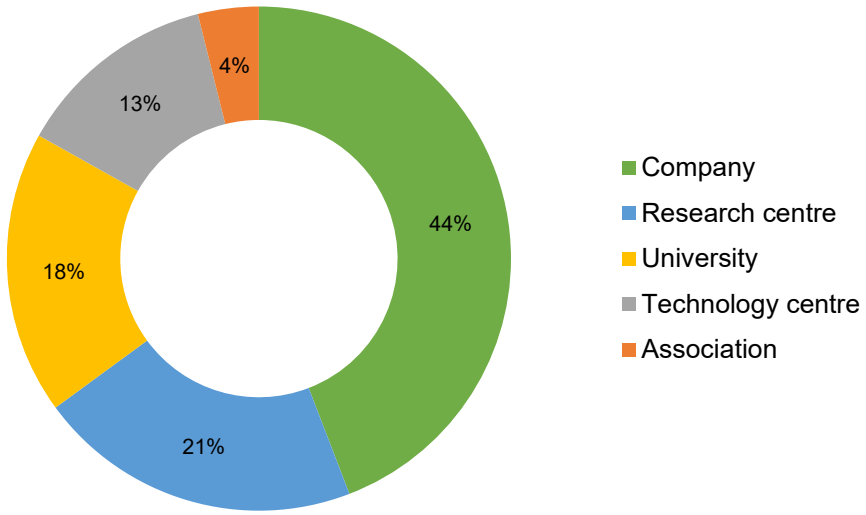
BatteryPlat internal capability map: from market overview to platform capacities

The Excel-based map classifies consolidated BatteryPlat entities by type, region, technology and value chain.

77 consolidated entities

34 companies

40 universities + research/tech centres



This is not a market census: it is an internal working map.

It helps identify potential partners within BatteryPlat.

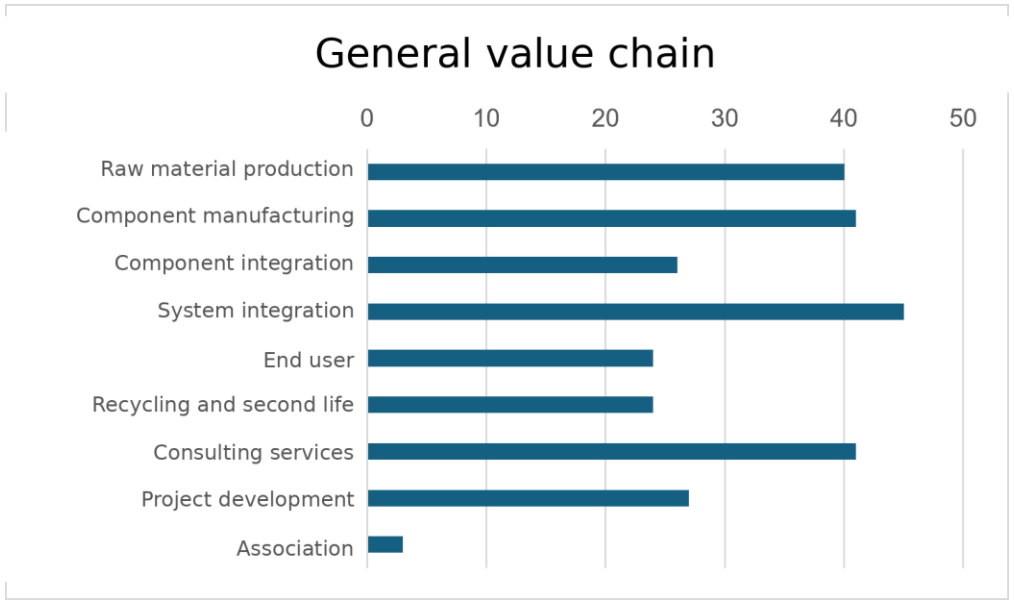
It enables targeted matchmaking by technology, region and value-chain stage.

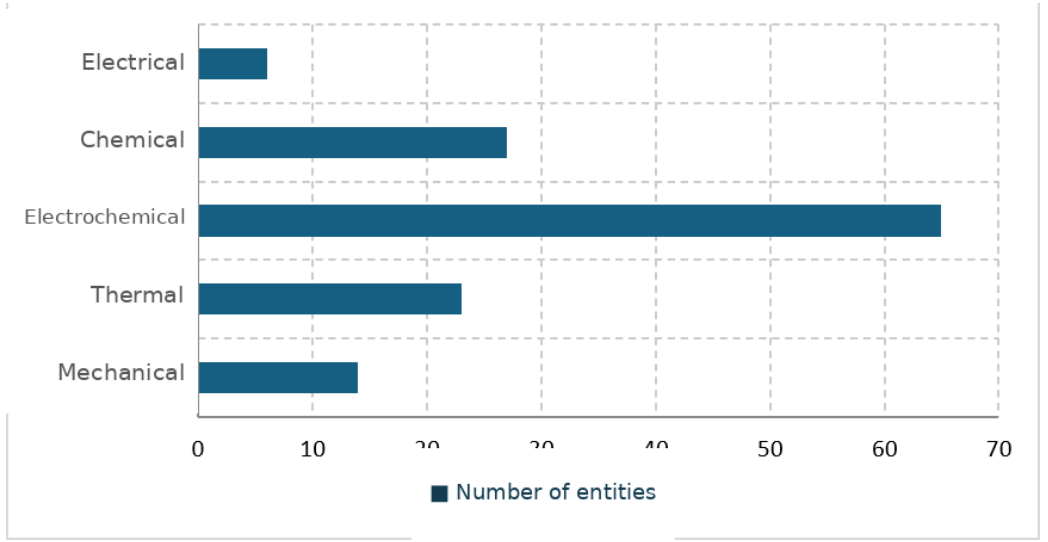
Use case: orient collaboration, visibility and updates of member capability profiles.

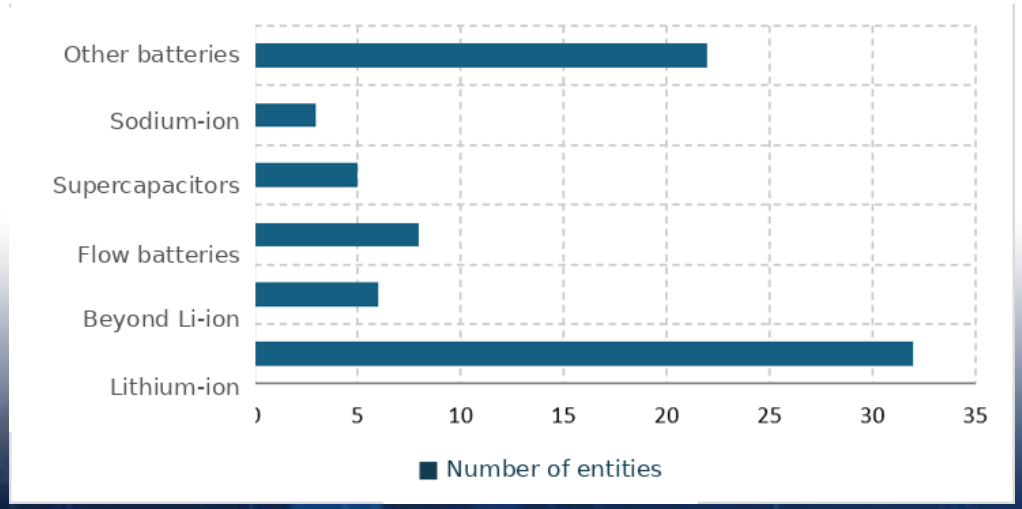
Source: BatteryPlat internal capabilities analysis Excel, 2026.

Internal capabilities: technologies and value-chain coverage

The BatteryPlat map shows strong electrochemical coverage and broad system-integration capacity.







What the BatteryPlat work reveals for Spanish R&D&I

The three products create an evidence base for action, collaboration and visibility.

1 **A portfolio view is essential**

Storage should be read as a set of complementary technology families, not as a single solution.

2 **Electrochemical storage is the innovation hotspot**

Patents and Spanish company mapping confirm the weight of batteries, BESS and related systems.

3 **Spain shows value-chain strength in integration**

The competitive map points to system integration, O&M and end-of-life as strong national areas.

4 **BatteryPlat can convert mapping into collaboration**

The internal capability map enables matchmaking by region, technology and value-chain stage.

Practical next step: use these findings to prioritise thematic working groups, regional outreach and R&D matchmaking actions.

Sources: BatteryPlat taxonomy report, IALE/BatteryPlat VT&IC study and BatteryPlat internal capabilities Excel.