



Welcome to the

# Batteries Europe Plenary Session 2023

Brussels, Thon Hotel EU – Hybrid  
Event

7<sup>th</sup> June 2023 | 10:30 – 17:00



Batteries Europe Secretariat is a EU-funded project that has received funding from the European Union's Horizon Europe Research and Innovation Programme under Grant Agreement N. 101069676.

[www.batteries-europe.eu](http://www.batteries-europe.eu)

 @BatteriesEurope

## Introductory notes & practicalities:

- ◆ Today's Plenary Session has the format of a hybrid event
- ◆ Online participants can raise questions by writing on Microsoft Teams chat. Secretariat will take care of addressing the questions to the speakers.
- ◆ Physical participants, if they also want to join the meeting on Teams, need to mute their PC, to avoid echoes
- ◆ **Disclaimer: this event will be recorded**



# Batteries + Europe

## Opening and Welcome Message *Stefano Saguatti (BE Advisory Steering Board Member - MANZ)*

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# Batteries + Europe

## Opening and Welcome Message

*Philippe Froissard (Head of Unit  
RTD C.2 European Commission)*

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## Institutional framework for a resilient and competitive Europe

*European Commission*

*Caspar Klos – DG GROW*

*Matilda Axelson – DG GROW*

*Cesar Santos - DG ENV*

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## I) European CRM Act

Proposal for a Regulation - establishing a framework for ensuring a secure and sustainable supply of critical raw materials

*Caspar Klos – DG GROW*

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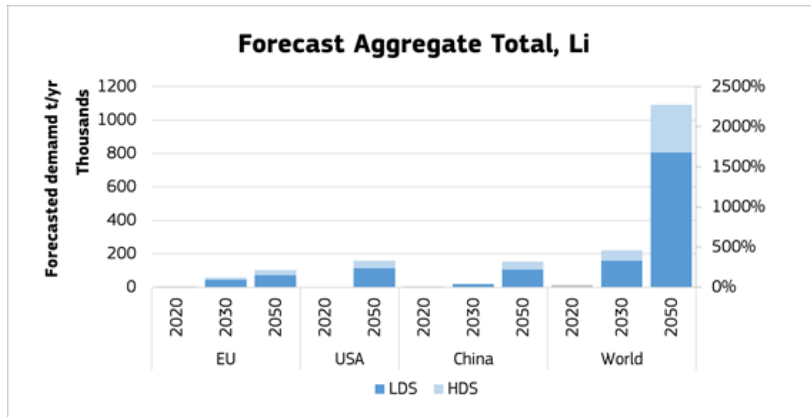
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# Critical raw materials (CRMs) and the EU economy

- Driven by the **twin transition** and defence needs, significant **growth in CRM demand**, with risk of global supply/demand imbalance



*Demand forecasts aggregated for lithium (2023 Foresight Report)*

Lithium demand for batteries in the EU is expected to **grow by 12 times by 2030** and **by 21 times by 2050**.

- EU is heavily dependent on third country supply for CRMs that are key for strategic technologies
- Strategic dependencies and risk of supply chain disruption

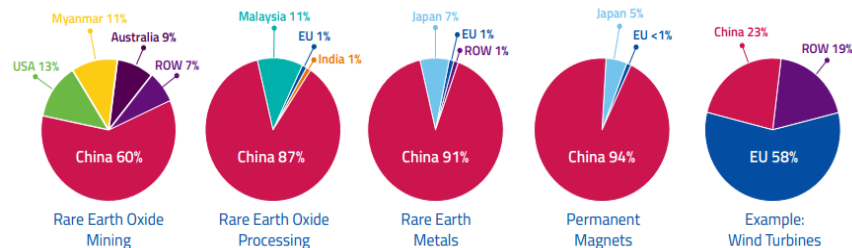


Fig. 3: From rare earths mining to wind turbine manufacturing: estimated market shares in 2019. Sources: Team analysis and Roskill 2018; Adamas Intelligence 2019; Peteves 2017; Carrara et al. 2020; IEA 2021; USGS 2021.

*Source: European Raw Materials Alliance (ERMA)*

# European Critical Raw Materials Act

Ensuring a secure and sustainable supply  
of critical raw materials for the Union



Strengthen all stages of the  
European CRM value chain

Improve EU capacity to monitor  
and mitigate risks of disruption to  
CRM supply



Diversify EU CRM imports to  
reduce strategic dependencies

Improve CRM circularity  
and sustainability



# I. Setting Priorities

## Defining critical and strategic raw materials

### CRM

Whole EU economy, based on :

- supply risk
- economic importance

### SRM

SRM are a subset of CRM:

- Key for strategic technologies (twin transition, defence and space)
- Forecast demand risks outstripping supply

## 2030 benchmarks

### Towards more SRM supply security

- EU's **extraction** capacity cover at least **10%** of the EU's SRM consumption
- EU's **processing** capacity cover at least **40%** of the EU's SRM consumption
- EU's **recycling** capacity cover at least **15%** of the EU's SRM consumption

### Towards more diversification of supply

- Not more than **65%** of EU consumption of each SRM should come from a single third country.

## II. Strengthening the value chain

### Strategic Projects

Across the whole SRM value chain: extraction – processing - recycling

Selected by the Commission with advice from the Board based

- Contribution to security of supply
- Sustainability
- Technical feasibility
- Cross-border benefits in EU/ Economic and social benefits in third countries

### Benefits

- **Priority Status** in national and EU law: for administrative and judicial procedures
- **One-stop-shop approach**
- **Permitting - Legal time-frames**
  - Extraction: 24 months
  - Processing & Recycling: 12 months
- Provisions to facilitate and timely deliver **environmental assessments and authorisations without weakening environmental and social protection**
- **Enabling conditions to implement Strategic Projects**
  - The Critical Raw Materials Board provides coordination and advice to secure remaining financing
  - Provisions to facilitate the conclusion of off-take agreements

### One-stop-shops

Member States shall designate one national authority to facilitate and coordinate the permit-granting process

### Exploration

Member States shall draw and implement national exploration programmes targeting CRMs

### III. Risk monitoring and mitigation

- Monitor **supply risks** of CRM
- **Stress tests** by the Commission with Member States
- Alerts to MS/relevant authorities in case of risk
- **Company risk preparedness**
- **Strategic stockpiling**: information gathering and coordination
- Voluntary joint purchasing

## IV. Ensuring the free movement of CRMs with a high level of environmental protection

### CIRCULARITY

- **National measures on CRMs circularity**
- Maximising potential from (closed) **extractive waste facilities**
- Preparing the ground for massive recycling of **permanent magnets**

### SUSTAINABLE CHOICES

- Recognition of **certification schemes** on the sustainability of CRMs
- Empowerment to set, at a later stage, information requirements on **the environmental footprint** of CRMs placed in the EU market

# Governance

## CRITICAL RAW MATERIALS BOARD

The Board has an **advisory role** supporting the Commission in the implementation of the different actions proposed in the Act.

### COMPOSITION

Chaired by the European Commission

Composed by Member States and the Commission

Representatives from the EP as observers

### STRATEGIC PARTNERSHIPS

The Board also discusses **Strategic Partnerships** of the Union with third countries that cover raw materials and ensures their coordination with other international fora and initiatives.

# Links

- [CRM Act Press Release](#)
- [CRM Act \(Draft Regulation\)](#)
- [CRM Act \(Communication\)](#)
- [2023 JRC Foresight Study](#)
- [2023 Study on CRMs for the EU](#)
- [CRM Factsheets](#)

## II) Net Zero Industry Act

Proposal for a Regulation on establishing a framework of measures for strengthening Europe's net-zero technology products manufacturing ecosystem

***Matilda Axelson – DG GROW***

[www.batteries-europe.eu](http://www.batteries-europe.eu)

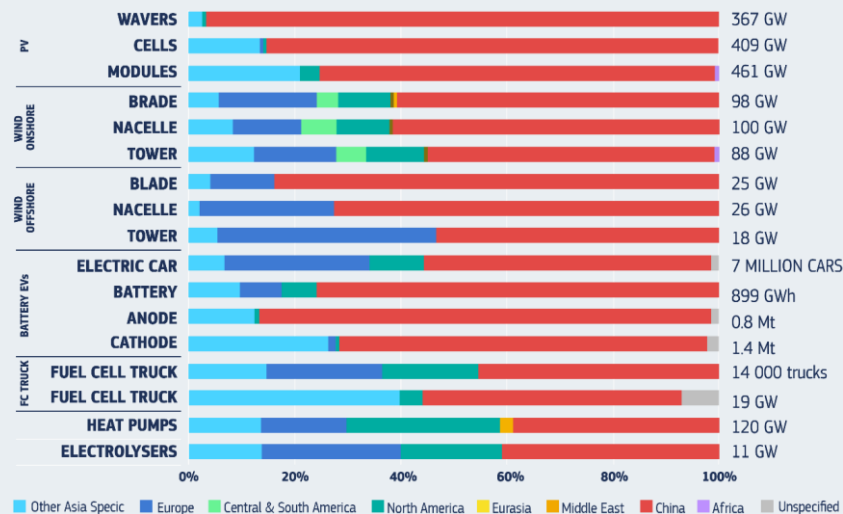
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# Rationale

## 1. Dependencies



## 2. Investment Needs

- USD 1.2 trillion required in clean energy technology supply chains for global 2030 targets.
- Fit for 55 objectives require annual investments of EUR 487 billion in the energy system in next 2 years

## 3. Barriers

- Global supply chain and price constraints: volatility in international material prices, more expensive transportation and financing, and continued supply chain bottleneck
- Current lead times slow down production: e.g., up to 5 years for EV battery production
- Lack of skilled workforce: 180,000 skilled workers needed in the hydrogen sector and 66,000 for solar PV by 2030

Global market for key mass-manufactured net-zero technologies to triple by 2030 with an annual value of around EUR 600 billion



Once in a generation opportunity to secure the EU's industrial lead in the fast-growing net-zero technologies sector with the Net-Zero Industry Act

# Technology Scope (1/2)

## Net-Zero Technologies

- renewable energy technologies;
- electricity and heat storage technologies;
- heat pumps;
- grid technologies;
- renewable fuels of non-biological origin technologies;
- sustainable alternative fuels technologies;
- electrolysers and fuel cells;
- advanced technologies to produce energy from nuclear processes with minimal waste from the fuel cycle, small modular reactors, and related best-in-class fuels;
- carbon capture, utilisation, and storage technologies;
- and energy-system related energy efficiency technologies



NZIA is about the manufacturing  
of net zero technologies

## Strategic Net-Zero Technologies



Solar photovoltaic  
and solar thermal



Electrolysers  
and fuel cells



Onshore wind and  
offshore renewables



Sustainable  
biogas/  
biomethane



Batteries  
and storage



Carbon capture  
and storage



Heat pumps and  
geothermal energy



Grid technologies

## Technology Scope (2/2)

### Net-Zero Technologies

- Technologies that are needed to reach EU's net zero objective by 2050
- Commercially available technologies with Technology Readiness Level 8 or above.

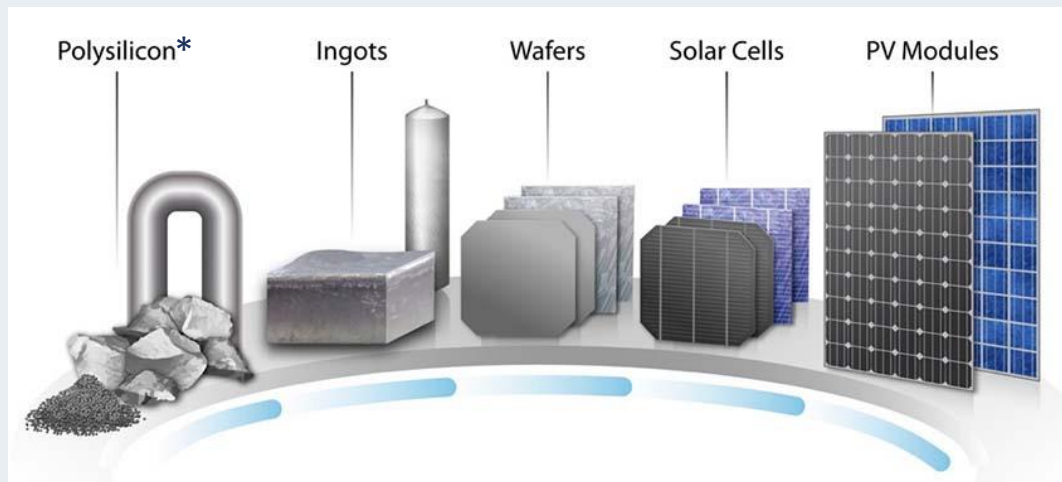
### Strategic Net-Zero Technologies

Critical technologies for our path towards our 2030 objectives, responsive to 3 main criteria:

- 1) technology readiness level  $\geq 8$ ;
- 2) contribution to decarbonisation and competitiveness;
- 3) security of technology supply risks.

## Value chain Scope

In scope are manufacturing facilities that produce:  
“final products, specific components and specific machinery primarily used for the production of those products”



\* Silicon metal is covered in CRMA, hence polysilicon is not in scope of NZIA.

# Net-Zero Industry Act: "The what"

## Permitting

Streamlined procedures and transparent information on process

—  
One stop shop

—  
Predictable deadlines, incl. for gigafactories

—  
Digital by default

## Investment

Crowding-in private investments in net-zero strategic projects by Commission and Member States

—  
Net-Zero Industry Europe Platform to advise on financing of projects

## Markets

Sustainability & resilience criteria in auctions, public procurement and public support measures

—  
CO2 injection capacity for carbon dioxide capture and storage markets

## Skills

Skills for quality jobs through Net-Zero Industry Academies

—  
Credentials for skills transparency, transferability & cross-border mobility

## Innovation

Regulatory Sandboxes to promote innovation and to test innovative net-zero technologies in a controlled environment for a limited amount of time

## Governance

Net-Zero Europe Platform as a reference body for the Commission to coordinate actions jointly with Member States including international partnerships

## CO<sup>2</sup> storage

Sets objective and obligations aimed at removing one of the main barriers to carbon capture and utilisation

# Deep Dive: Permitting (1)



## Legal, planning and investment certainty

- Clear scope: entire permit-granting procedure
- Harmonisation & simplification of permitting rules across all MS via Regulation



## National Competent Authority (“One-stop shop”)

- One authority in charge of entire process for given project
- Subsidiarity: one or more one-stop shop, provided that one remains sole point of contact for project
- Documents can be submitted electronically
- Designated authority provides info online on permitting process, investment, funding & business support services
- Designated authority ensures easy access to simple dispute settlement procedures
- Member States ensure that designated authority have sufficient staff, as well as financial, technical and technological resources (TSI)
- Net Zero Platform best practice group re: one-stop shop

# Deep Dive: Permitting (2)



## Timelines and procedural clarity

- Shall not exceed 18 months for giga-factories, 12 months for smaller projects
- For expanding production lines, deadlines halved
- In exceptional cases, timelines can be extended
- Within 1 month of receiving project application, designated authority shall check documents for completeness and provide detailed schedule



## Priority Status for Strategic Projects

- 12 months for strategic giga-factories, 9 months for smaller strategic projects
- Priority treatment, including for litigation, appeals, and judicial remedies
- May be in the overriding public interest, provided relevant mitigating measures are met
- “Administrative silence” for individual steps



## Streamlined Environmental Impact Assessments

- Projects can request scoping study on EIA from designated authority—must be provided within 30 days
- EIAs bundled and carried out at the same time  
Designated authority responsible for combined assessment
- Designated authority to respond to EIA within 3 months
- Consultation of public 45 days. 90 days when risks.

**THANK YOU**

## III) The EU Batteries Regulation

*Cesar Santos - DG ENV*

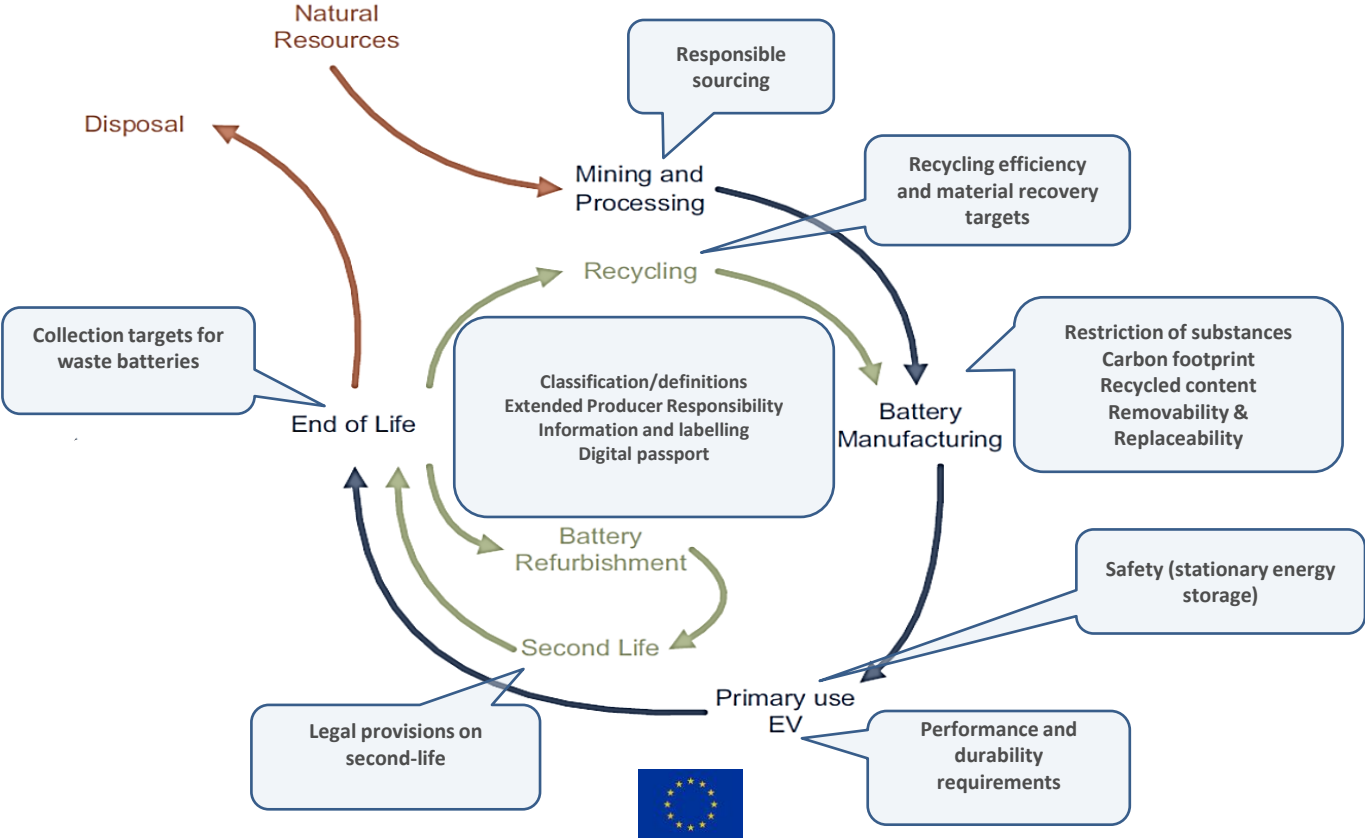
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# The EU batteries regulation covers the entire life cycle



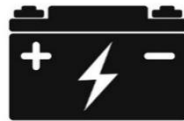
# Main elements of the new regulation 1/2

## CHAPTER II – SUSTAINABILITY AND SAFETY REQUIREMENTS

- Restrictions of substances
- Carbon footprint
- Recycled content
- Performance and durability
- Removability and replaceability
- Safety (only for SBESS)

## CHAPTER VII – MANAGEMENT OF WASTE BATTERIES

- EPR obligations for producers/PROs
- Collection of waste portable/LMT batteries
- Recycling efficiency targets
- Material recovery targets
- Shipment of waste batteries outside the EU
- Reporting obligations



# Main elements of the new regulation 2/2

## CHAPTERS III & VIII – LABELLING AND INFORMATION REQUIREMENTS

- Labelling and marking
- Information via QR code
- Battery passport

## CHAPTER VIa – DUE DILIGENCE

- Due diligence policy
- Management system
- Risk management plan
- Third-party verification
- Disclosure of information

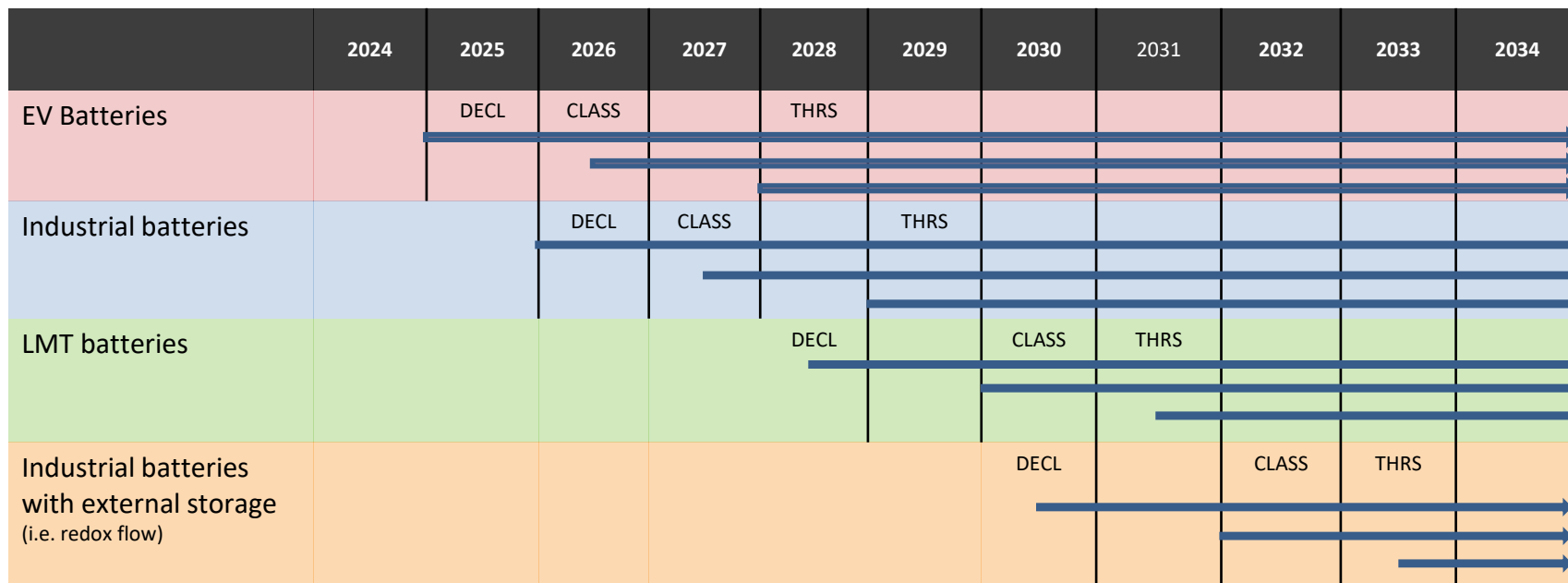


# Provisions on carbon footprint 1/2

- Applicable to industrial batteries (above 2 kWh), EV and LMT batteries, with different timelines
- Staged approach: first declaration of the carbon footprint (CF), then performance classes, and lastly maximum thresholds
- CF declaration is calculated as kgs of CO2 equivalent per one kWh of the total energy provided by the battery over its expected service life, per battery model, per manufacturing plant.
- Methodology to be detailed by the Commission in a separate delegated act in 2024
- Feasibility study to extend to all batteries before the end of 2030.

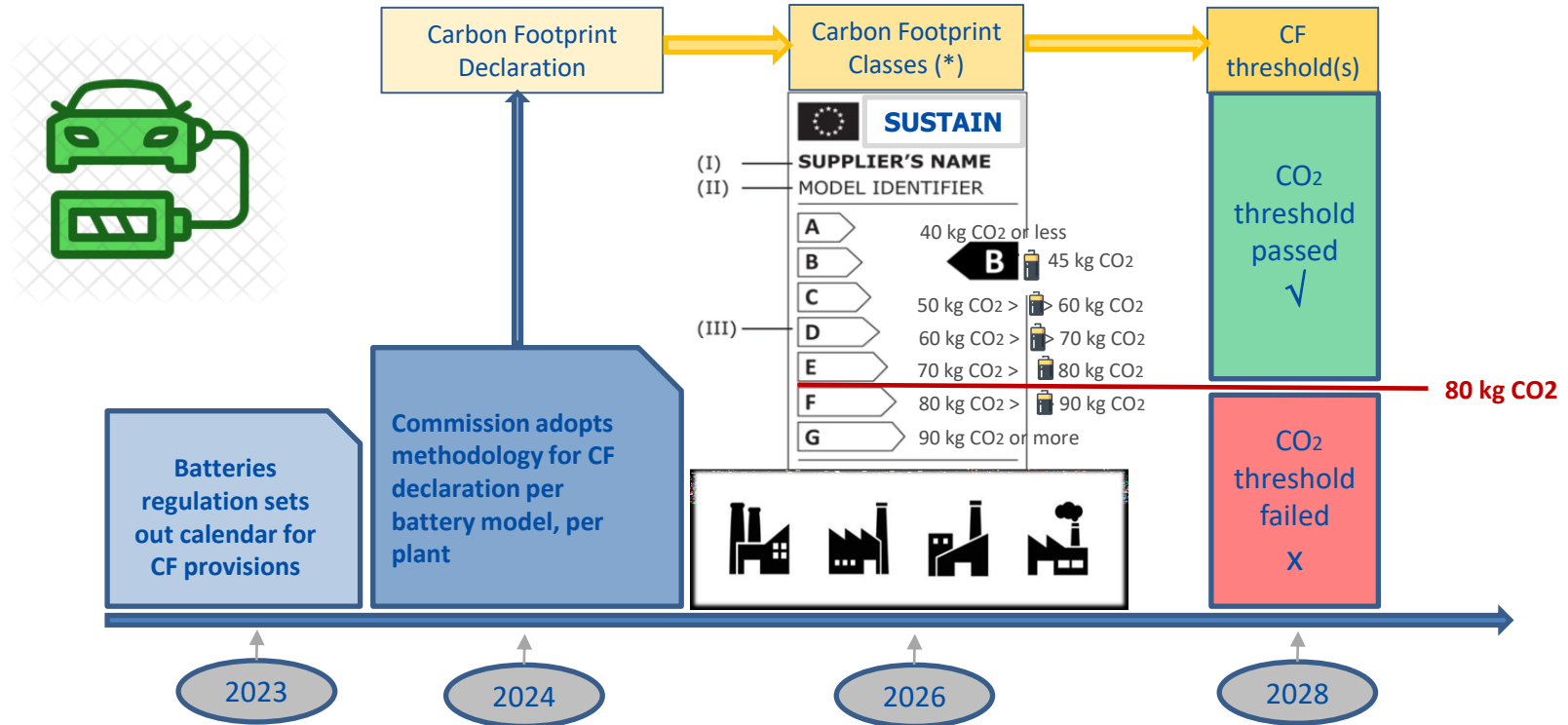
# Provisions on carbon footprint 2/2 –

Timelines for economic operators (assuming entry into force on 01.07.2023)



# Provisions on carbon footprint 1/3:

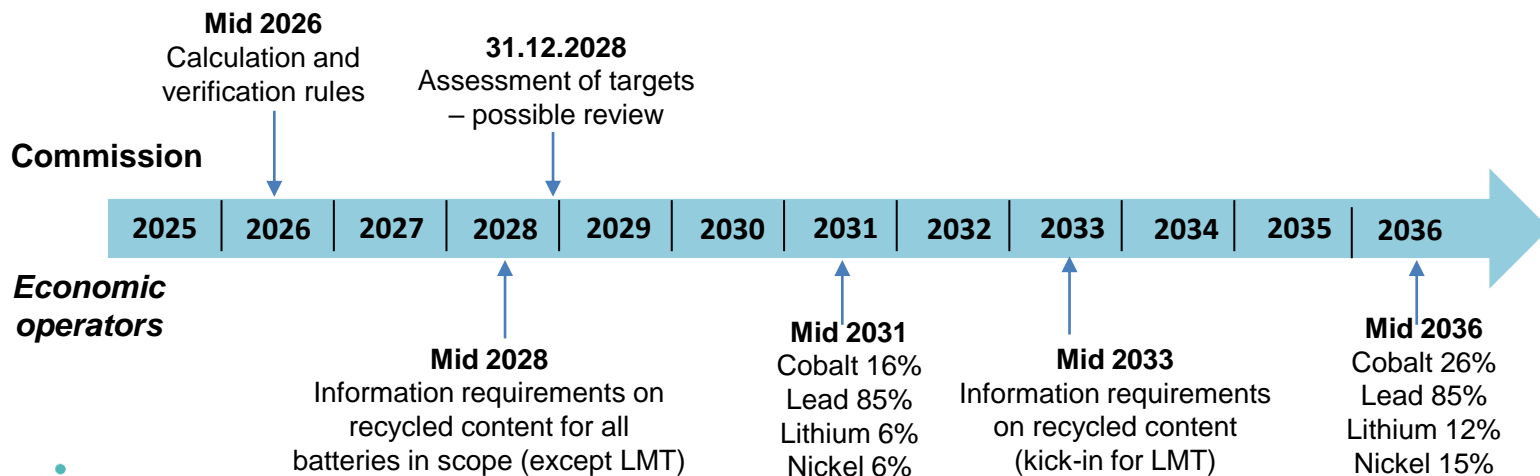
declaration, performance classes and maximum thresholds



(\*) All figures are merely indicative, until a proper techno-economic analysis is carried out.

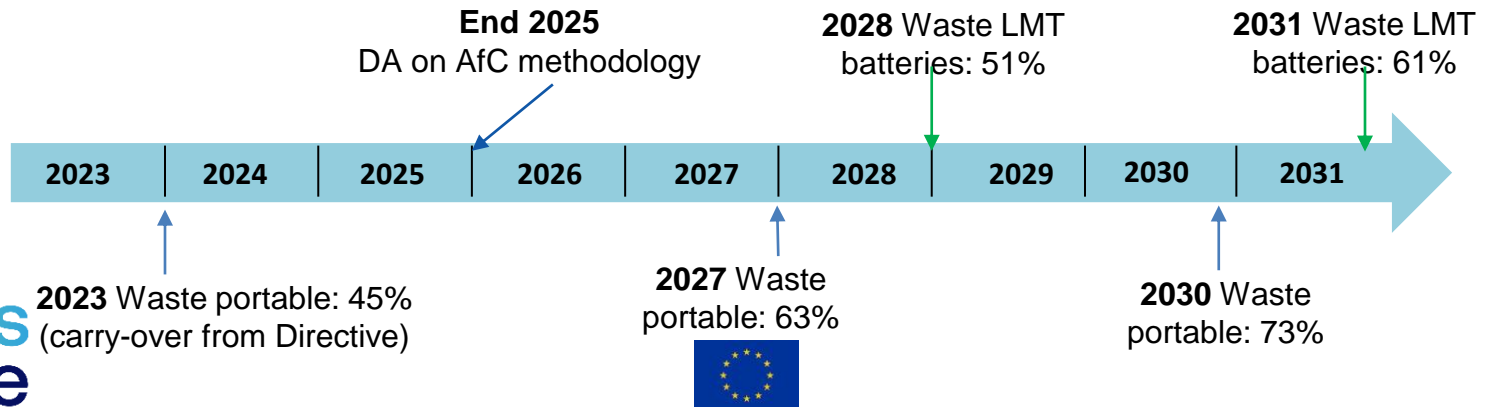
# Provisions on recycled content

- Applicable to industrial, SLI (former automotive), EV batteries (and LMT from 2036)
- Valid sources of recovered material include **battery manufacturing waste** and **post-consumer waste**
- Staged approach: calculation methodology first, then declaration of recycled content, then minimum targets for recycled content (cobalt, lead, lithium, nickel)
- Possibility to review minimum targets in 2028-2029



# Collection targets for waste batteries

- Obligation on producers to have batteries placed in the EU internal market collected, once they become waste.
- For waste industrial, SLI and EV batteries, an implicit 100% collection target remains.
- For waste portable and LMT batteries, a new methodology based on “Available for Collection” (AfC) will be developed with the aim to replace the existing methodology based on the volume of batteries placed on the market (PoM).
- The Commission is empowered to adopt rules for the calculation of the collection rates based on the AfC methodology and converting the targets in the regulation based on PoM to AfC, while maintaining the timing and level of ambition.
- By 01.01.2025 and every five years thereafter, Member States shall carry out a compositional survey of collected mixed municipal waste and WEEE streams to determine the share of waste portable and LMT batteries therein.



# Targets for recycling efficiencies and material recovery

## RECYCLING EFFICIENCIES BY 2025 AND 2030 (by average weight)

75 % for lead-acid batteries (80% in 2030)  
65% for lithium-based batteries (70% in 2030)  
80% for nickel-cadmium batteries  
50% for other waste batteries

## MATERIAL RECOVERY TARGETS BY 2027 AND 2031

90 % for cobalt (95% in 2031)  
90 % for copper (95% in 2031)  
90 % for lead (95% in 2031)  
50 % for lithium (80% in 2031)  
90 % for nickel (95% in 2031)

**31.12.2024**

Rules on calculation and verification

2023

2024

2025

2026

2027

2028

2029

2030

2031

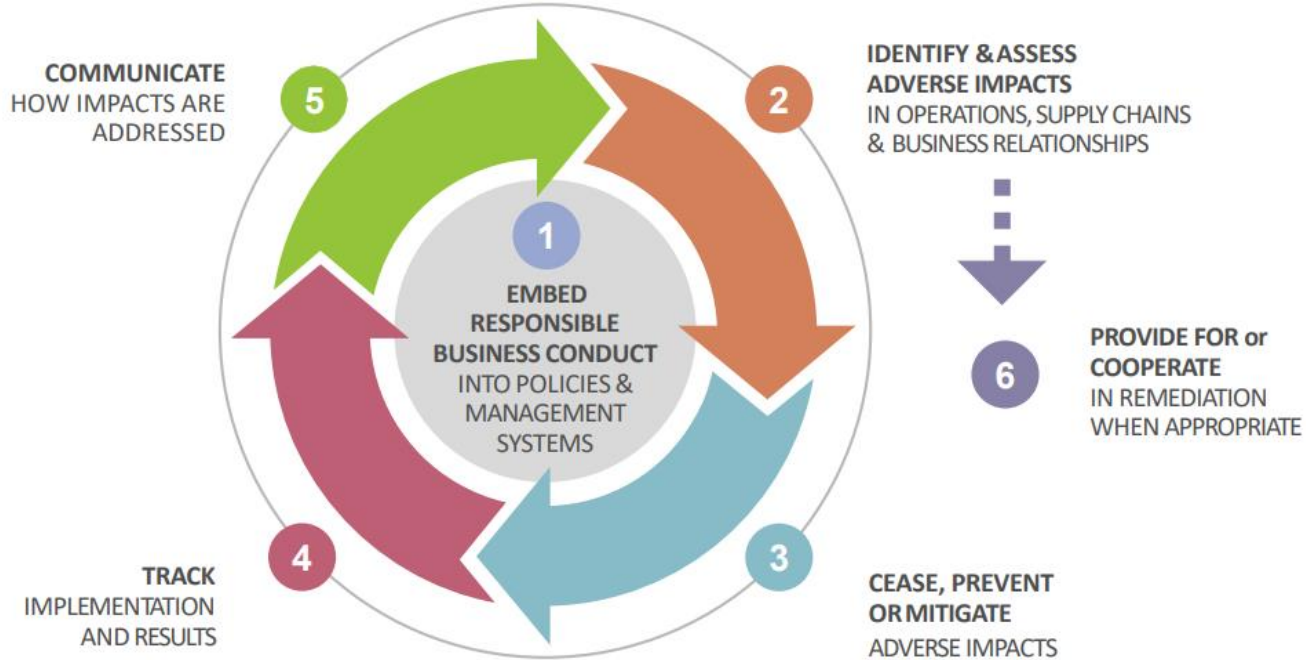
**01.07.2026**  
Review lithium  
recovery target  
(50%)

**31.12.2028**  
Review all targets  
for recycling  
efficiencies and  
material recovery



**No fixed deadline:**  
Add other batteries  
chemistries and  
materials to the  
targets

# Due diligence framework



Source: adapted from OECD Due Diligence Guidance for RBC



# Supply chain due diligence obligations

- Companies that place batteries on the EU market have to put in place a due diligence system for lithium, cobalt, nickel, and natural graphite contained in those batteries:
  - Adopt company due diligence policy
  - Operate a system of controls and transparency over the supply chain
  - Identify environmental and social risks (list of risk categories included in the Regulation)
  - Implement a strategy to respond to the risks
  - Be verified by a 'notified body'
- Companies with turnover of less than 40 million euro and not part of a large group are exempted
- Also applies to secondary raw materials of the minerals concerned
- Applying from mid-2025
- Commission will:
  - adopt guidelines early 2025
  - assess any due diligence schemes that are submitted to the Commission (such submission is optional)

## National Perspective: What are the needs that Research can feed

*Cristiana Leandro – Portuguese National Innovation Agency*

*Luis Santos – Spanish BatteryPlat*

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# Portugal's Perspective: What are the needs that Research can feed

Cristiana Leandro  
7 June 2023



AGÊNCIA NACIONAL  
DE INOVAÇÃO



# Overview of the Portuguese Battery Sector



**Batpower – Battery Cluster Portugal**



**Vasco da Gama Colab**



**Strong R&I ecosystem**

- ALBATTIS – Skills and training
- PulseLiON – solid state
- CAVALI – Anode less batteries
- NGS (New Generation Storage) – Na+ Structural Batteries
- CVB – Lithium batteries value chain in Portugal

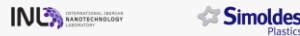
Thank you  
we welcome your contact!  
secretariat@batteryclusterportugal.eu



## Founding Partners



## Adherent Partners



# Needs and Challenges in Portugal



## Battery performance and efficiency

Develop new materials, explore advanced battery chemistries and optimise manufacturing processes



## Intellectual property and commercialisation

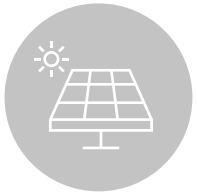


## Cost reduction and Environmental sustainability

Cost-effective materials; innovative manufacture processes; Efficient recycling methods



## Skills



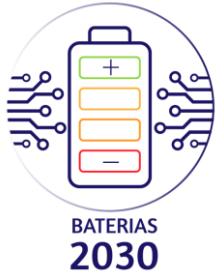
## Energy storage for renewable integration

Large scale, high-capacity Battery systems to store and manage intermitente renewable energy

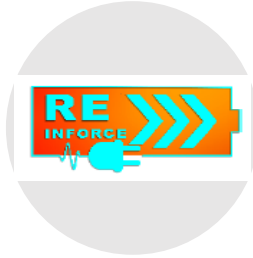


## Long term funding

# Current Research Initiatives and Emerging technologies

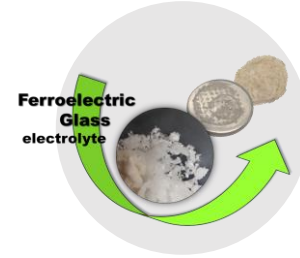


## Baterias 2030



## REINFORCE

Standardized, Automated, Safe and  
Cost-Efficient Processing of End-of-Life  
Batteries for Second and Third Life  
Reuse and Recycling



## Quantum or condensed matter battery

# Baterias 2030

## [HTTPS://BATERIAS2030.PT](https://baterias2030.pt): LIVING LABORATORY

- Building Integrated PV (~1 kW)
- 8 kWp PV
- Advanced micro-grid sensorization
- Energy community with other buildings (4 x 20 kW)
- Energy storage via second life batteries (50 kWh)
- RedoxFlow Batteries (150 kW; 200 kWh)
- 10 intelligent windmill lamp poles
- Road traffic energy generation
- EVs charging station with batteries
- IoT based electrical grids
- Supercapacitors for grip stabilization (15 kWh)

Pedro Salomé



dstsolar

ADDVOLT

bysteel

CE@TI

CMP

efacec

INESCTEC

TÉCNICO LISBOA

LNEG

FEUP

visblue

zeev

Amnis Pura

CEIIA

C2C

dst

INESC MN

innovationpoint

INL

Omniflow

FEUP

watt is

# REINFORCE



## Standardized, Automated, Safe and Cost-Efficient Processing of End-of-Life Batteries for Second and Third Life Reuse and Recycling

June 2023 – May 2027 (4 years)

4.999.993,75€

15 partners  
(Universities, RTOs, Industry, Users)

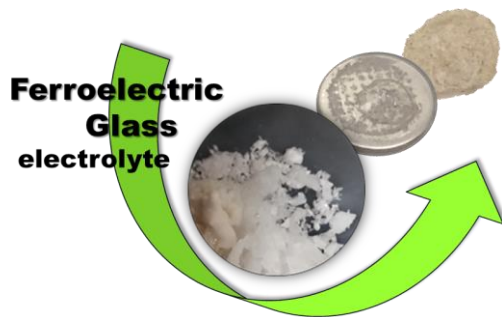
Coordinator: [Luís Oliveira](#)



 **Coordinator**



# Quantum or condensed matter battery



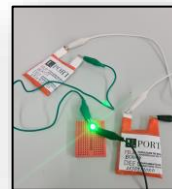
## Battery research chronogram

- **2009:** first projects on crystalline electrolytes
- **2012:** patent on crystalline antiperovskite electrolytes in collaboration with Los Alamos National Laboratory, USA
- **2014 – 2015:** 2014 first patent on **Li+ and Na+ glass electrolytes** and two different battery architectures, U.PORTO, Portugal
- **2016 – 2018:** six patents U.PORTO in collaboration with UT-Austin (Prof. John Goodenough)
- **2019–2021:** five **patents on ferroelectric electrolytes and quantum effects and their architectures, including structural batteries**, U.PORTO, Portugal

- Safe
- Low-cost
- No need to be fabricated under an inert atmosphere
- Fast charge
- Sustainable materials/methods
- Long-lasting performance
- Thermoelectric properties
- Key-enabling technology for structural batteries
- **2014** – First patent on glass electrolytes

## Portuguese technology by [Helena](#)

### [Braga](#)



# The future



## **New Generation Storage (Na+ Structural Batteries)**

Project led by DST Solar

## **Battery value chain (Lithium batteries value chain in Portugal)**

Project led by GALP

**CRISTIANA LEANDRO**

**cristiana.leandro@ani.pt**

**DELEGADA NACIONAL E PONTO DE CONTACTO NACIONAL**

*National delegate and NCP*

Horizonte Europa – Energia e Digital | *Horizon Europe – Energy and Digital*  
Programa Europa Digital – EDIH e IA | *Digital Europe Programme – EDIH and AI*

**[www.ani.pt](http://www.ani.pt) T. +351 210 103 060 M. +351 910 758 674**





## **BATTERIES EUROPE PLENARY SESSION**

European Battery Ecosystem: how innovation improves  
competitiveness and resilience in Europe

***National Perspective: What are the needs that Research can feed***

*June 7<sup>th</sup> 2023*

**Luis Santos, BatteryPlat**





# Spanish Technological Platform on Energy Storage

Near 100  
Members



Public  
funding:  
PTR -2018-  
001092



# Spanish Strategy on Energy storage

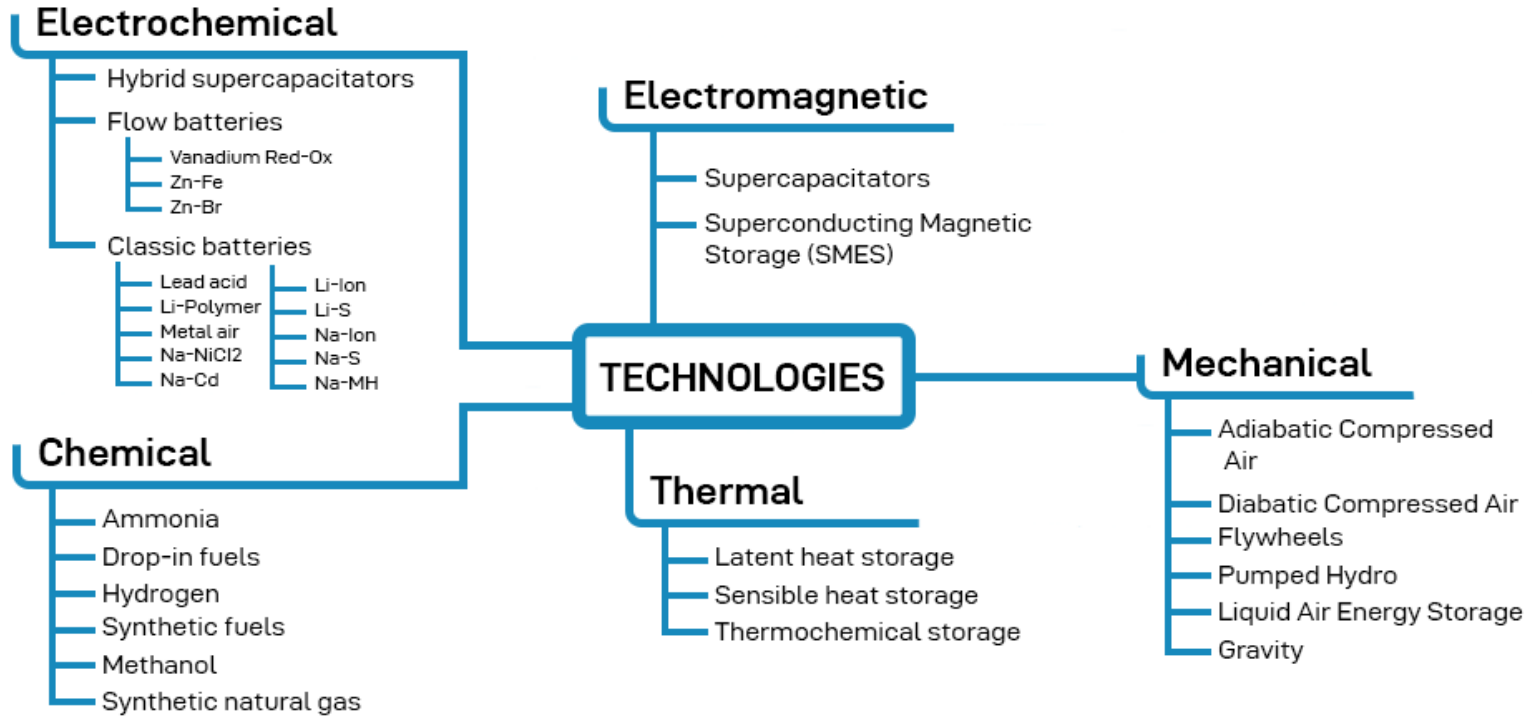


Regulation	<ul style="list-style-type: none"> <li>• Modify System Operating Procedures</li> <li>• Promote sector integration</li> <li>• Eliminate dual pricing of the network</li> </ul>
New Business Models	<ul style="list-style-type: none"> <li>• Promote the role of independent aggregator</li> <li>• Promote the domestic industry</li> <li>• Fostering renewable energy communities</li> </ul>
R&D	<ul style="list-style-type: none"> <li>• Develop prospective studies</li> <li>• Fostering collaboration between academia, industry and government</li> </ul>

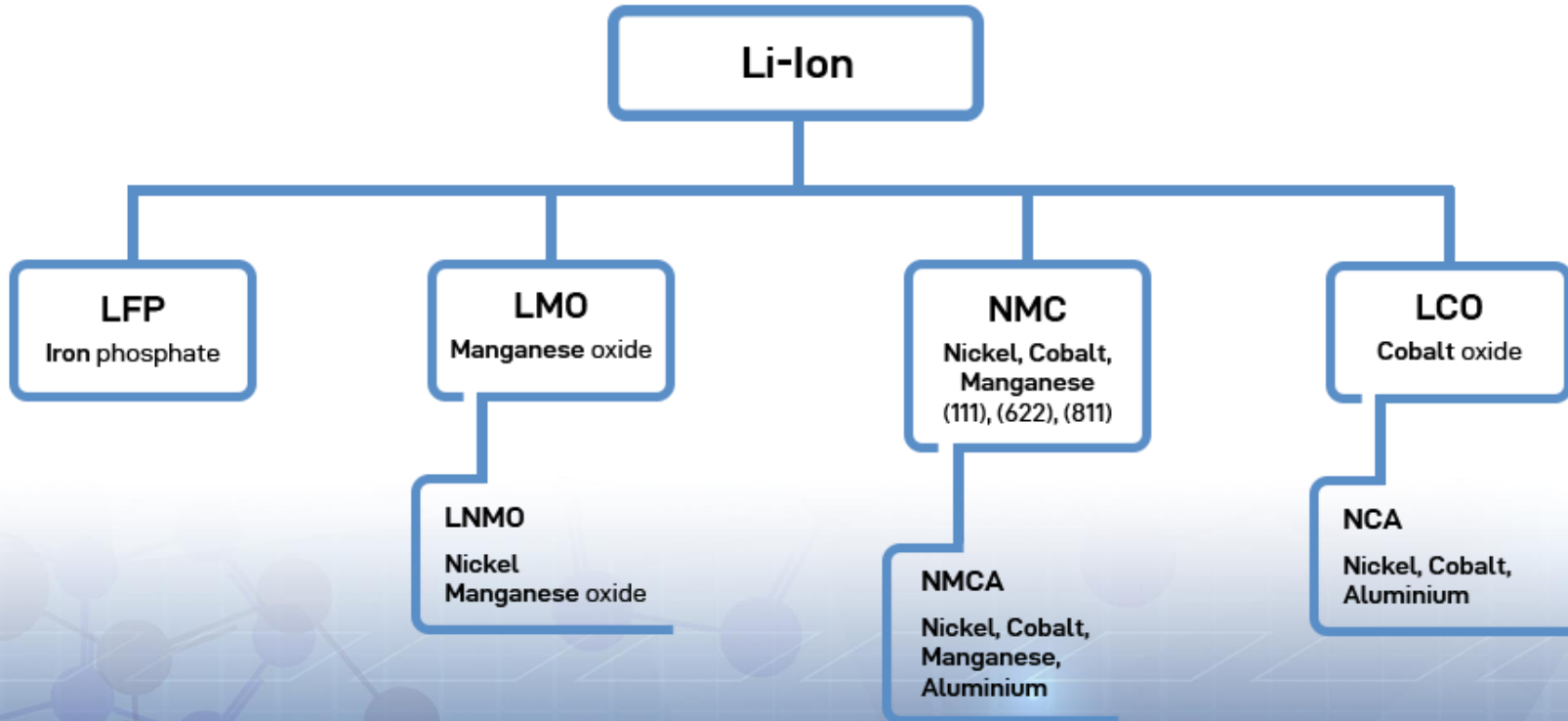
## **MEDIDA 6.1.** Promover la creación de plataformas de laboratorios experimentales y de investigación que aprovechen sinergias

La existencia de un tejido disperso de laboratorios hace necesario posibilitar el mutualizar los medios de ensayo a través de plataformas experimentales y tecnológicas, abiertas al conjunto de actores del sector, que cree sinergias, permita un uso eficiente de recursos y facilite la distribución y aprovechamiento de los resultados. En este sentido, en España ya se dispone de iniciativas como la Plataforma Tecnológica Española de Almacenamiento de Energía – BatteryPlat, cuyo objetivo general es consolidar a los principales actores españoles que trabajan en todas las tecnologías de almacenamiento energético, para potenciar una visión común y elaborar una agenda estratégica de investigación y así acelerar el desarrollo innovador del sector para situarlo en la vanguardia a nivel mundial. Otro ejemplo es la plataforma multidisciplinar (PTI FLOWBAT) del CSIC, donde se integran todas sus capacidades para el desarrollo de baterías de flujo redox.

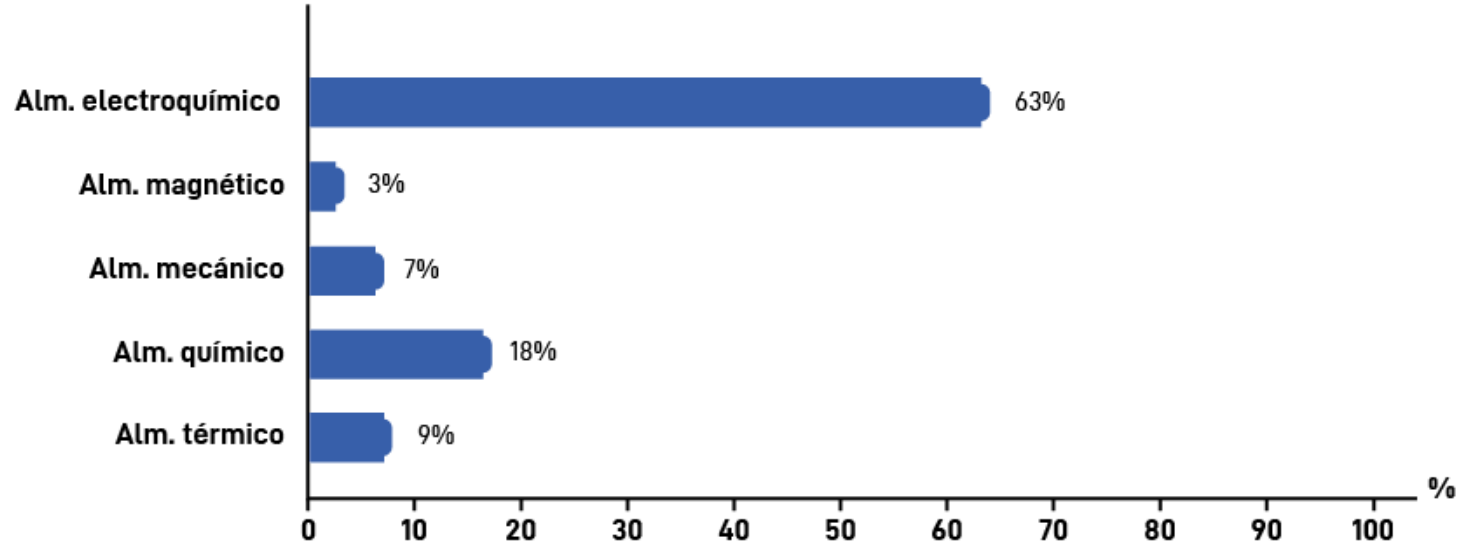
# Taxonomy of technologies



# Taxonomy of technologies

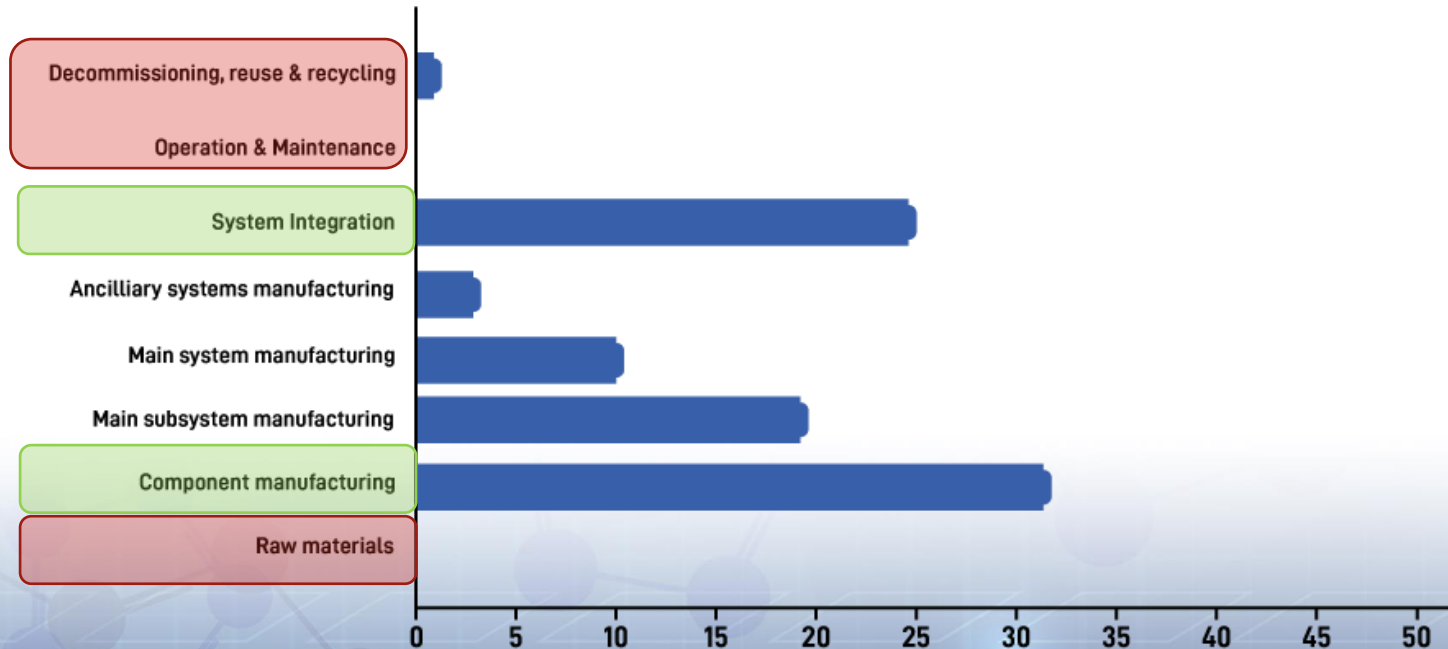


## Capabilities in storage technologies (% of institutions)



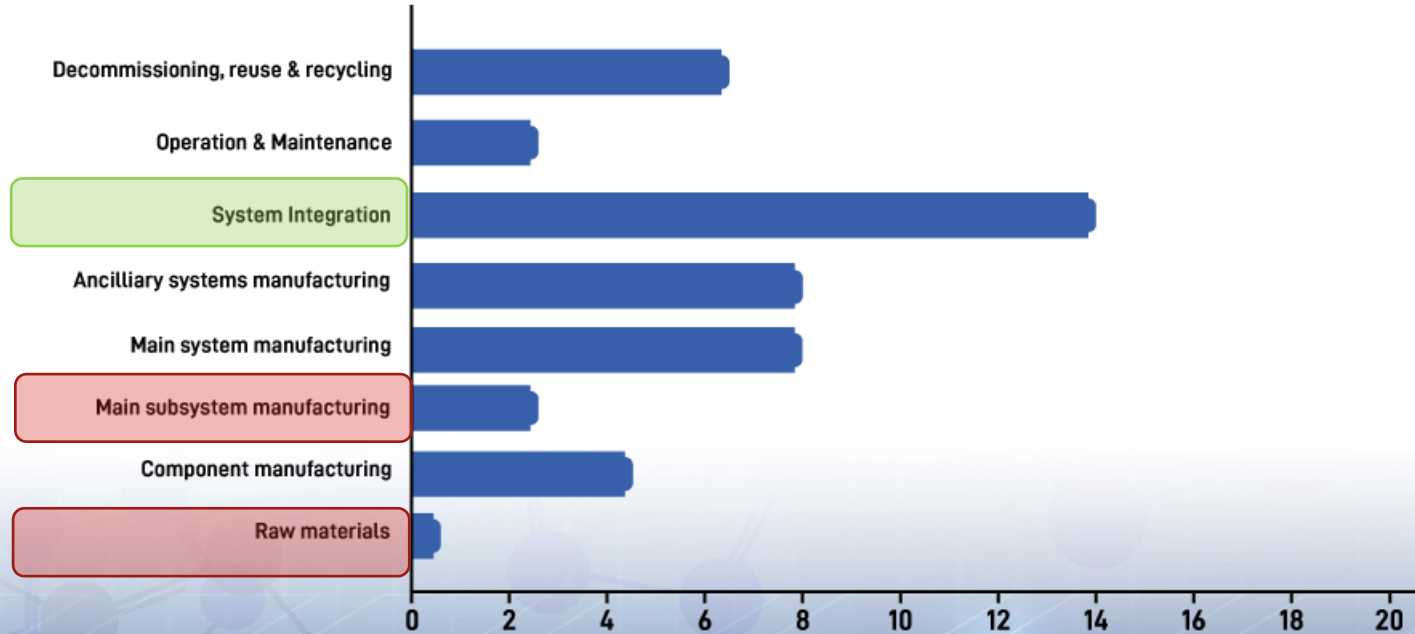
# Members in the Academic Value Chain (number. of entities)

## CdV — Centros I+D, Centros Tecnológicos y Universidades



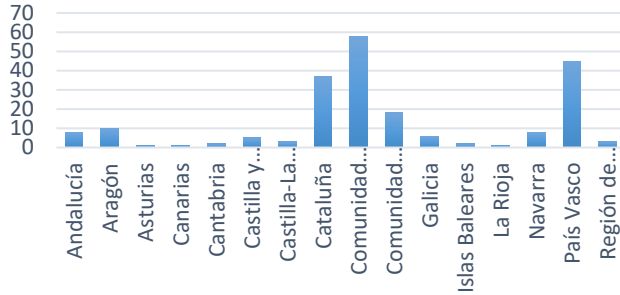
# Members in the Industrial Value Chain (Number of entities)

## CdV — Empresas y asociaciones empresariales

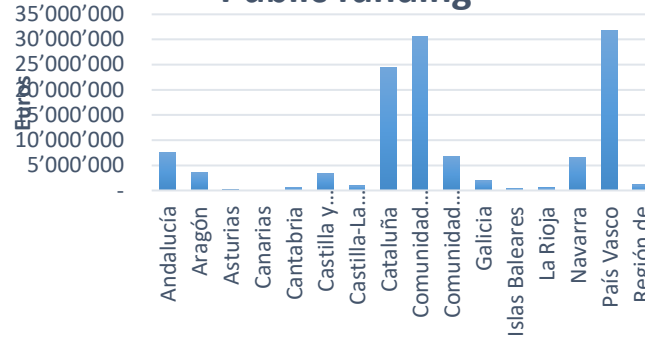


# List of R&D projects (European)

## Participation in projects



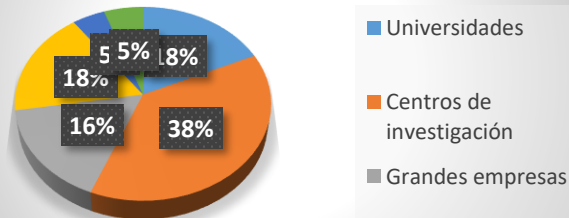
## Public funding



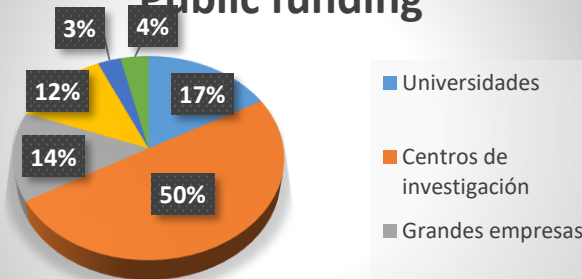
## European projects

- Source: CORDIS
- Period 2020 to 2022
- 122 projects
- 163 entities
- 221 participants
- 121 M€ funding

## Participation in projects

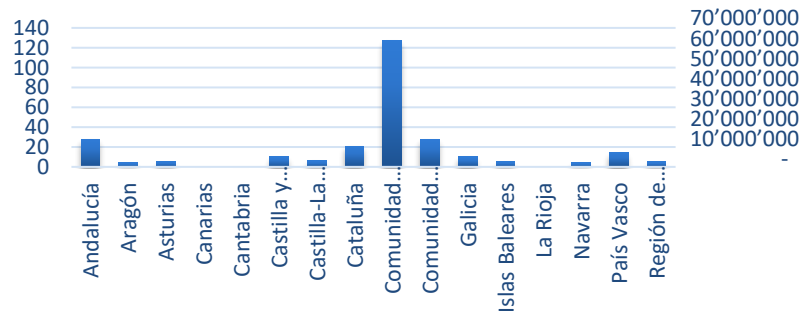


## Public funding

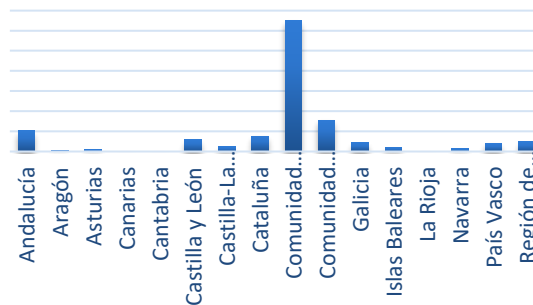


# List of R&D projects (Spanish)

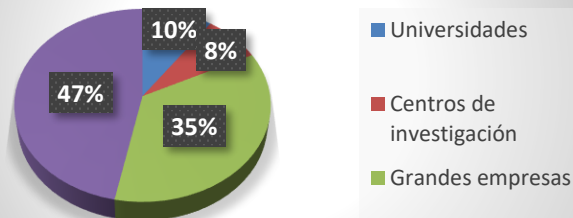
## Participation in projects



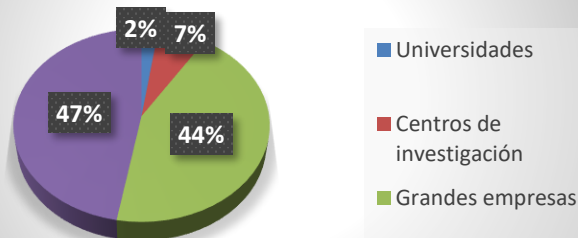
## Public funding



## Participation in projects



## Public funding

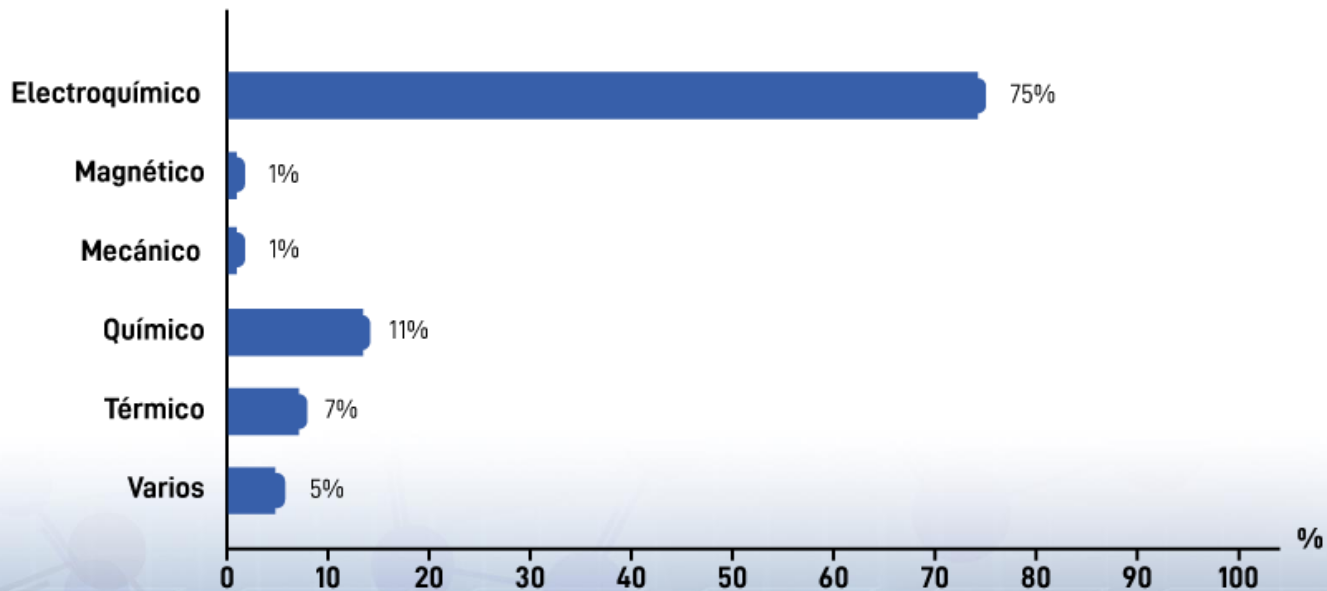


## National projects

- 267 projects
- 206 entities
- 179 M€ budget
- 125 M€ funding

## Projects by Technology Family

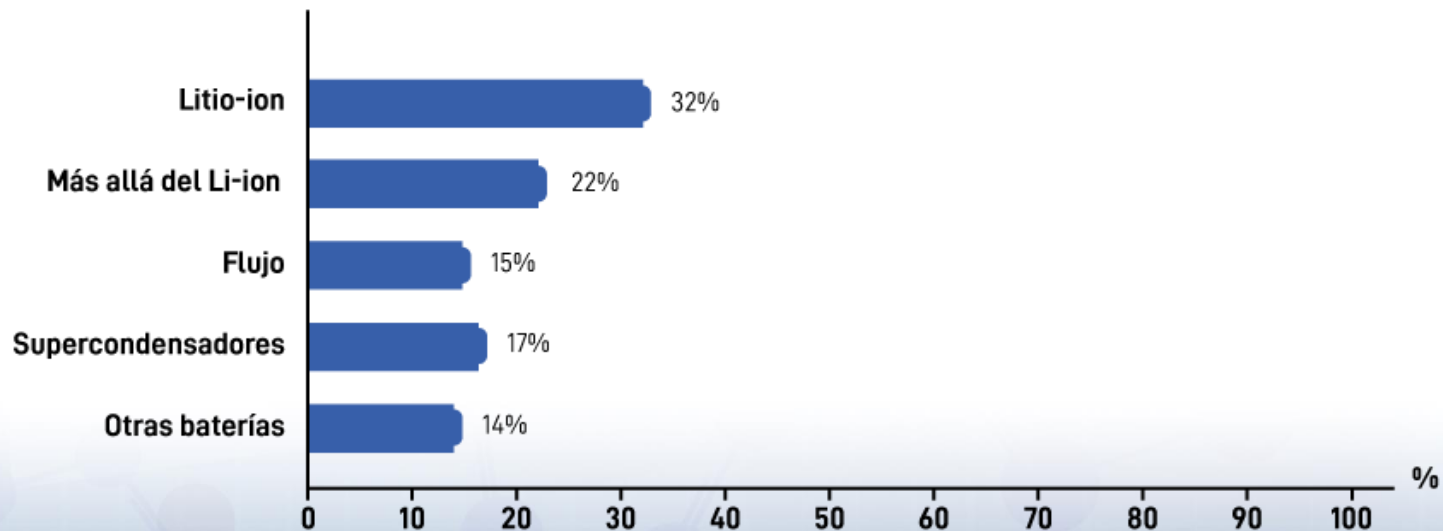
### Tecnologías Proyectos



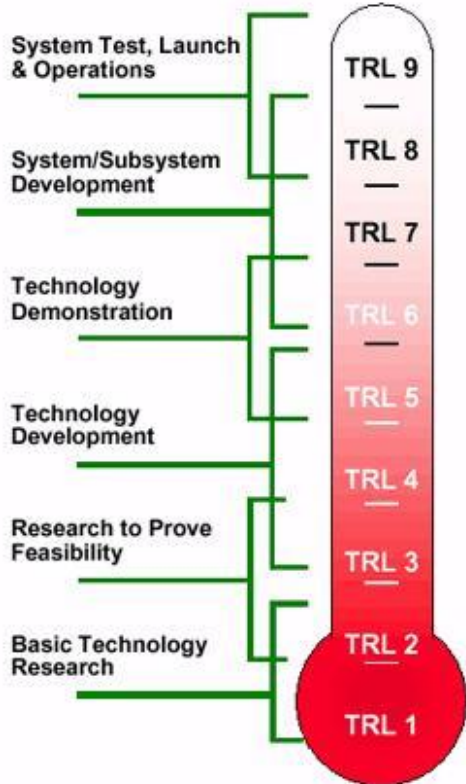


## Breakdown Electrochemical Storage

### Almacenamiento electroquímico



# TRL Technology Maturity Scale



TRL 9	System successfully tested in real environment
TRL 8	Complete and certified system through tests and demonstrations
TRL 7	Demonstration of system or prototype in a real environment
TRL 6	Modelo de sistema o subsistema o demostración de prototipo en un entorno relevante
TRL 5	System or subsystem model or prototype demonstration in a relevant environment
TRL 4	Validation of components and/or layout of components in laboratory environment
TRL 3	Analytical and experimental critical function and/or proof of concept characteristic
TRL 2	Concept and/or technological application formulated
TRL 1	Basic principles observed and reported

# Multifactorial assessment of technological maturity

## *Factors to be considered*

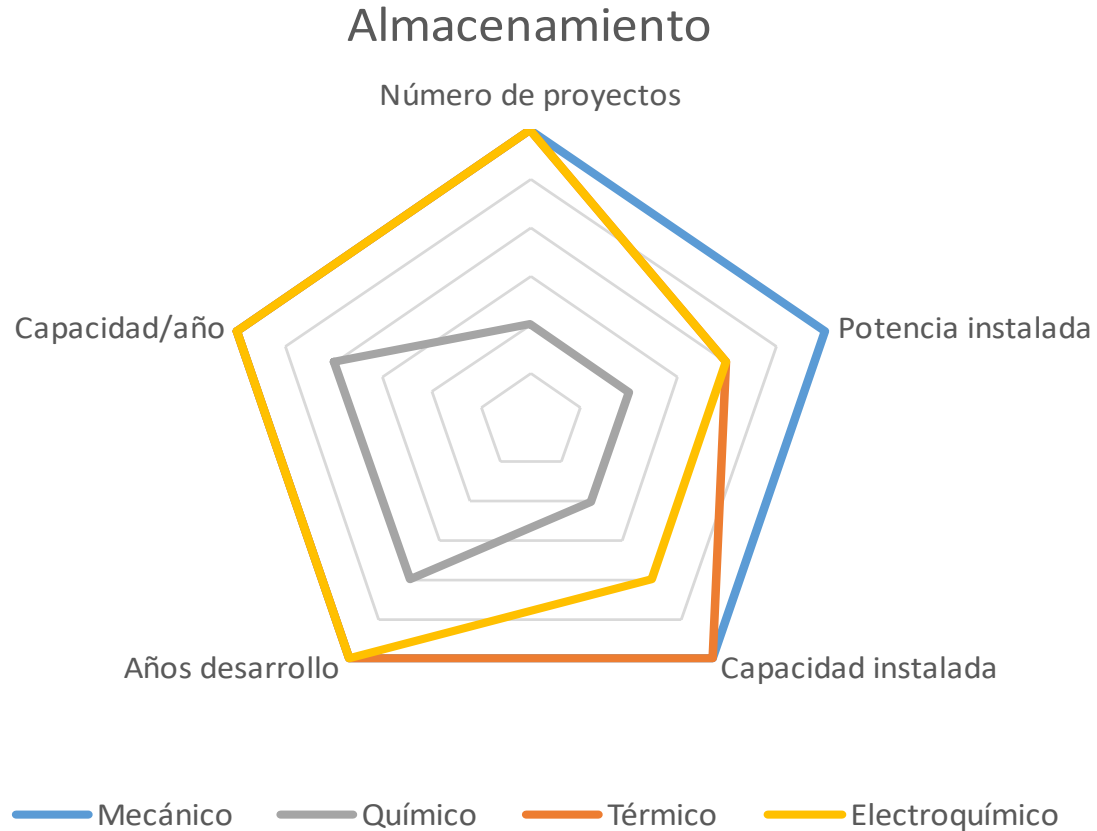
- (C) Total installed capacity
- (P) Total installed power
- (N) Number of installations
- (A) Age of installations
- (I) Installed capacity increase per year

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

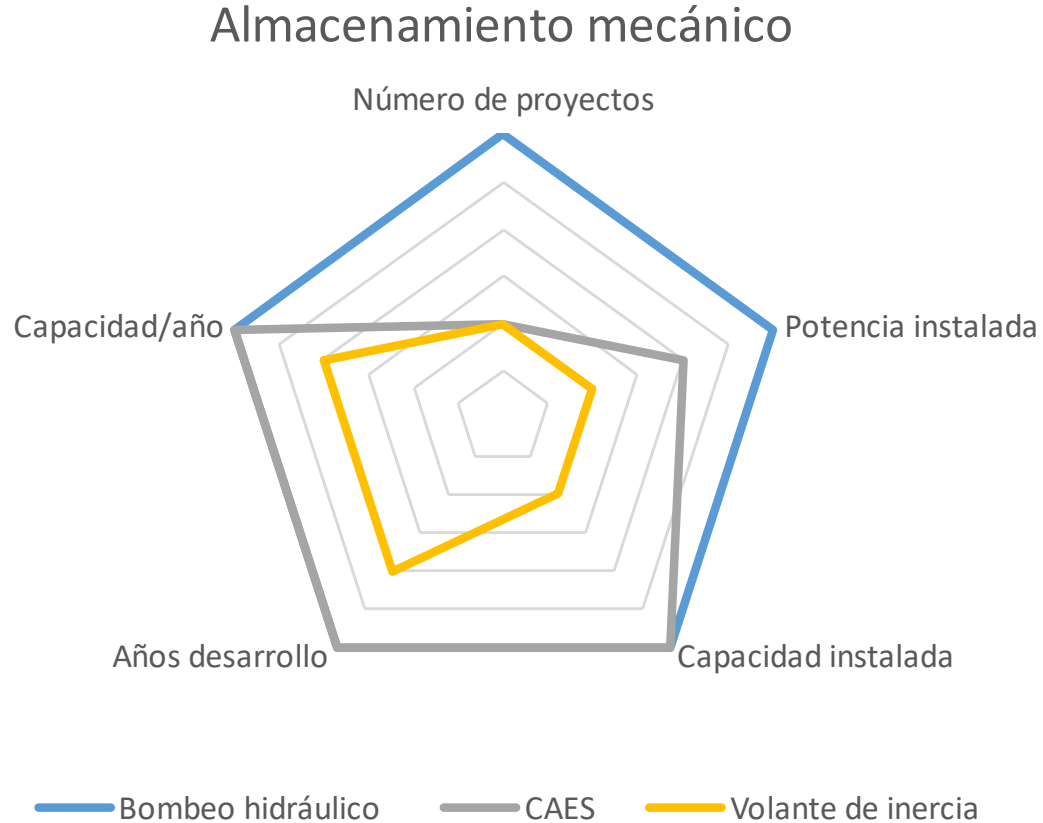
## *Data sources*

- DoE list of projects: <https://sandia.gov/ess-ssl/gesdb/public/projects.html>
- 1693 references
- 4 technology families
- 30 sub-types.
  
- Batteries Europe list of projects: <https://data.europa.eu/data/datasets/database-of-the-european-energy-storage-technologies-and-facilities?locale=en>
- 969 references
- 4 Technology families
- 20 sub-types.

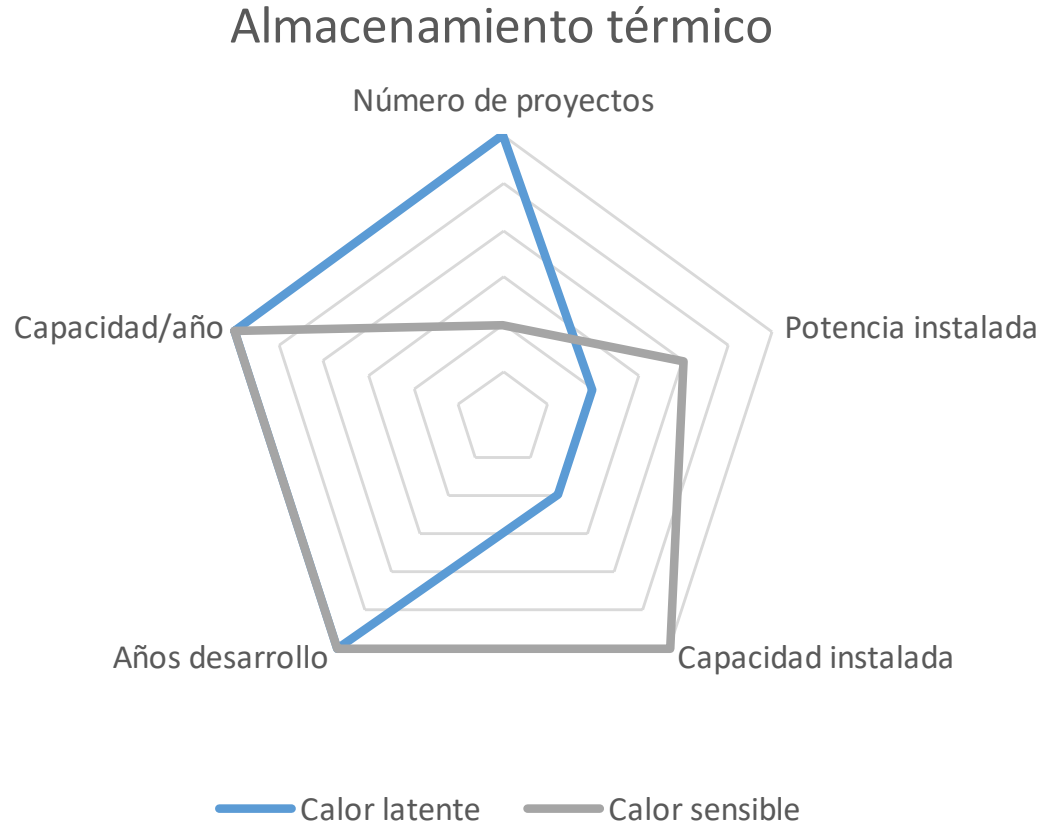
# Multifactorial assessment of technological maturity



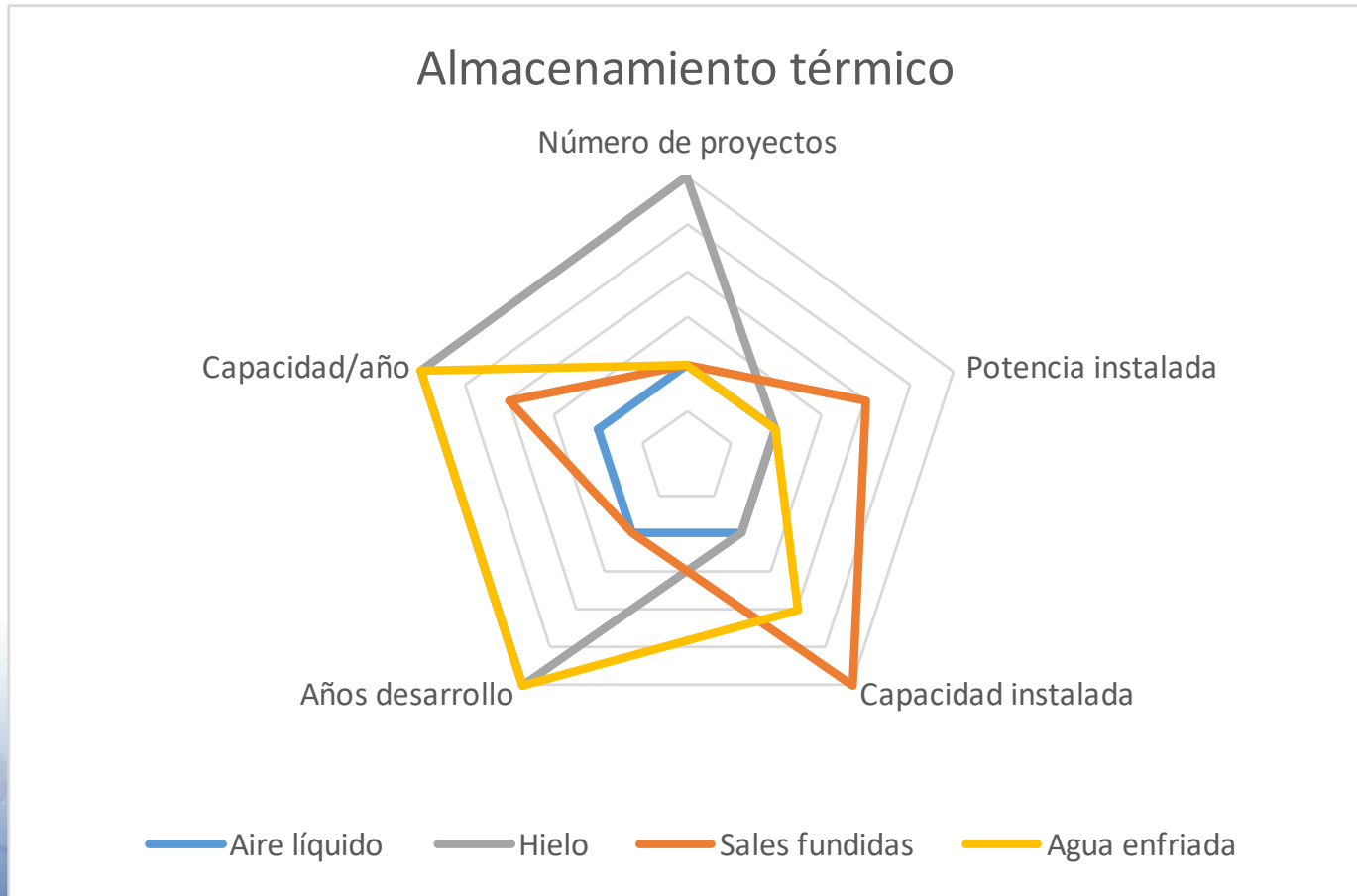
# Evaluación multifactorial de la madurez tecnológica



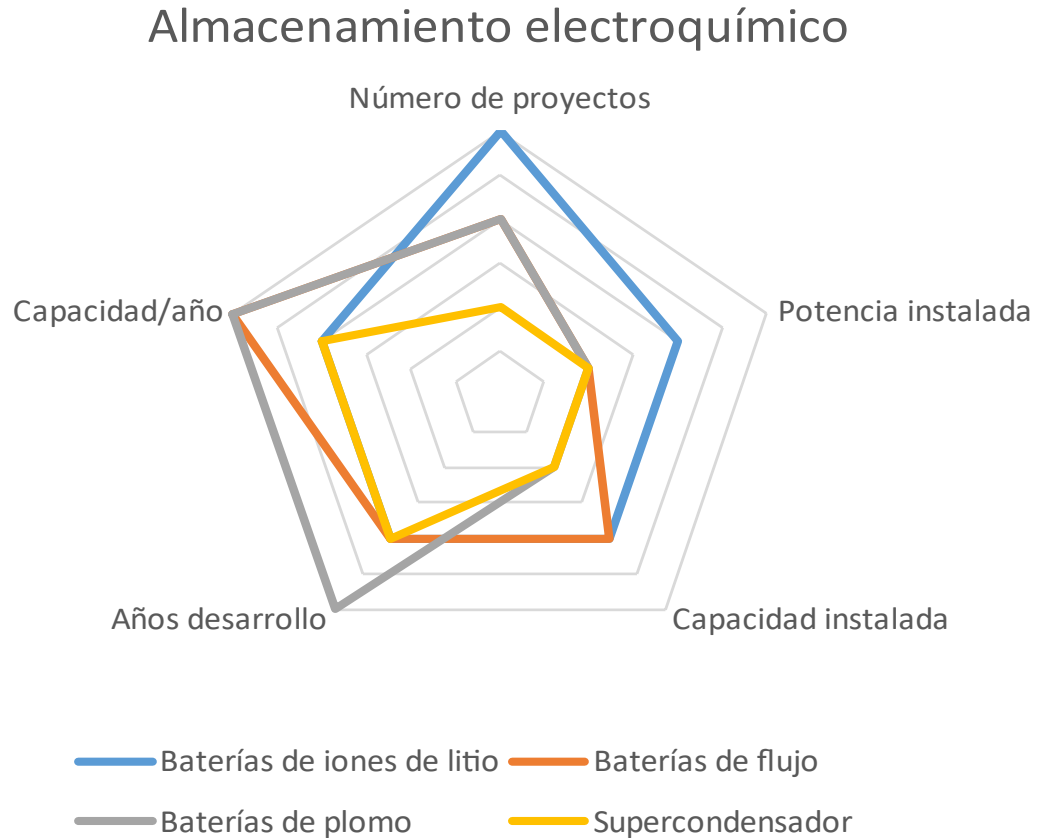
# Multifactorial assessment of technological maturity



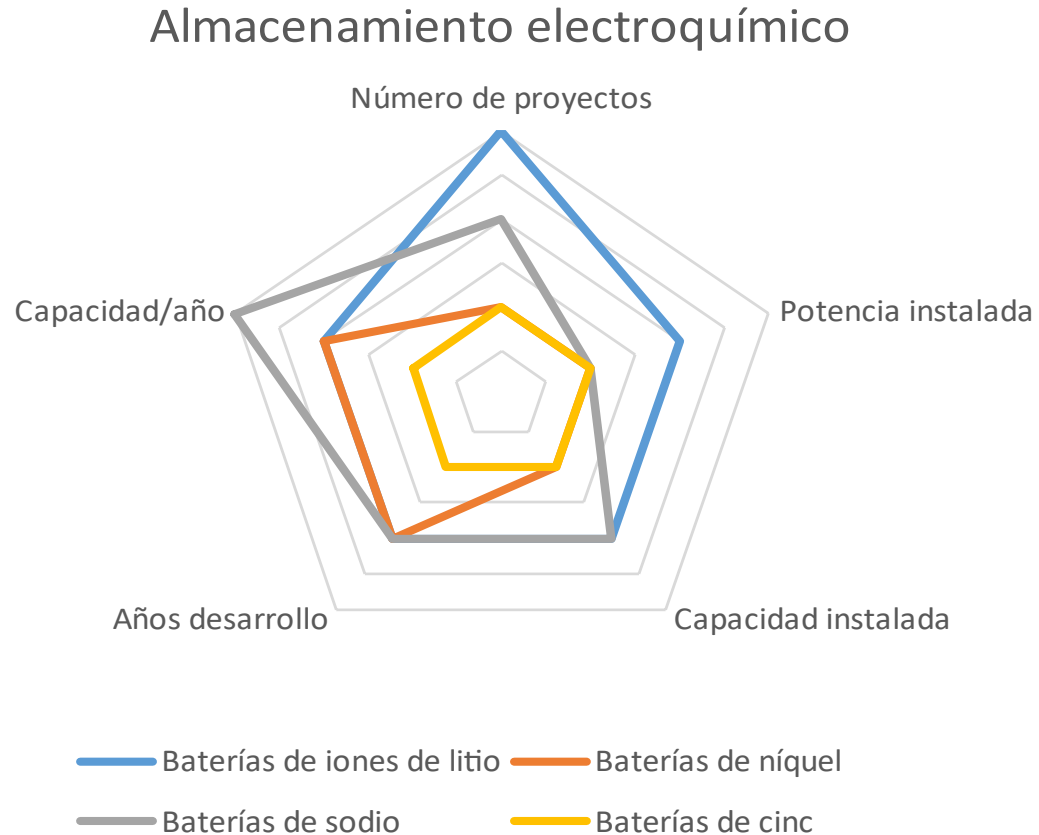
# Multifactorial assessment of technological maturity



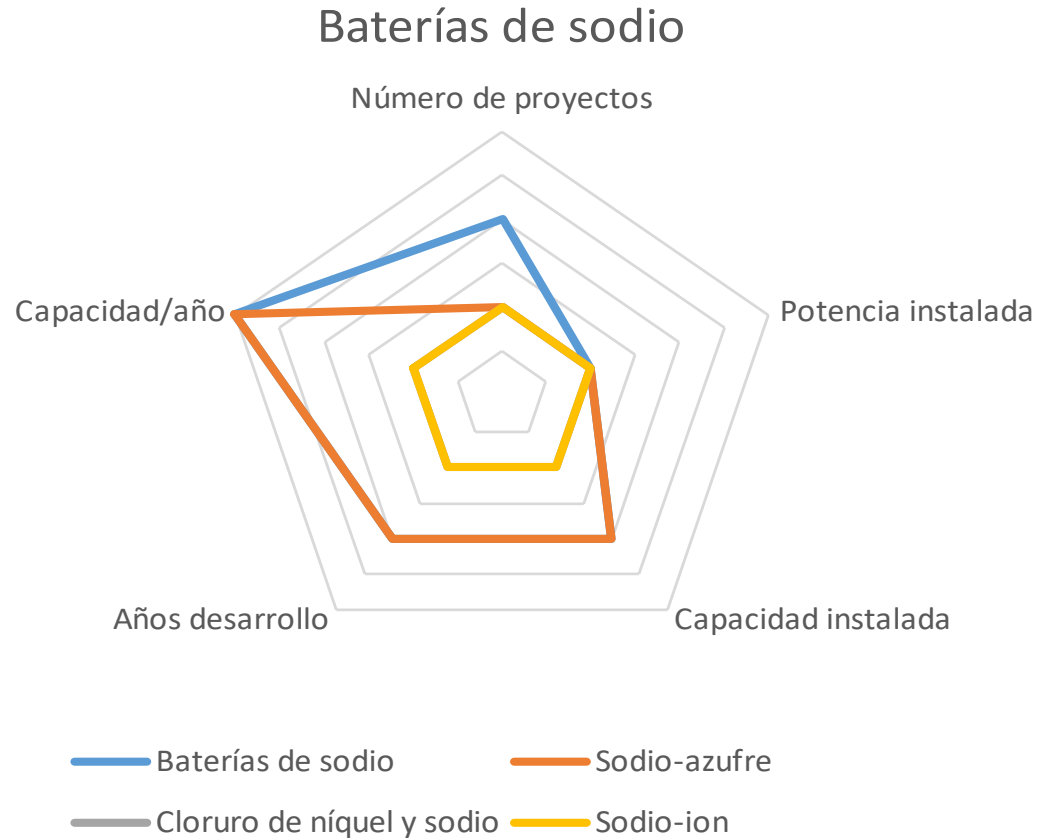
# Multifactorial assessment of technological maturity



# Multifactorial assessment of technological maturity



# Multifactorial assessment of technological maturity





## Closing remarks

1. Batteryplat brings together organisations that promote the development of energy storage technologies in Spain.
2. 63% of the Batteryplat entities report electrochemical storage capacities.
3. In Spain, industrial and academic capacities are different.
4. So far, several gaps have been identified at the capacity level
5. Batteryplat entities are active in project submissions

# Thank you

These are our contacts:



[lsantos@edp.com](mailto:lsantos@edp.com)

[mjousif@secartys.org](mailto:mjousif@secartys.org)

[fgramendola@secartys.org](mailto:fgramendola@secartys.org)



[www.batteryplat.com](http://www.batteryplat.com)



## Keeping the European battery industry competitive in a changing global landscape

*The role of R&I*

*Wouter IJzermans, BEPA Executive Director*

# Challenges new and old

*Impacts on the competitiveness of the European industrial battery value chain*

---



High **energy prices** in Europe.



Foreign **dependency** for raw and processed materials



Strong **financial incentives** to boost production elsewhere

# How does this impact the Batt4EU vision?

*In 2021 we set out the following objectives*

---



To establish the **best innovation ecosystem** for batteries in the world in Europe by 2030



Which will boost a **competitive, sustainable and circular** European battery value chain



And will drive the transformation towards a **carbon-neutral society**

# How does this impact the Batt4EU vision?

*In 2021 we set out the following objectives*

---



Support the development of **differentiating technologies** in battery materials, cell design and manufacturing and battery recycling



Accelerate the development and deployment of **sustainable and affordable battery solutions** for clean mobility



Enable a **cost-effective integration of renewable energy sources** in the power grid

# Tackling the challenges

*Impacts on the competitiveness of the European industrial battery value chain*

---



Higher **sustainability and resource-efficiency** in raw materials processing (2023-D2-01-01), manufacturing (2024-D2-02-01) and supporting LCA (2021-D5-01-04) and battery passport development (2023-D2-02-03).



**Reducing raw material dependency**, by increasing recycling options (2023-D2-01-02), better raw material processing (2023-D2-01-01) and exploring a more diverse set of battery chemistries (2024-D2-01-02 and 2024-D2-02-02).



**Lowering costs** in raw materials processing (2023-D2-01-01), advanced materials (2023-D2-02-01) manufacturing (D2-01-03) and recycling (D2-01-01). Boost European manufacturing capabilities and value chain integration (2022-D2-01-04).

*The Batt4EU work programmes  
support the strategic policy objectives  
for the battery value chain*

# Where are we now with the Batt4EU Partnership?

*A pivotal point in Horizon Europe*

Project duration



Work Programmes

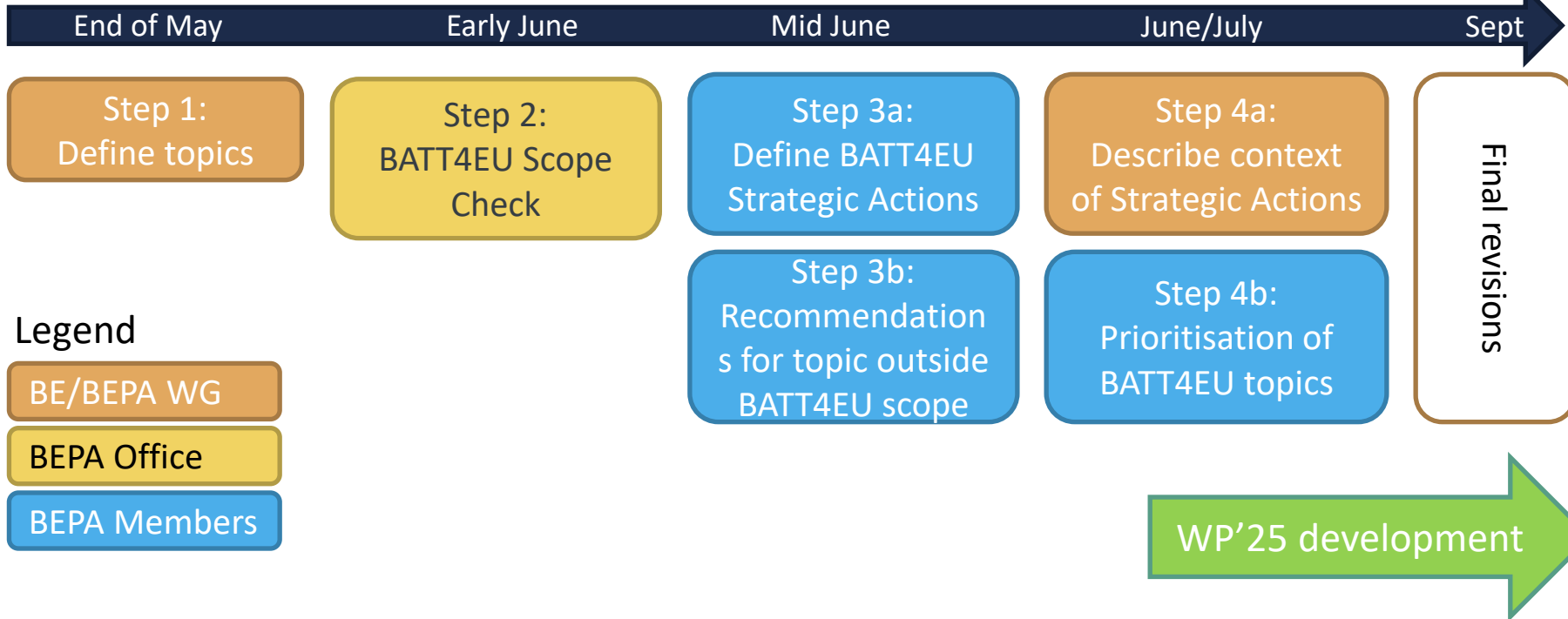


Money allocated



# What's next

*Adapting the Strategic Research and Innovation Agenda and*



## Legend

BE/BEPA WG

BEPA Office

BEPA Members

# Key priorities

*To keep industry and research competitive*

---



Double down on the **sustainability premium** to leverage the European excellence and to raise the bar for both domestic and global actors.



A well-balanced research agenda that keeps investing in **future battery chemistries** alongside short-term boosts to efficiency.



Ensure the **readiness of the workforce** in the sector by promoting education and training programmes.



Make sure that the results of the Horizon Europe projects get to the market by **promoting innovation uptake**.



# THANK YOU!

---

BATT4EU  
[info@bepassociation.eu](mailto:info@bepassociation.eu)

---

Wouter IJzermans  
[w.ijzermans@bepassociation.eu](mailto:w.ijzermans@bepassociation.eu)

**BATT4EU**   
Batteries European  
Partnership

# Batteries + Europe

## EBA Battery Plan – Adapting Europe’s toolbox with speed and simplicity

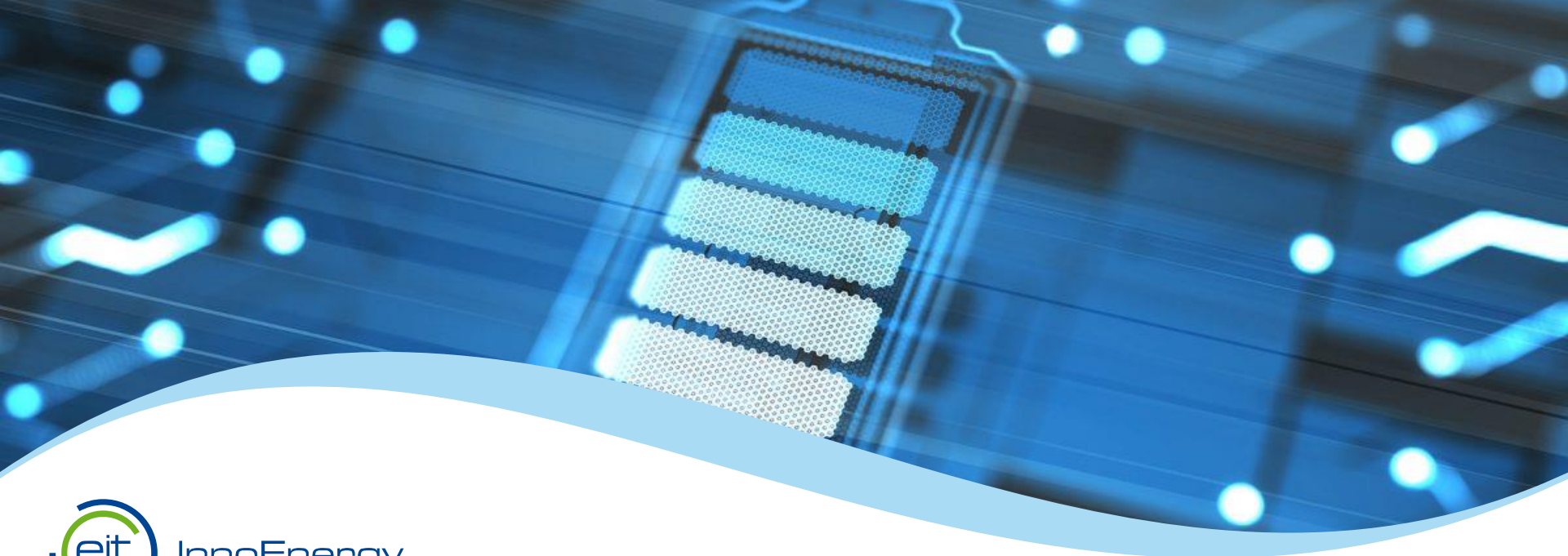
*Ilka von Dalwigk (EBA250 – EIT InnoEnergy)*

[www.batterieseurope.eu](http://www.batterieseurope.eu)

 @BatteriesEurope



Batteries Europe Secretariat is a EU-funded project that has received funding from the European Union’s Horizon Europe Research and Innovation Programme under Grant Agreement N. 101069676.



InnoEnergy  
Knowledge Innovation Community

EUROPEAN  
BATTERY  
ALLIANCE

EBA250

Fostering the global leadership of the **European battery industry** in the face of the **US Inflation Reduction Act** and other recent challenges.

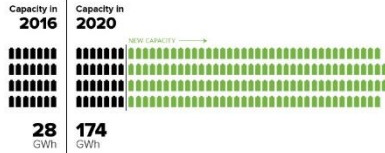
**Adapting Europe's toolbox, with speed and simplicity, for a business friendlier environment, today and tomorrow.**

Chart of the Week:

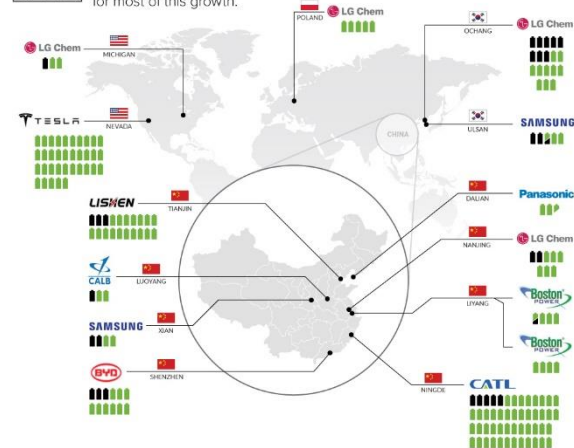
## CHINA IS LEADING THE CHARGE

Lithium-ion megafactories in China to grow capacity 6X by 2020

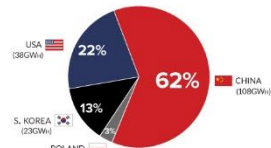
Global lithium-ion battery production capacity will increase by **521%** between 2016 and 2020.



China's battery sector continues to be a hub for most of this growth.



**B**



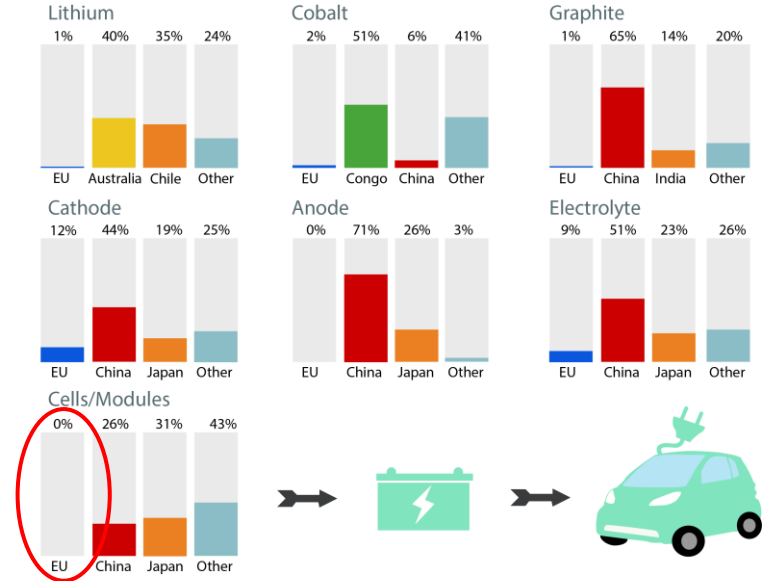
By 2020, mass production of lithium-ion batteries will still be concentrated in just **four** countries.

Source: Benchmark Minerals

Raw materials

Processed materials

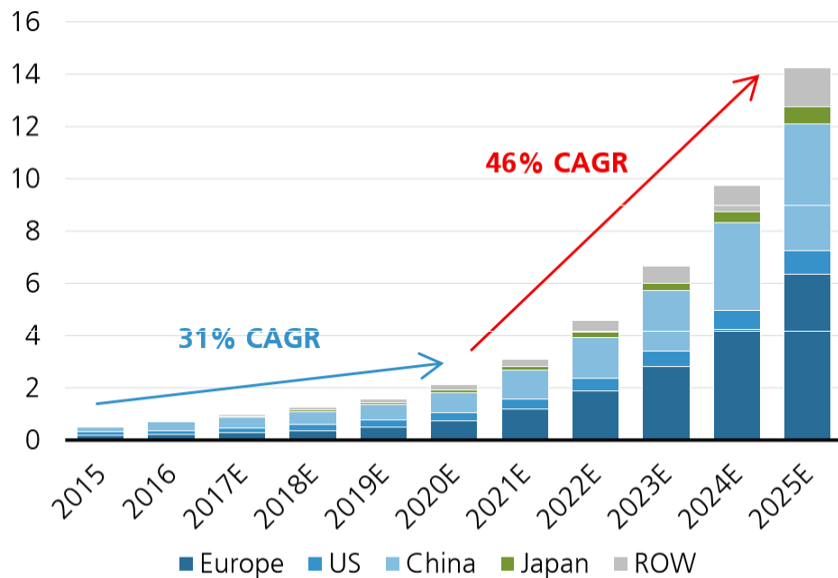
Cells/Modules



Sources: Roskill, Peteves et al., World Resource Forum 2017, European Commission

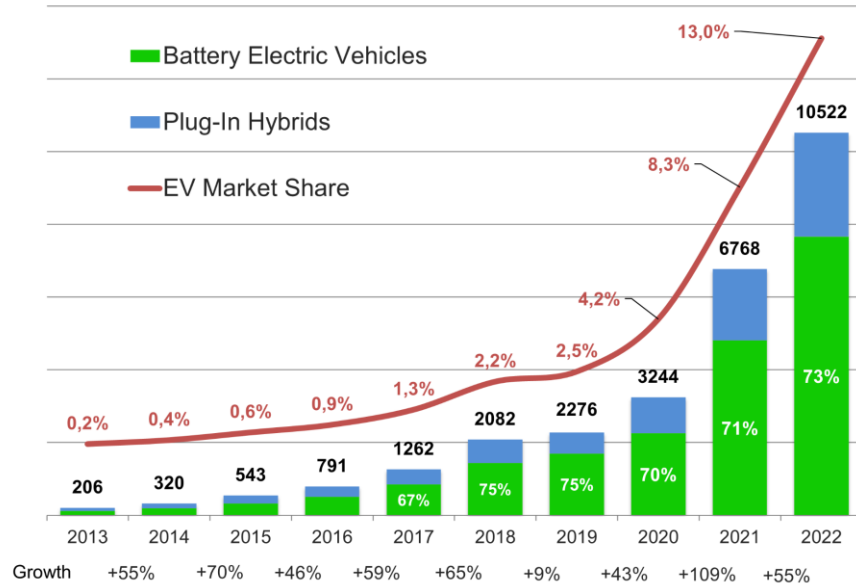
# Actual EV market 2022 was 2 x prediction 2017

## Projection 2017



## Actual 2023

GLOBAL BEV & PHEV SALES ('000s) EV VOLUMES



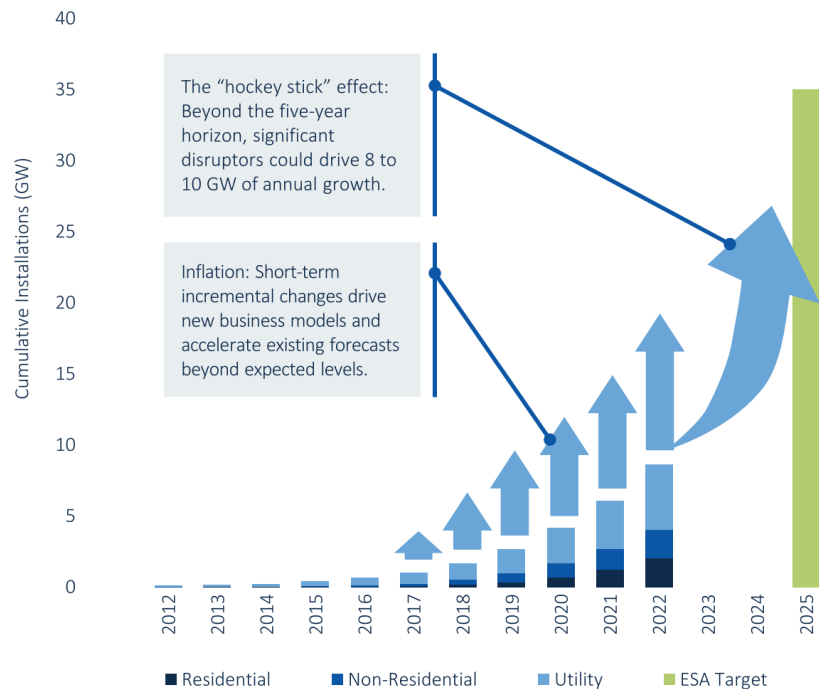
E

Source: UBS estimates



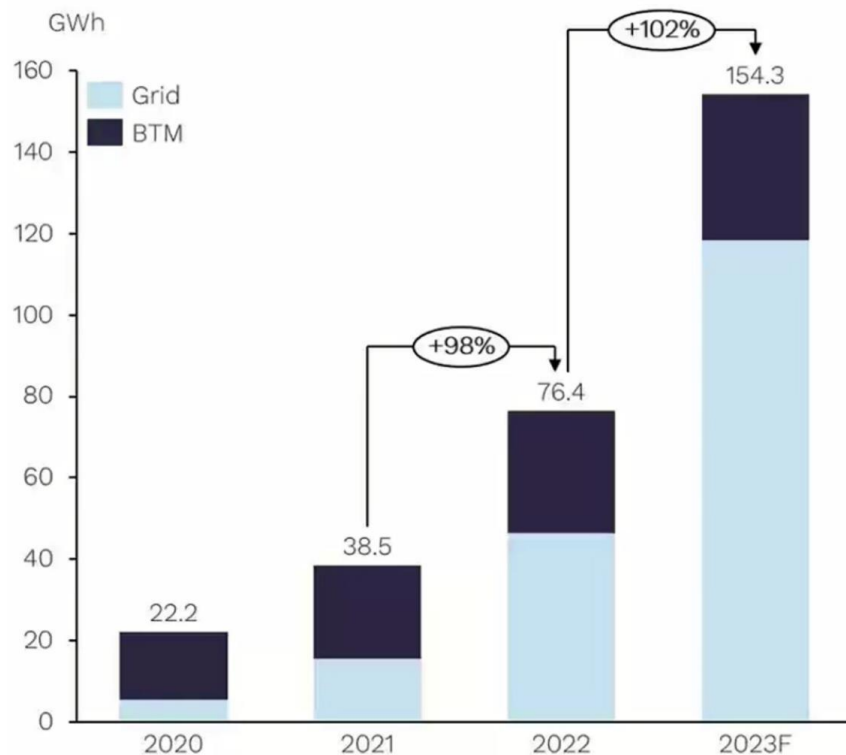
# Actual BESS market 2022 was 4 x prediction 2017

## GTM Research Total Cumulative 5-Year Forecast



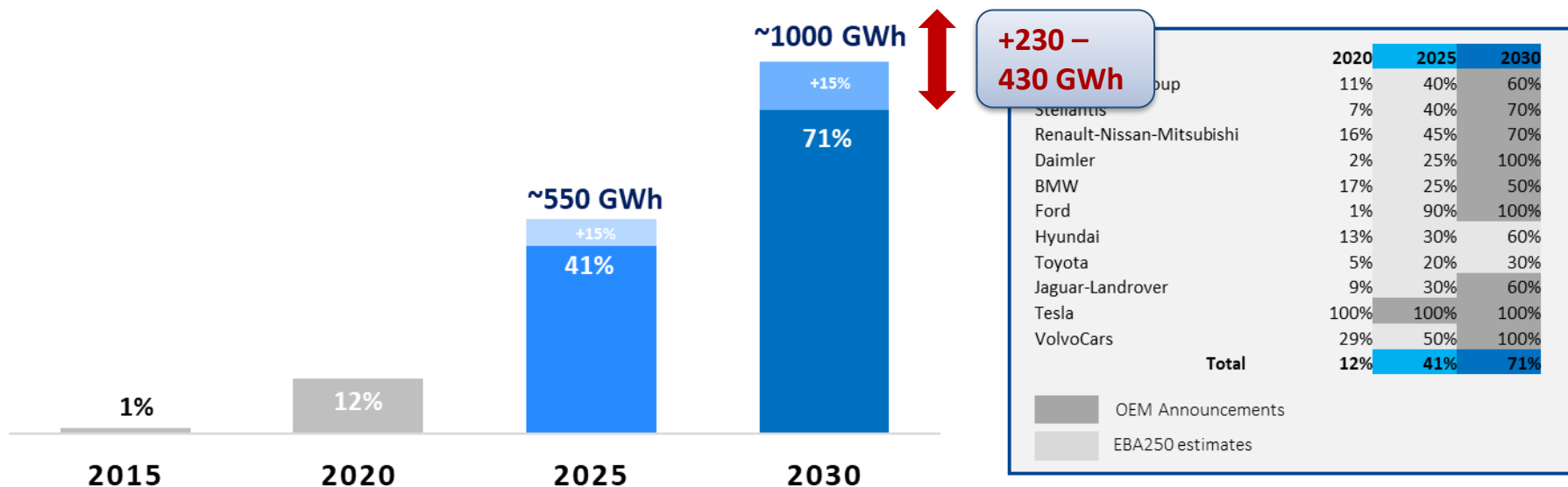
Source: GTM Research

## BESS installed capacity outlook by storage type, new additions



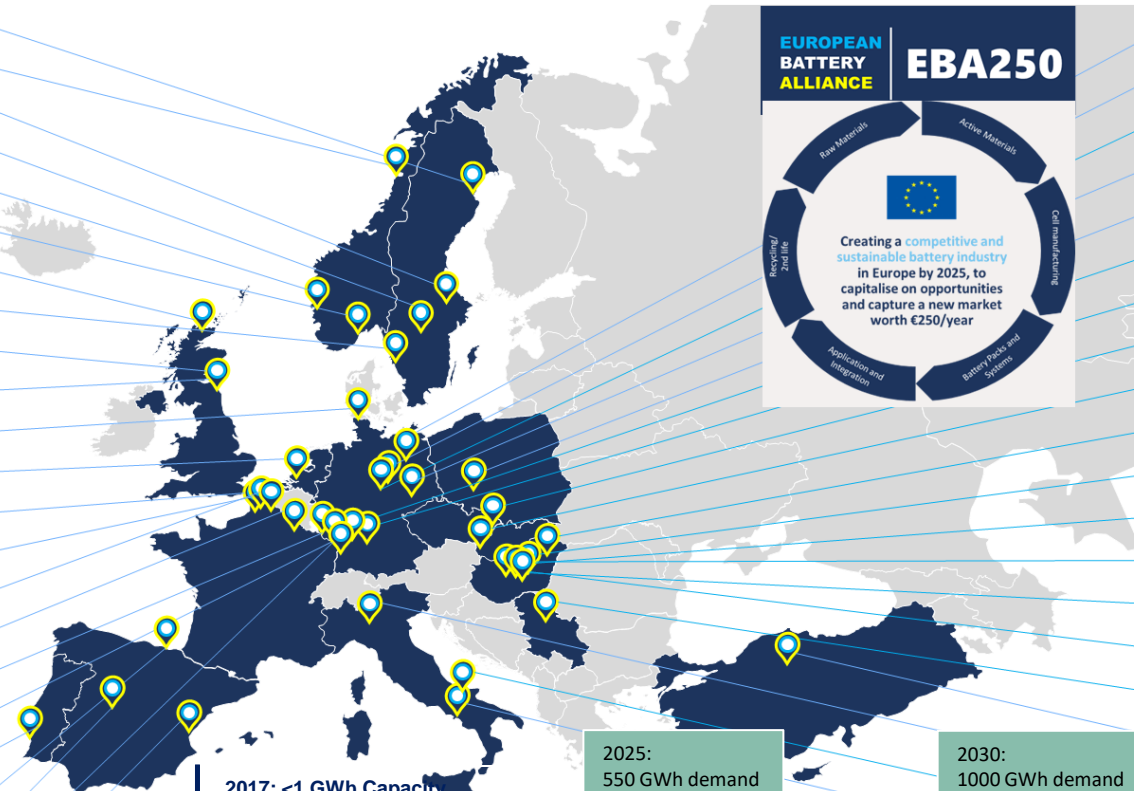
# Increased electrification targets increase demand forecasts

Volume-averaged Europe forecast EV+PHEV sales forecast, including 15% for other sectors (HDV, busses, yellow machines etc...)



# From zero production to more than 1000GWh of announced production capacity in 5 years

- NORTHVOLT ETT**  
In operation, up to 60 GWh
- FREYR**  
Announced, planned start 2023, up to 29 GWh
- NORTHVOLT Labs**  
In operation, 0,5 GWh
- Volvo Group**  
Announced, up to XX GWh for HDV
- Beyonder**  
Announced, up to 10 GWh
- MORROW**  
Announced, planned start 202, up to 24 GWh
- AMTE Power**  
Announced, up to 2 GWh for niche appl.
- Northvolt/ Volvo Cars**  
Announced, planned start 2025, up to 50 GWh
- ENVISION AESC**  
In operation, 1,9 GWh
- ENVISION AESC/Nissan**  
Announced, up to 25 GWh
- NORTHVOLT Heide**  
Announced, planned start 2025, up to 60 GWh
- Eurocell**  
Announced, planned start 2025, up to 45 GWh
- Prologium**  
Announced, planned start 2025, up to 45 GWh
- VERKOR/Renault**  
up to 50 GWh
- ENVISION AESC/Renault**  
Announced, up to 24 GWh
- ACC, France**  
IPCEI project, Start 2025/4, up to 40 GWh
- ACC, Germany**  
IPCEI project, Start 2024, up to 240GWh
- SVOLT**  
Announced, planned start 2025, up to 24 GWh
- CALB**  
Announced, planned start 2025, up to 45 GWh
- Basquevolt, Spain**  
Announced, start 2025, up to 10 GWh
- Acciona Energia/Envision**  
Announced, start 2025, up to 30 GWh
- LECLANCHÉ/ENERIS**  
Small scale operation (0,3 GWh), up to 4 GWh
- VW**  
Announced, up to 20 GWh



- TESLA**  
Start 2022, up to 150 GWh
- CATL**  
Start 2022, up to 80 GWh
- Volkswagen**  
Start 2022, up to 40 GWh
- SVOLT**  
Announced, start 2025, up to 16 GWh
- LG ES**  
In operation, 24 GWh, up to 67 GWh
- CELLFORCE/Porsche**  
Announced, up to 1 GWh
- VARTA**  
IPCEI project, Start 2021, up to 5 GWh
- MES**  
Started 2020, up to 15 GWh
- INOBAT**  
Announced, up to 2 GWh
- EVE Energy**  
Announced, start 2028, up to 30 GWh
- SAMSUNG**  
Start 2018, up to 30 GWh
- SK Innovation**  
In operation, 7,5 GWh
- SK Innovation**  
In operation, 9,8 GWh
- SK Innovation**  
Announced, start 2028, up to 30 GWh
- CATL**  
Construction starting 2022, up to 100 GWh
- ELEVEN ES**  
Announced, up to 16 GWh
- SK Innovation/Ford Motor /Koç**  
Announced, start 2025, up to 30 GWh
- ITALVOLT**  
Announced, planned start 2025, up to 45 GWh
- ACC, Italy**  
Announced, planned start 2026, up to 40 GWh
- FAAM/FIB**  
IPCEI project, up to 8 GWh
- Volkswagen, Eastern Europe**  
Announced, location TBD, up to 10 GWh

2017: <1 GWh Capacity

2022: ~ 80 GWh Capacity

2025: ~ 458 GWh Capacity

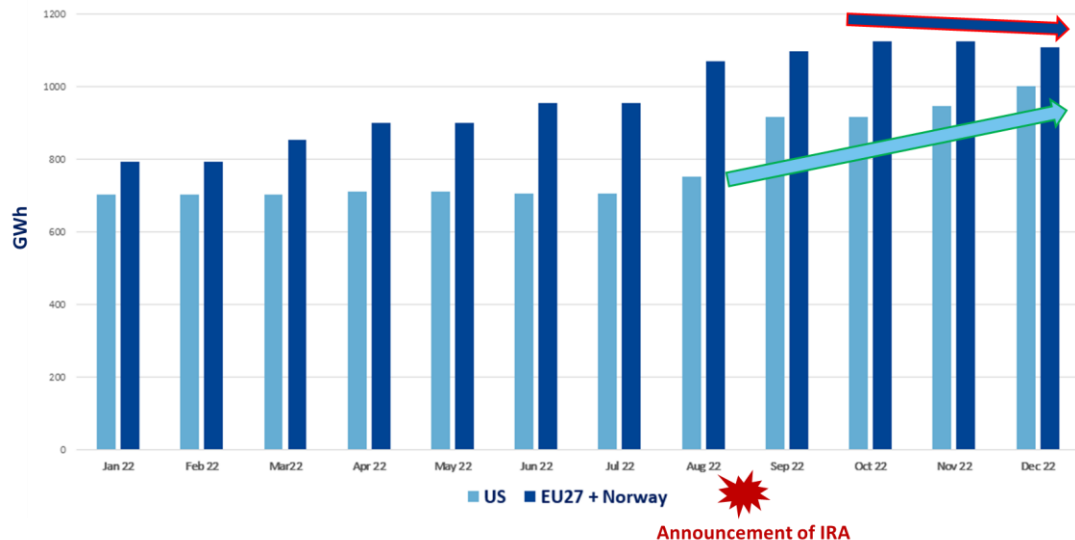
2025: 550 GWh demand

2030: 1000 GWh demand

2030: ~ 1083 GWh Capacity

# US policies dramatically expanded and accelerated investment in manufacturing facilities

Announced cell production capacity during 2022, in pipeline for 2032



## IRA accelerates the growth of a US battery value chain

- Manufacturers have announced more than \$120 billion in investments in the last eight years

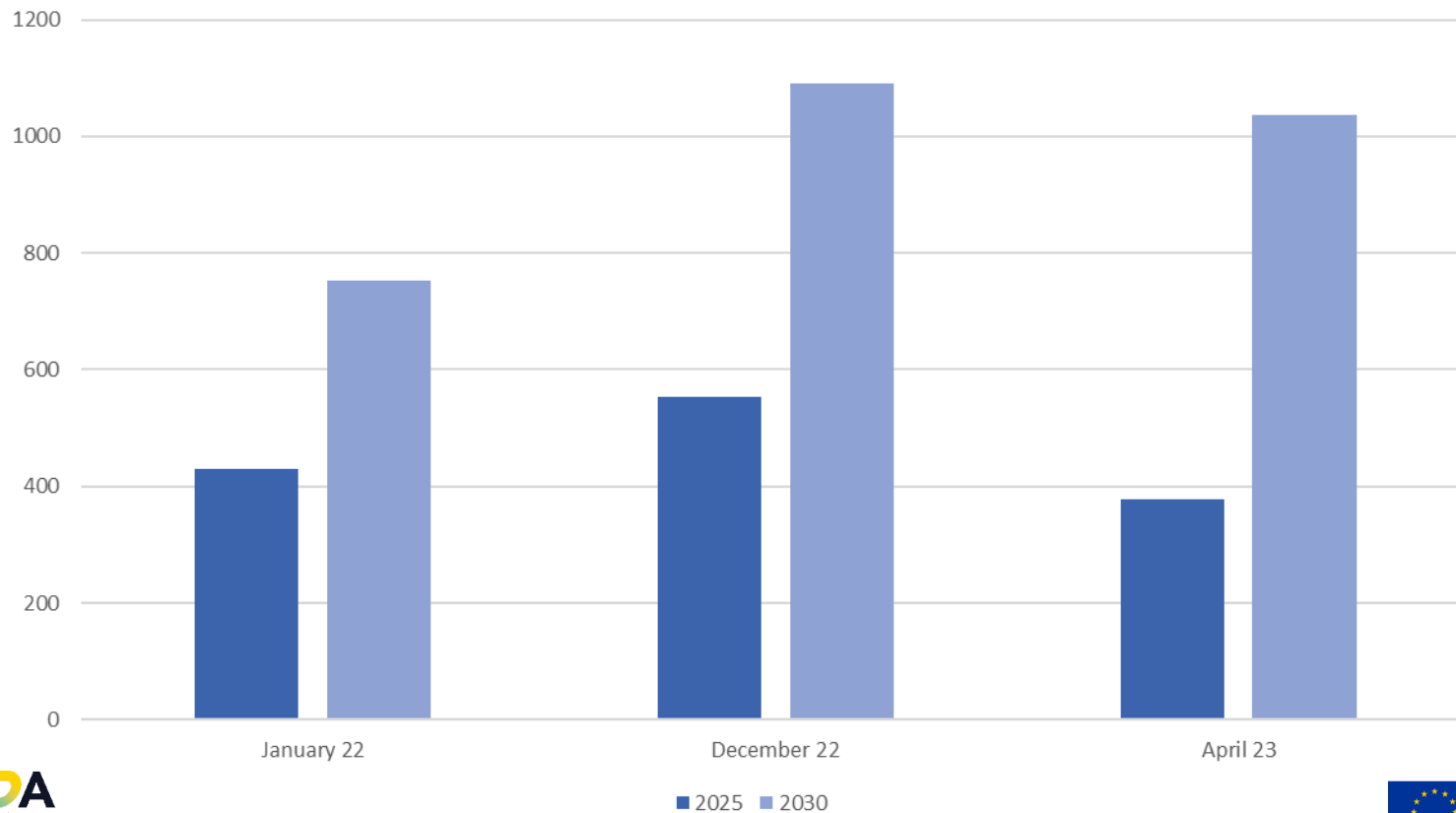
- 42% of that \$120 billion was announced in just the last six months – since Congress passed the IRA*

**That investment will support massive numbers of new U.S. electric vehicle-related jobs.**

- Manufacturers have announced 143,000 new jobs in the electric vehicle sector in the last eight years

- 32% of those jobs were announced in just the last six months – since Congress passed the IRA*

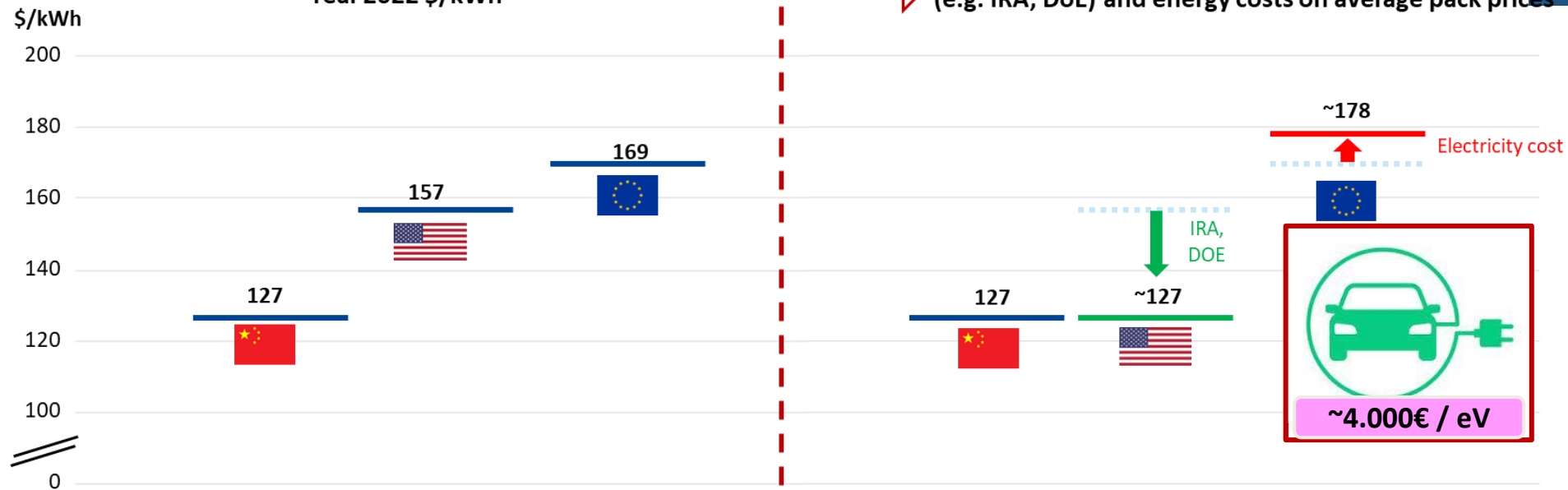
# Forecast Installed Cell Production Capacity



# An unbalanced global playing field, impacting EU competitiveness

~4.000 Euros price difference per average eV

Average battery pack price and range by region, real 2022 \$/kWh



US average pack price is +24% compared to China

EU average pack price is +33% compared to China and +8% compared to US

~Price parity for US compared to China thanks to IRA, DoE grants and tariff policy

EU average pack prices +40% compared to China and US due to EU electricity prices far above developments in US and China and other factors

# Chinese OEM:s are taking market share domestically

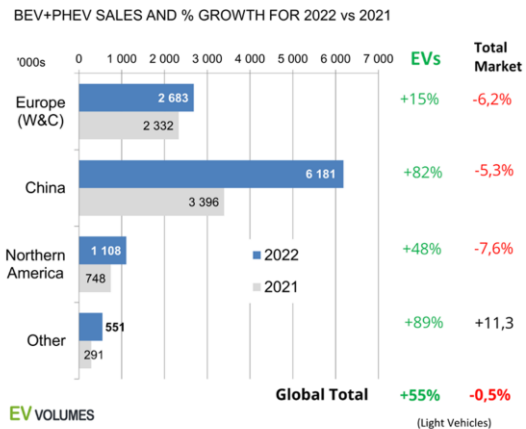
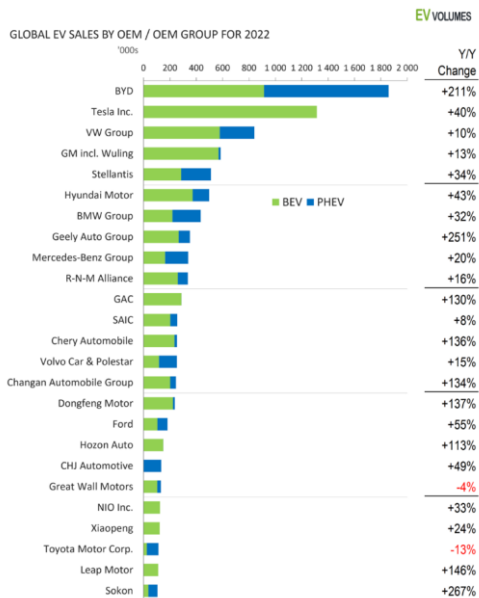
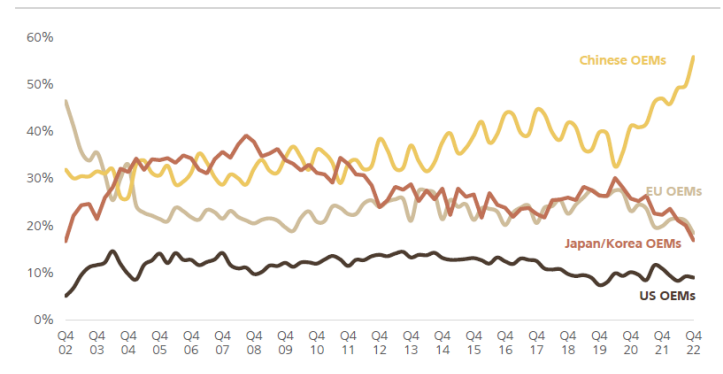


Figure 64: Market share trends in China including exports by OEM domiciles, 2002 - 2022



Source: Company information, CPCA

- European OEM ICE market shares in China are melting.
- Only BEV market shares grow, but remaining at low levels
- Chinese preference for domestic brands in the BEV market

# • Record growth in Chinese EV export to EU

## China's Exports Of Electric Vehicles To Europe Reach Record Levels

Exports of China-made EVs to Europe amounted to \$3.2 billion in November 2022, up 165 percent from a year ago.

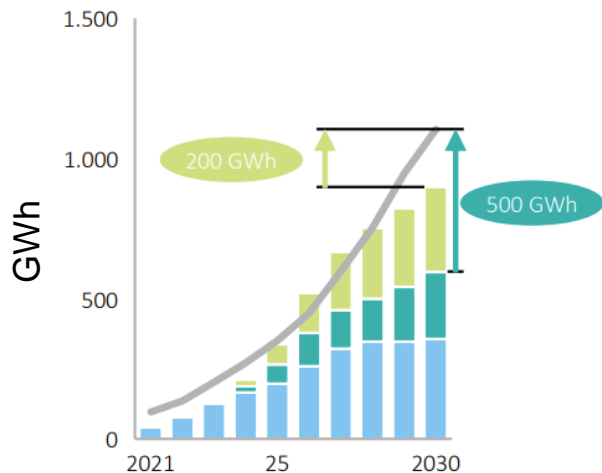
- Bulk of the exports wasn't made up of EVs from Chinese brands but from European automakers that have manufacturing facilities in the Asian country.
- For e.g., 17% of Norwegians consider buying a Chinese brand.



- Balance of battery supply up to 2030



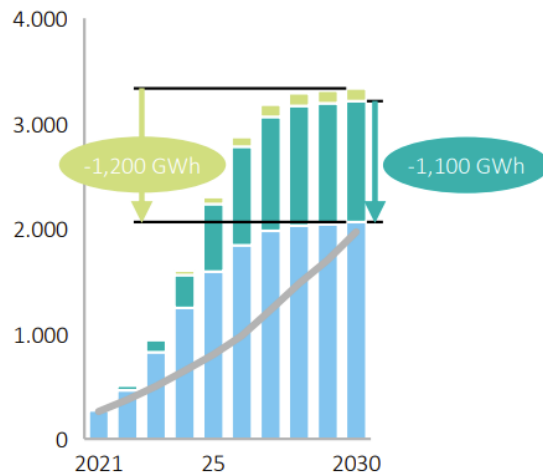
Europe



Domestic undersupply  
requiring imports up to 2030  
and beyond



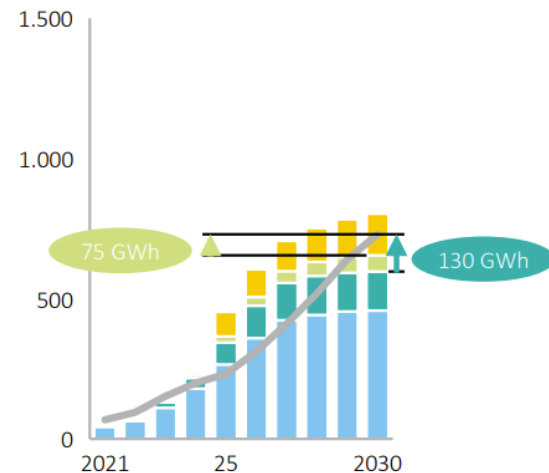
China



Large oversupply (up to 1200  
GWh in 2030) showing export  
orientation of market.  
IRA will limit export to US post  
2025.



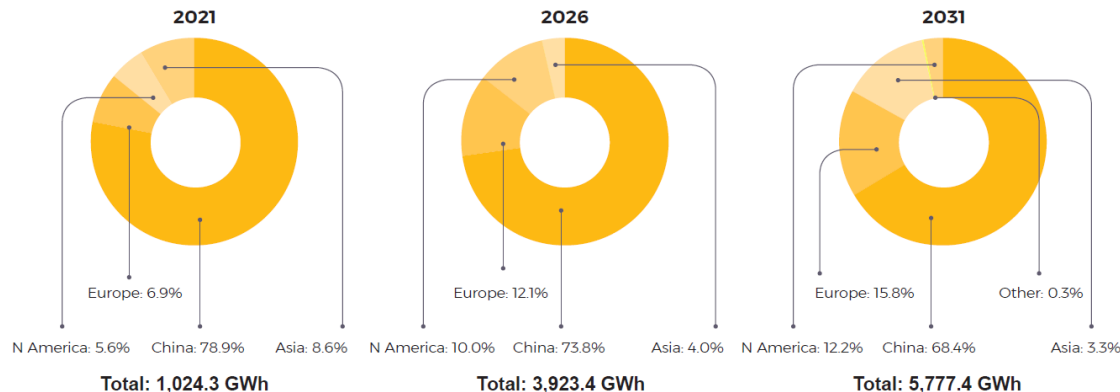
North America



Supply gap expected to be  
closed with further  
announcements to fulfill IRA  
requirements

The global lithium-ion pipeline continues to grow- China will maintain its lead, with Europe following lead in the long term

### Lithium ion Battery Cell Capacity by Region

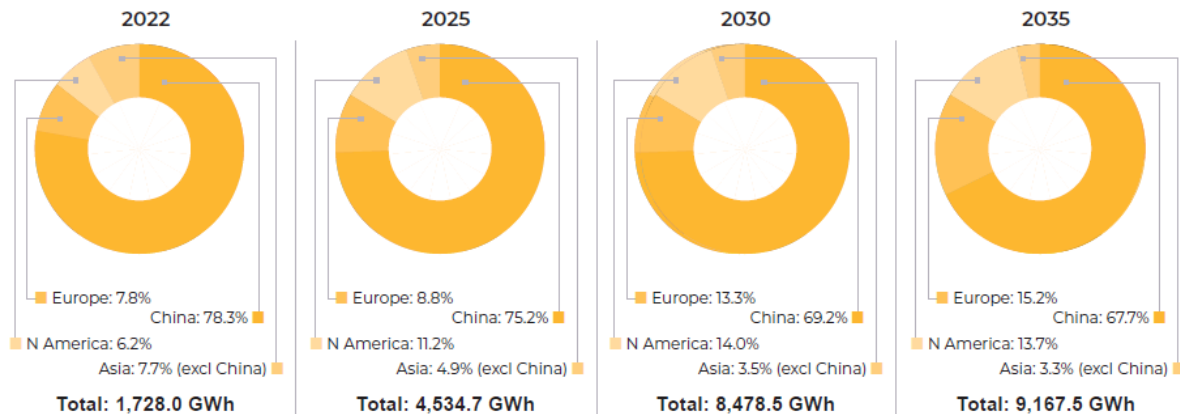


### Forecast, March 2022

- Total announced capacity of **5774 GWh in 2031**
- **Europe second largest market share (15,8%) in 2031**

Source: Benchmark Mineral Intelligence

### Lithium ion Battery Cell Capacity by Region

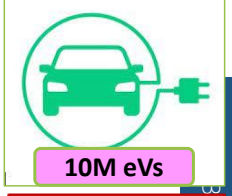


### Forecast, March 2023

- Total announced capacity of **8478 GWh for 2030** and over **9000 GWh in 2031 !**
- **EU second largest market share in long term despite IRA**

# Still big gaps to address on domestic supply vs EU 2030 demand

## Amplified by unbalanced global playing field



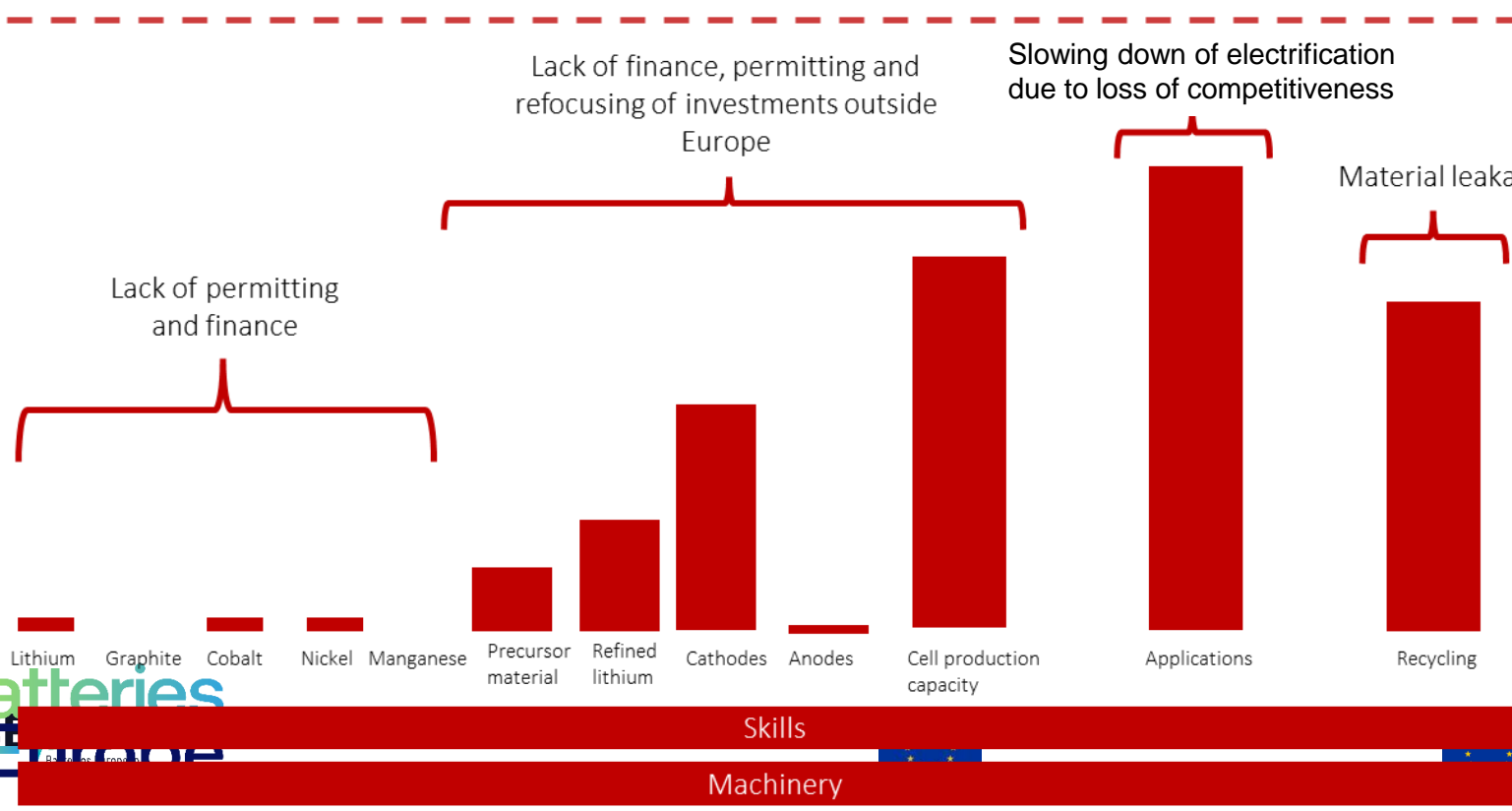
10M eVs

Expected EU demand in 2030: 1000GWh

Cross-sectorial demand gaps



Estimated realistic share of EU + Norway production capacity compared to estimated demands based on public announcements with current framework in 2030

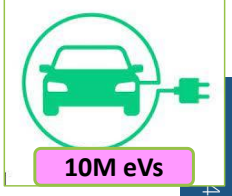


Batteries + BEV



# 7 emergency proposals for bridging the 2030 gap, and more

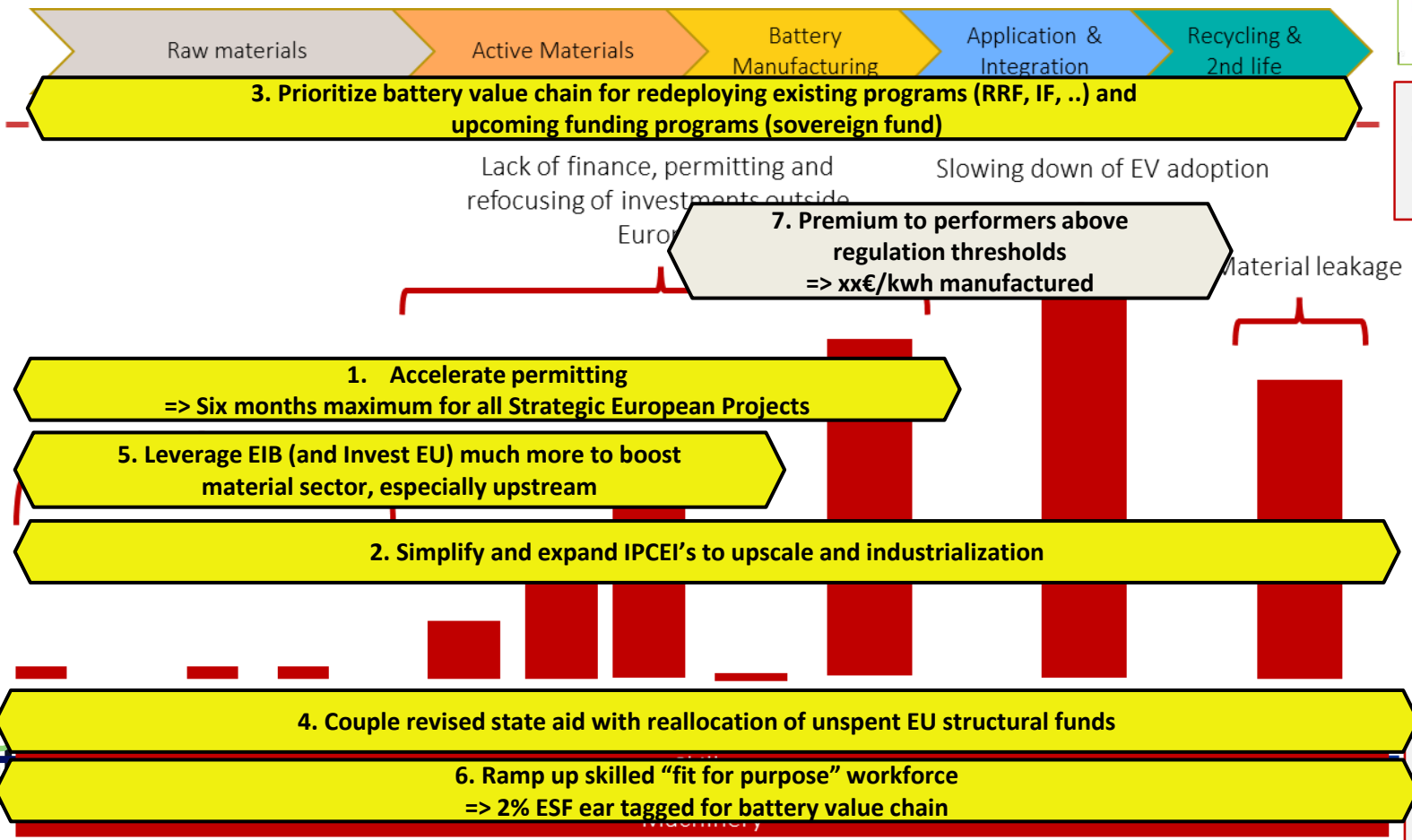
Objective: Actively support our champions' growth, also in Europe



Expected EU demand in 2030: 1000GWh

Cross-sectorial demand gaps

Estimated realistic share of EU + Norway production capacity compared to estimated demands based on public announcements with current framework in 2030



- Ilka von Dalwigk

- [Ilka.vondalwigk@innoenergy.com](mailto:Ilka.vondalwigk@innoenergy.com)

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## European Battery R&D Pilot Lines – Supporting the European Battery Ecosystem

*Arno Kwade – LiPLANET*

[www.batterieseurope.eu](http://www.batterieseurope.eu)

 @BatteriesEurope



Batteries Europe Secretariat is a EU-funded project that has received funding from the European Union's Horizon Europe Research and Innovation Programme under Grant Agreement N. 101069676.

- 1 Battery R&D Pilot Lines in Europe**
- 2 Role of Battery R&D Pilot Lines**
- 3 Contribution of Pilot Lines Network LiPLANET to the Battery Ecosystem**

# Introduction to LIPLANET

## LIPLANET is a network of research pilot lines for lithium battery cells

### LIPLANET ...

- is a network built around research pilot lines for Lithium battery cell production,
- advances the development of sustainable batteries and production technology
- aims to intensify the output of European projects and initiatives by accelerating knowledge and technology transfer between pilot lines and other stakeholders

### Value Propositions



Knowledge Exchange



Coordination

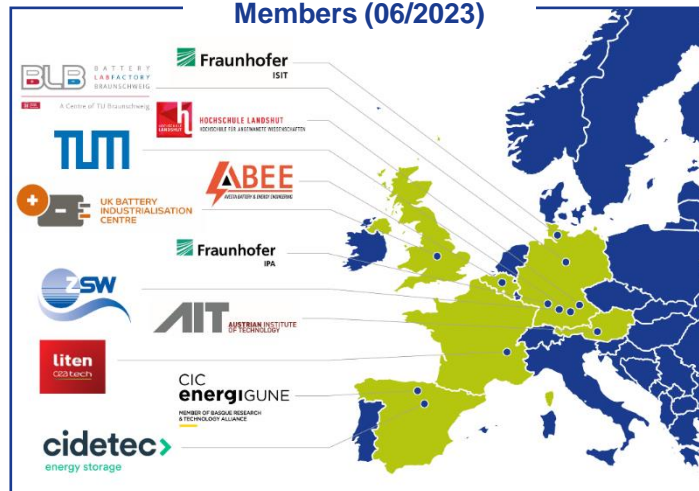


Training



Standards & Best Practices

### Members (06/2023)



### LIPLANET PROJECT

- Core consortium consisted of 8 project partners, lead by TU Braunschweig (Prof. A. Kwade)
- Funded by a Coordination and Support Action (CSA) under EU's Horizon 2020 from 01/2020 to 05/2022

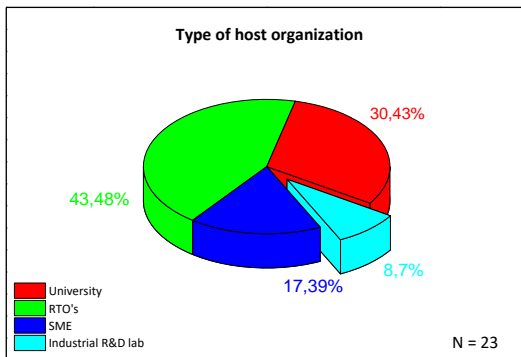
### LIPLANET NETWORK

- Association (e.V.) that operates with a sustainable, non-profit business model to provide a benefit for all stakeholders
- Currently comprises 12 pilot lines and is inclusive towards new (non-pilot line) members

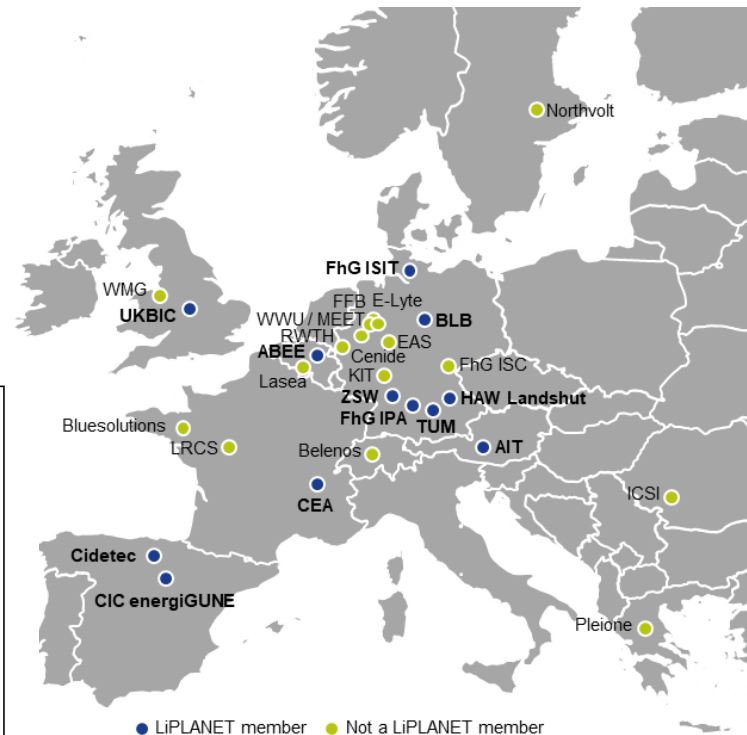
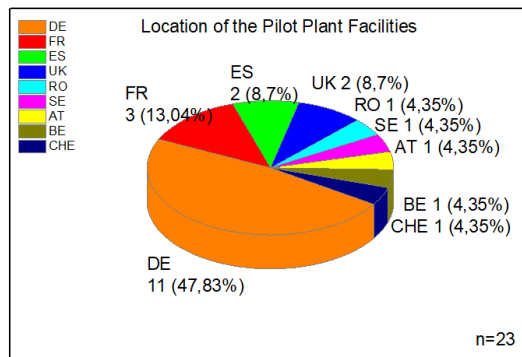
# Battery Pilot Lines in Europe

## The number of pilot lines in Europe is growing

- A growing number of battery R&D pilot lines is being established in the European Region
- The pilot lines have been mapped during the runtime of the LiPLANET CSA project (2020-2022) under Horizon Europe
- We want to update this map in the following months



Results of the Mapping within LiPLANET [[www.liplanet.eu/news-documents/](http://www.liplanet.eu/news-documents/)]



Lithium Battery R&D pilot lines in European region (Dec 21)

# Role of Battery R&D Pilot Lines

## Bridging the gap between lab scale and industrial production

Pilot lines definition

State-of-the-art electrodes and cells

Battery R&D pilot lines are **R&D-oriented, linear small-scale production environments to process materials into electrodes, then into cells, according to industry-relevant manufacturing techniques.**

Scalable processes

Performing R&D with some public accessibility

Integrate a series of production process steps, which do not have to be fully interconnected

State-of-the art and innovative equipment



	Laboratory-scale	Pilot-line	Industrial production
Cell capacities	~ 2 Ah	industry-relevant cell capacities	3.5 – 120+ Ah
Process types	discontinuous and manual	semi-continuous or continuous, semi-automated or automated, quasi-industrial	continuous, fully automated, production of semi-finished products with full integration in battery production chain
Scope	<ul style="list-style-type: none"> <li>development of new materials</li> <li>material investigation</li> <li>formulation screening</li> </ul>	<ul style="list-style-type: none"> <li>evaluation of scalability</li> <li>investigation of process parameters and their interactions</li> <li>prediction of suitable process parameters</li> <li>validation of cell designs</li> <li>prototype building</li> <li>quality control optimization (from random samples to 100 % inspection)</li> <li>cost minimization</li> <li>reduction of scrap rates</li> <li>identification of bottlenecks</li> </ul>	<ul style="list-style-type: none"> <li>process establishment of fully developed slurry/electrode formulations and validated cell designs</li> <li>examination of process robustness</li> <li>automated defect recognition</li> <li>mass-production with maximized throughput</li> </ul>
General trends	<p>↑ automatization degree</p> <p>↑ interdisciplinary character</p> <p>↑ costs</p> <p>↓ variety in materials/formulations/cell designs</p> <p>↓ publication of results</p>		

Keppeler et al. "The Role of Pilot Lines in Bridging the Gap Between Fundamental Research and Industrial Production for Lithium-Ion Battery Cells Relevant to Sustainable Electromobility: A Review." *Energy Technology* 2100132 (2021). <https://doi.org/10.1002/ente.202100132>.

# Role of Battery R&D Pilot Lines

## Pilot Lines intensely contribute to the European Battery Ecosystem

- Pilot lines aim to bridge the gap between lab-scale research and industrial production (TRL 5 – 7 & MRL 4 – 8)
- R&D focus of pilot lines is on scalability, manufacturability, and cell design for new technologies
- They provide industry – from start-ups to gigafactories – testing facilities on a smaller scale prior to mass production
- Pilot Lines today are very strongly contributing to the European Battery Ecosystem in the following dimensions:



### Projects

- Serve as a development platform for new technologies, particularly production
- Validation of R&I activities at pilot lines
- Assessments of manufacturability, scalability, and more



### Policy & Programmes

- Contribute to roadmapping and program development processes
- Provide R&I recommendations from individual pilot lines



### Training & Education

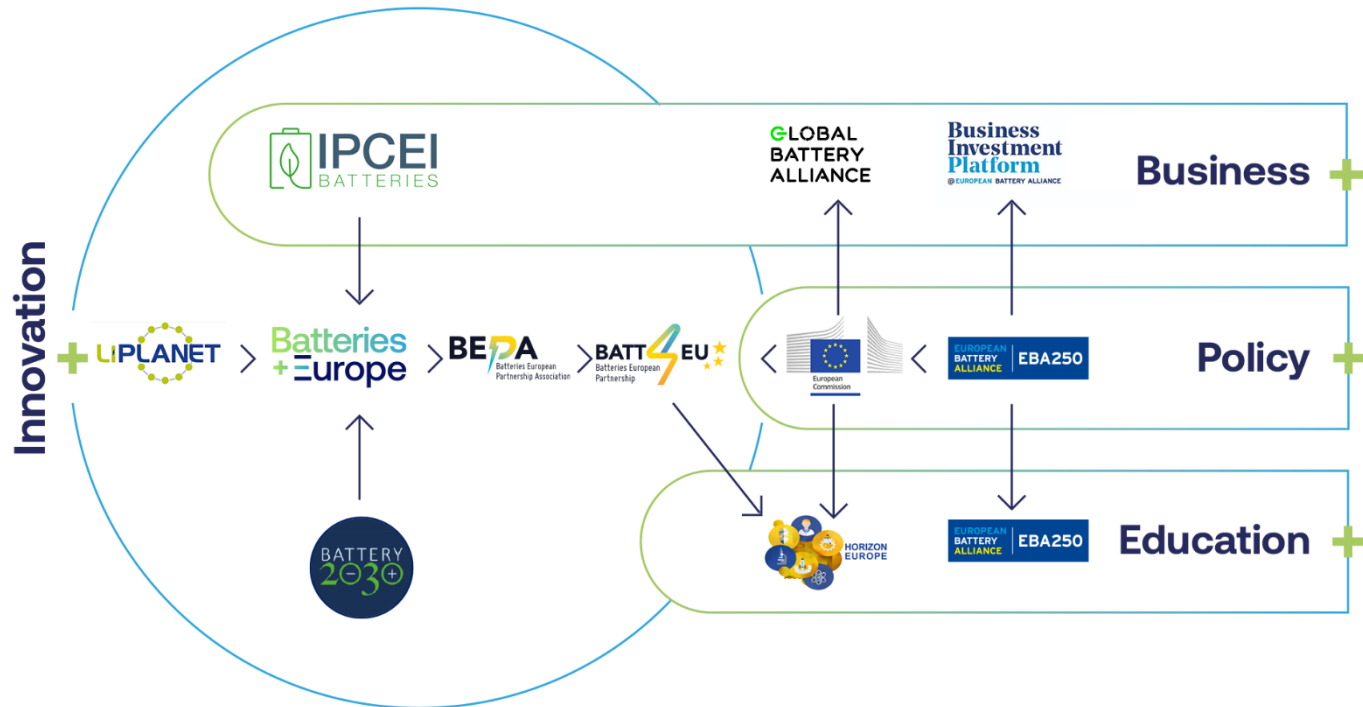
- Provide possibilities for education close to the production equipment
- Perform on-site trainings

# Contribution of LIPLANET

## How the LIPLANET network can support the European Battery Ecosystem

LIPLANET support through:

- Joint representation of Pilot Lines in the Battery Ecosystem
- Representation of R&D on:
  - manufacturing
  - cell design
  - handling of new materials
  - recycling
- Validation and consolidation of R&I recommendations from Pilot Lines perspectives



[<https://batterieseurope.eu/about-us/the-eu-battery-ecosystem/>]

## Proposed measures to leverage the contribution of LiPLANET

In order to leverage the contribution of pilot lines to the European Battery Ecosystem, we propose ...



### A stronger tie between Batteries Europe and LiPLANET

- Associate LiPLANET with Batteries Europe
- Joint communication & dissemination activities
- Integrate some workstreams to avoid double work



### Active contribution in validating R&I recommendations

- Particularly in joint Working Group *4 on Manufacturing & Cell Design*
- Cooperation with other joint Working Groups (e.g. WG1 & WG3 for good practices in performance data reporting and assessment)
- Help to set the right KPIs and pathways to reach them



### Increasing knowledge exchange between BATT4EU projects on manufacturing and also recycling

- Integrate manufacturing and recycling
- Organize joint workshops on certain aspects of production and also recycling, which target a broader community (BEPA, BE, ...)
- Allocation of resources to this knowledge exchange is needed



**Thank you very much  
for your attention!**

## Contact us for coordination



**Prof. Arno Kwade**

TU Braunschweig,  
BLB  
1st Chairman

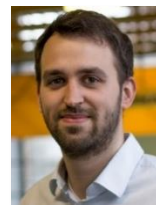
[a.kwade@tu-bs.de](mailto:a.kwade@tu-bs.de)



**Dr. Simon Perraud**

CEA-Liten  
2nd Chairman

[simon.perraud@cea.fr](mailto:simon.perraud@cea.fr)



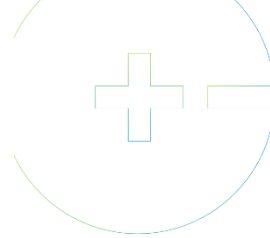
**Nicolas v. Drachenfels**

LIPLANET CEO

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 [linkedin.com/company/liplanet/](https://www.linkedin.com/company/liplanet/)



**Lunch break**  
We will be back at 13.45

[www.batteries-europe.eu](http://www.batteries-europe.eu)

 @BatteriesEurope



# Why is collaborative R&I necessary to resolve our battery value chain challenges?

Moderator:

- *Edel Sheridan (BE Secretariat – SINTEF Energy)*

Panelists:

- *Ilaria Pucher (Green Energy Storage)*
- *Ivana Hasa (WMG, University of Warwick)*
- *Kurt Vandeputte (Umicore)*
- *Michele De Gennaro (AIT)*
- *Johan Blondelle (European Commission)*



# Re-skilling and up-skilling: how to provide answers to industry needs

Moderator:

*Silvia Bodoardo (Battery2030+)*

Panelists:

*Oana Penu (InnoEnergy Skills Institute )*

*Jakub Stolfa (Automotive Skills Alliance)*

*Anders Norberg (ALBATTTS)*

*Julia Altenhofer (Northvolt)*



**“Education  
is the most powerful weapon which  
you can use to change the world.”**

Nelson Mandela

# Education in Batteries Europe and BEPA

**Transversal to all WGs**

**Multidisciplinarity**

Raw materials, new materials development, digitalization, on recycling and cell and battery pack production for both automotive and stationary applications, without excluding any other actual and future needs.





## Seminal work available

- Mapping existing education activities
- Examining European needs
- Evaluating new job roles
- Learning objectives and education concepts for the sector

Done by research initiative **Battery2030 plus** ([battery2030.eu](http://battery2030.eu)), in the **position paper** of ETIP Batteries Europe, a report by **Fraunhofer** and **EIT Raw Materials** by **ALBATTs** through multiple updated skills intelligence reports, and through a 4.5 years research led by the **EIT InnoEnergy** (now via InnoEnergy Skills Institute)



## TF Education – Academic level

Battery2030 plus (battery2030.eu)



- Adoption and update of curricula
- creation of MOOC also for Long Life learning
- Increase of mobility of researchers across Europe

## TF Education – Professional/Vocational level

Fraunhofer, EIT Raw Materials by ALBATTIS and EIT InnoEnergy Skills Institute



- Identify industry needs and analyse future skill and workforce requirements
- Train the trainers
- Collaborative models between industry-schools and mainstream

## TF Education – Public/User level



- Increase acceptance, awareness, knowledge opportunities for the public
- Accelerate regulatory aspects

# Re-skilling and up-skilling: how to provide answers to industry needs

Moderator:

*Silvia Bodoardo (Battery2030+)*

Panelists:

*Oana Penu (InnoEnergy Skills Institute )*

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*Anders Norberg (ALBATTIS)*

*Julia Altenhofer (Northvolt)*





## Europe's battery innovation system in international comparison

*Monika Curto Fuentes (BE Secretariat – VDI/VDE-IT)*

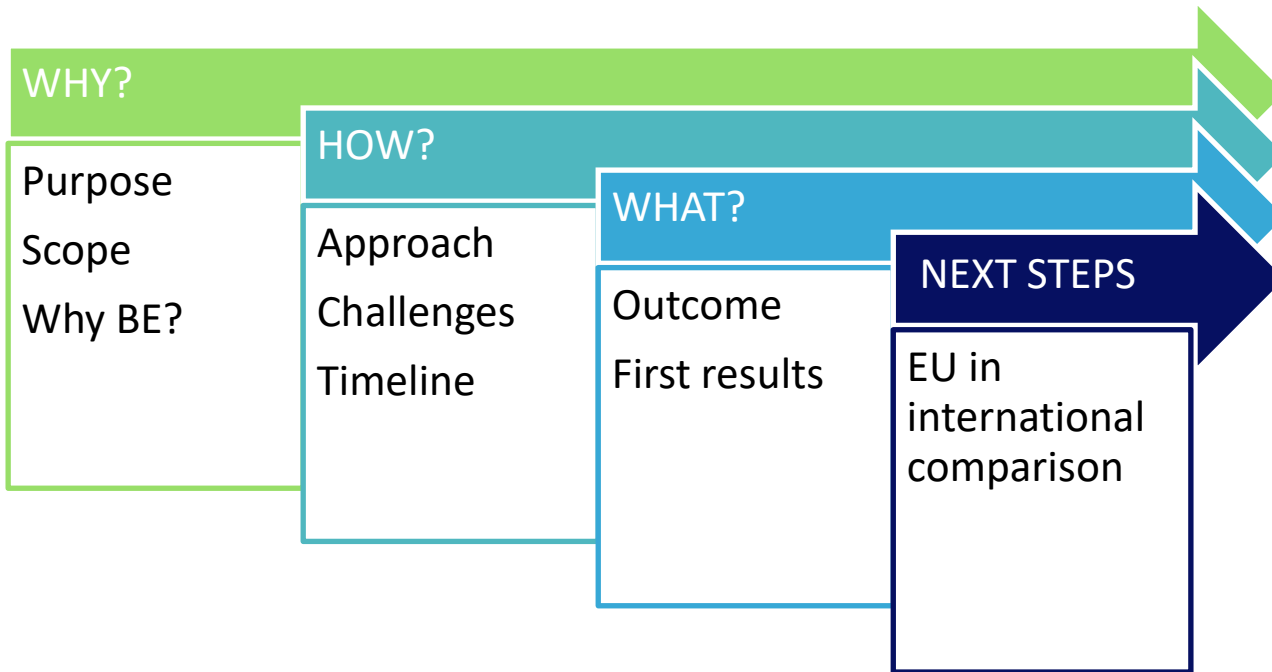
[www.batterieseurope.eu](http://www.batterieseurope.eu)

 @BatteriesEurope



Batteries Europe Secretariat is a EU-funded project that has received funding from the European Union's Horizon Europe Research and Innovation Programme under Grant Agreement N. 101069676.

# What are we up to today?



# What's the purpose of international observation?

## Why does Europe need international observation?

- **Understand** international innovation funding and support structures for batteries as well as political targets and instruments for the creation of a successful battery ecosystem
- **Benchmark** competitiveness of the EU battery innovation system
- **React** to international developments
- **Learn** from international success stories

## Why should it be done by Batteries Europe?

- Provide **neutral information** on battery innovation without a hidden agenda
- Make information public to provide a **common knowledge base** for discussion
- Use the **extensive network** (e.g. WG experts, NRCG) to obtain the most complete picture possible
- Feed results into European **decision making** (e.g. batteries SRIA and the SET plan process)

# WHY? To ensure Europe's leadership in battery technology and identify cooperation opportunities



## Scope

**Project Proposal**, Task 5.4.: “Global Overview of Battery R&D&I, Funding and International Benchmark on KPIs” (Leader: VDI/VDE, Contributors: CICE, IE, ENEA)



## Results

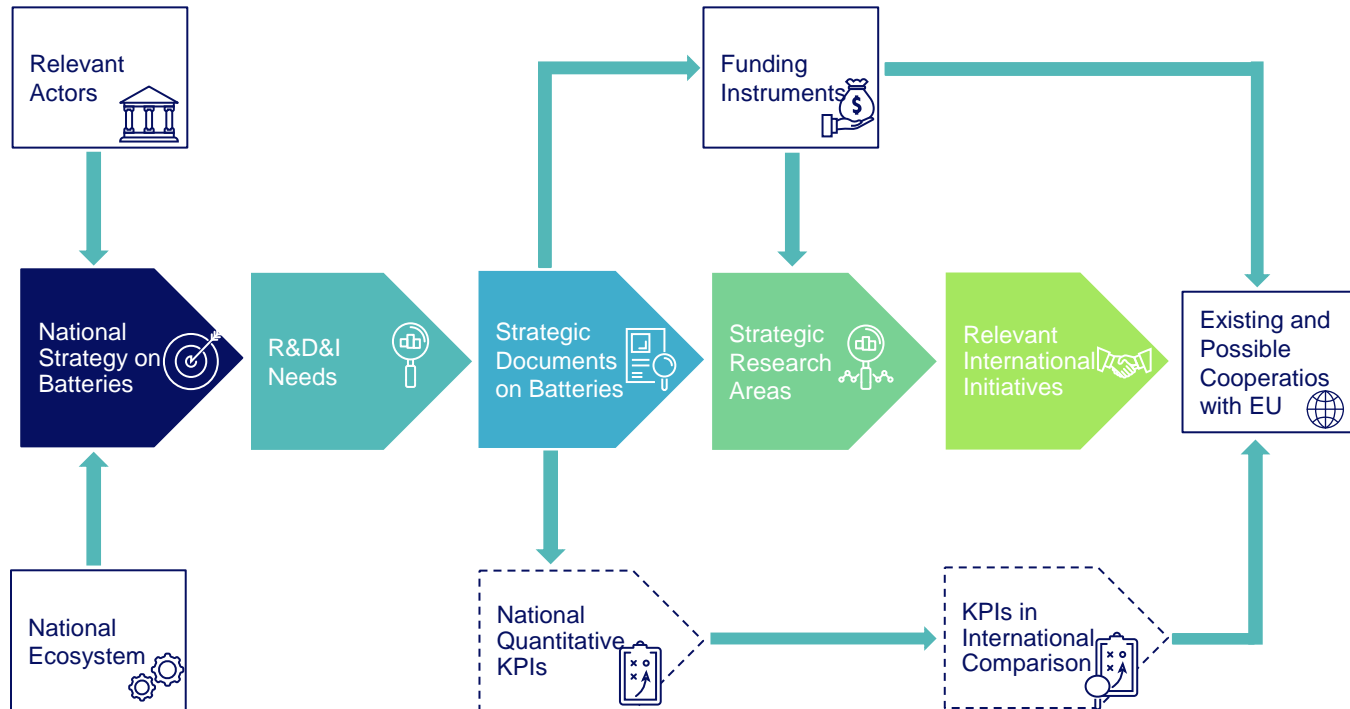
Deadline for the deliverable: **M24**; Input to the EC for contextualization of the **Batteries Europe SRIA** and for the **prioritization of R&D&I activities**



## Regions

Selected countries and regions: **USA, Japan, China, South Korea and Australia (Canada, India, Indonesia)**

# We identified various fields for a holistic analysis of international KPIs



# We developed a mitigation strategy to overcome faced challenges

## Availability of data

- Sources restricted to governmental networks
  - Confidential information
  - No willingness to share the data
  - Language barrier
  - Difficulties to reach international key players
- ✓ Extension of **experts` network**
  - ✓ Partnership with **international agencies**
  - ✓ Usage of **translation tools**
  - ✓ Interviews with **native experts**

## Comparison of data

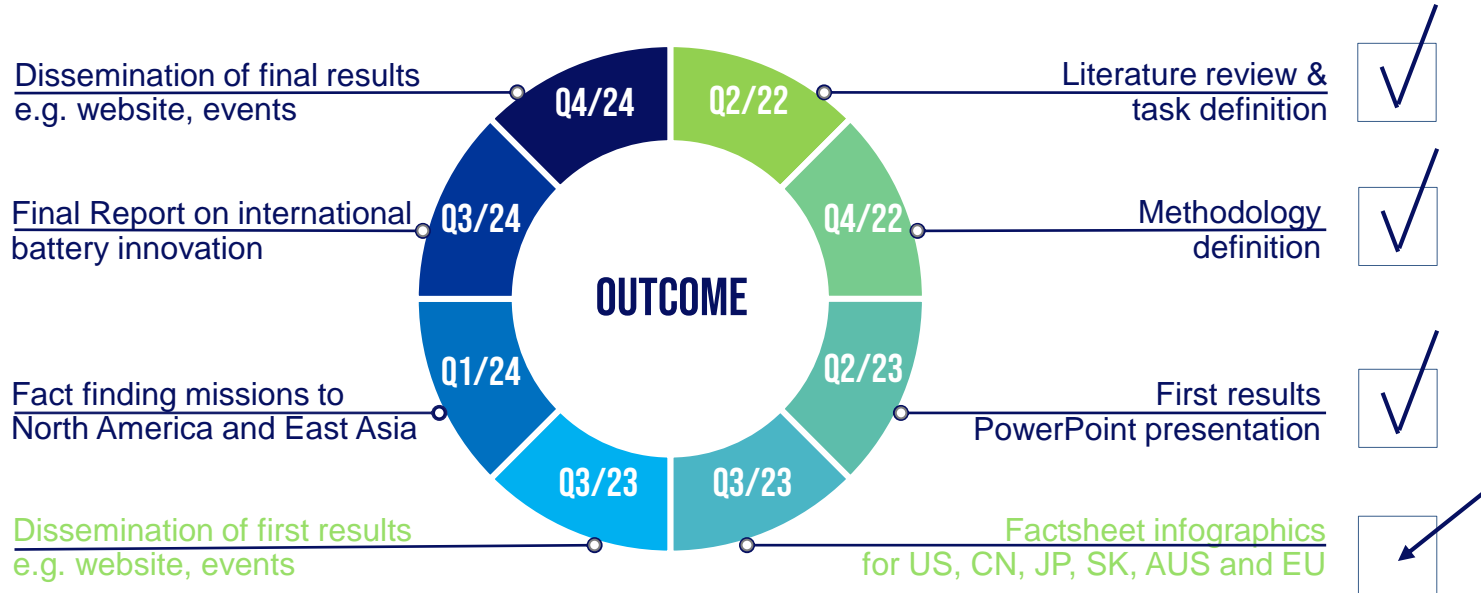
- Various standards of reporting
  - Various level and kind of KPIs
  - Various definitions
  - Various units
- ✓ Focus on the **goal**
  - ✓ Specification of **level and kind of int. KPIs**
  - ✓ Agreement on the **type and scope of outcomes**

# We made a proposal how to achieve best possible international observation results

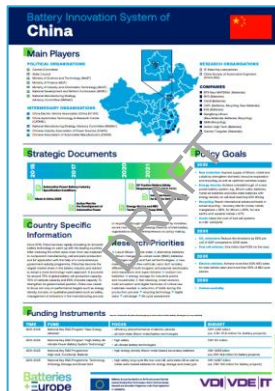
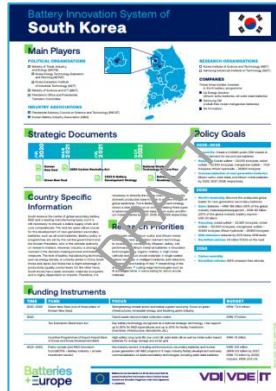
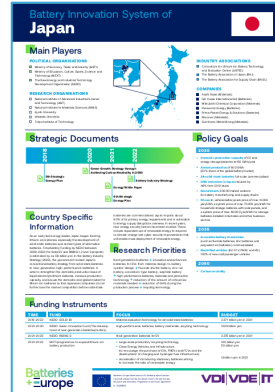
## Proposal:

- ✓ Focus on **strategic and high-level political KPIs** e.g. costs, recycling efficiency, sustainability, production, raw material strategy, reduction of energy consumption, etc.
- ✓ Deliver both **numeric** and **textual outcomes**
- ✓ Create a **matrix of national KPIs**
- ✓ Create a ranking of **R&D priorities**, a list of international **governmental activities** and their characteristics, an analysis of **funding instruments** and a list of **key actors and key innovators** by country
- ✓ Make **comparison** and **conclusions for EU**: Global if possible, otherwise bilateral

# We defined the timeline and outcome



# We consolidated the first results



Link:  
<https://batterieseurope.eu/results/international-observation>

# We unified the structure of the factsheets

Title and Country

Main Players

Categorisation and Links

Strategic Documents

Timeline and Links

Country Specific Information

Conclusions

Funding Instruments

Time/Fund/Focus/Budget

## Battery Innovation System of Japan

### Main Players

**POLITICAL ORGANISATIONS**

- Ministry of Economy, Trade and Industry (METI)
- Ministry of Education, Culture, Sports, Science and Technology (MEXT)
- The New Energy and Industrial Technology Development Organization (NEDO)

**RESEARCH ORGANISATIONS**

- National Institute of Advanced Industrial Science and Technology (AIST)
- National Institute for Materials Science (NIMS)
- Kyoto University
- Tohoku University
- Tokyo Institute of Technology

**INDUSTRY ASSOCIATIONS**

- Consortium for Lithium Ion Battery Technology and Business Center (CLITEC)
- The Battery Association of Japan (BAJ)
- The Battery Association for Supply Chain (BASC)

**COMPANIES**

- Aichi Kasei (Matsushita)
- GS Yuasa International Ltd (Yuasa)
- Mitsubishi Chemical Corporation (Mitsubishi)
- Panasonic Energy (Panasonic)
- Prime Planet Energy & Solutions (Mitsubishi)
- Resonac (Mitsubishi)
- Saitama Metal Works (Mitsubishi)

### Strategic Documents

**2018**

- 5th Strategic Energy Plan

**2020**

- Green Growth Strategy: Strongly Achieving Carbon Neutrality by 2050

**2021**

- Energy White Paper

**2022**

- 6th Strategic Energy Plan

**Policy Goals**

**2030**

- Domestic production capacity of EV and energy storage batteries at 500 GWh/year
- Annual production of 800 GWh (50% share of the global battery market)
- ABBU-60 cells batteries full-scale commercialized
- 50% cell cost to Japan not used by 40% from 2020 levels
- Recycle about 2,000,000 trained workers for battery manufacturing and recycling plants
- Prices for vehicle batteries at price of max. 30,000 yen/kWh, a system price of max. 70,000 yen/kWh for household storage batteries with 10% profit, and a system price of max. 30,000 yen/kWh for storage batteries enabled to increase another business sector.

**2035**

- Innovative battery cell and cells
- 50% for flexible batteries, and batteries and polymer ion batteries commercialized
- Identified as a key EV, FCV, PHV, and/or other 100% of new car/energy vehicles

**2050**

- 100% cell recyclability

### Country Specific Information

Batteries are commercialized. Japan imports about 90% of its primary energy requirements and is vulnerable to energy supply fluctuations overseas. In recent years, new energy security factors have been studied. These factors included use of renewable energy. It is required to stabilize energy and energy security environments that will enable the development of renewable energy.

As an early technology leader, Japan began leading lithium-ion devices, especially the development of solid-state batteries and on-chain types of alternative batteries. Collaborative Funding by NEDO between 2009-2022 (for Solid EV and R&D in Li and Farquads) is expected by ca. 500 billion yen in the Battery Industry Strategy (2022). The government revised Japan's comprehensive strategy from solid-state batteries to new-generation high-performance batteries. It aims to strengthen the domestic production of liquid electrolyte lithium batteries, increase production capacity and reduce the dependence on global markets for lithium-ion batteries so that Japanese companies do not become late the market competition before wide-scale.

### Research Priorities

New-generation batteries = innovative and enhanced batteries to cope from material design to battery system design. It should include the battery, cell-level battery, system-level battery, and the battery.

- High-performance batteries, materials and production technologies. It includes the amount of material materials needed, a reduction of CO2 during the production process, recycling technology.

### Funding Instruments

TIME	FUND	FOCUS	BUDGET
2016-2019	NEDO, JICA, etc.	Material innovation technology for all-solid-state batteries	2,271 billion yen in 2020
2020-2025	NEDO, Green Innovation Fund (The development of next-generation batteries)	High-performance batteries, battery materials, recycling technology	500 billion yen
2020-2025	NEDO, R&D-G-3	New-generation batteries for EV	2,200 billion yen in 2020
2020-2025	NET Program to support lithium-ion battery production	<ul style="list-style-type: none"> <li>■ Large-scale production (recycling) technology</li> <li>■ Cell-level production (recycling) technology</li> <li>■ Cell-level production (recycling) technology</li> <li>■ Cell-level production (recycling) technology</li> <li>■ Cell-level production (recycling) technology</li> </ul>	50 billion yen
		<ul style="list-style-type: none"> <li>■ Accumulation of innovative secondary batteries aiming to increase the rate of renewable energy</li> </ul>	138 billion yen in 2020

Map

Allocation Main Actors



Policy Goals

Defined Milestones


Link:  
<https://batterieseurope.eu/results/international-observation>

Research Priorities

Date

Conversion Rate

### Battery Innovation System of USA



**Main Players**

**Strategic Documents**

**Country Specific Information**


**Research Priorities**

**Main Funding Instruments**

Batteries + Europe

VDI | VDE | IT

### Battery Innovation System of Japan



**Main Players**

**Strategic Documents**

**Country Specific Information**


**Research Priorities**

**Funding Instruments**

Batteries + Europe

VDI | VDE | IT

### Battery Innovation System of Australia



**Main Players**

**Strategic Documents**

**Country Specific Information**


**Research Priorities**

**Main Funding Instruments**

Batteries + Europe

VDI | VDE | IT

### Battery Innovation System of South Korea



**Main Players**

**Strategic Documents**

**Country Specific Information**


**Research Priorities**

**Funding Instruments**

Batteries + Europe

VDI | VDE | IT

### Battery Innovation System of China



**Main Players**

**Strategic Documents**

**Country Specific Information**


**Research Priorities**

**Funding Instruments**

Batteries + Europe

VDI | VDE | IT

### Battery Innovation System of European Union



**Main Players**

**Strategic Documents**

**Region Specific Information**

**Research Priorities**

**Funding Instruments**

Batteries + Europe

VDI | VDE | IT



Link:  
<https://batterieseurope.eu/results/international-observation>



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<https://batterieseurope.eu/results/international-observation>

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# Batteries Europe Recap and Workplan

*Alessandro Romanello – EIT InnoEnergy*  
*Batteries Europe Coordinator*

[www.batterieseurope.eu](http://www.batterieseurope.eu)

 @BatteriesEurope



Batteries Europe Secretariat is a EU-funded project that has received funding from the European Union's Horizon Europe Research and Innovation Programme under Grant Agreement N. 101069676.

# *What we have done* in this first year of work and *what is next*



# One Year Achievements

## **Governance and Management-wise**

- BE Governance Terms of Reference
- Project management plan
- Risks management plan
- Communication plan

## **Content-wise**

- Road Map
- KPIs

## **Effort in harmonizing the Batt EU Ecosystem**

- Interaction with other EU Initiatives
- Integrated Working Groups & Task Forces
- Joint participation to Relevant Event

## **Reinforcing our Dissemination and Communication Capacity**

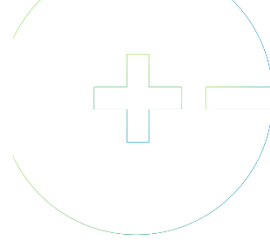
- New visual identity
- New website, creation of social media accounts
- Attraction of new experts

## **Contractual Compliance**

- BEST Project is delivering within budget and according to time schedule (12 Deliverables submitted out of 29)



# Governance and Management



## Governance

- **Integration of Working Groups** and Task Forces BE/BEPA
- Integration of key results of Batteries Europe with BEPA >> Resulting in **one single SRIA**
- **Integration of Task Forces** BE/BEPA
- Simplification of overall Platform structure:
  - One single Governing Body >> The **Steering Board**
  - No General Assembly but a **Plenary Session**
- BE Governance **Terms of Reference**

## Management

- New contractual legal base: **CSA**.
- Coordination of BEST Project according to **best practices** in project management:
  - Project management plan
  - Risk management plan
  - Communication plan
  - Data management plan
- Proceedings of all Batteries Europe Governing Bodies

# Content-wise

## What we issued in this first year

- **SRIA Template** > it provides guidelines for the drafting of the SRIA in terms of table of content, main areas of focus and length of the document
- **KPIs Benchmarking** > a first attempt in identifying the reference baseline values from 2023 and future expected values framed in 2027, 2030, 2035, 2050
- **Road Map** > Identification of Strategic Research Area to support Industrial scale up and competitive advantage



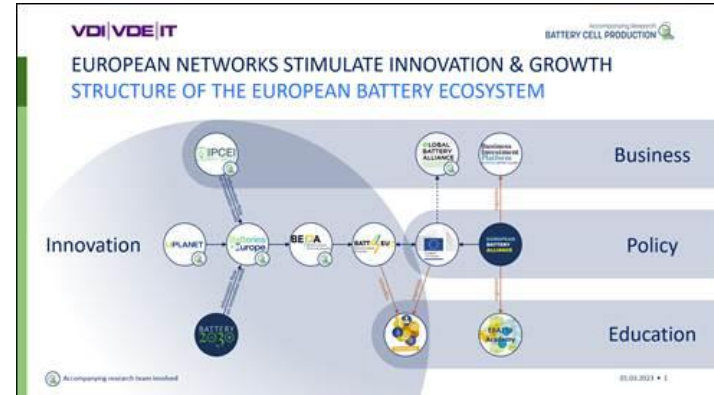
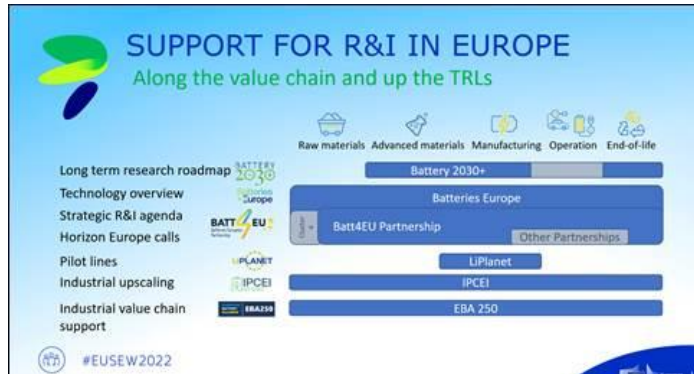
Batteries Europe Secretariat is a EU-funded project that has received funding from the European Union's Horizon Europe Research and Innovation Programme under Grant Agreement N. 101069676.



# Effort in harmonizing the Batt EU Ecosystem

We are working towards a more integrated Battery EU Ecosystem

- This process started 1 year ago with the decision of establishing **BE/BEPA Integrated Working Groups and Task Forces**
- Since then, we are working in close collaboration with **BEPA, Batt2030+, EBA250 and LiPlanet** and we manage to maximize the impact of our work, improving complementarity and reducing double work
- A number of Strategic events have been jointly attended and co-organized, among others: **EUSEW 2022/23, BID 2022 and TRA2022**
- More can be done and we are currently discussing the best way to **communicate strategic common messages** as the EU R&I Batt Community.



## Batteries Ecosystem in few Words



Think tank on European Battery Research



Prioritizing R&I activities and shaping HEU Call topics (together with EC)



Inventing the Sustainable battery of the Future



Supporting the creation of a European battery industry



R&I and first commercial deployment projects

# Reinforcing our Dissemination and Communication Capacity



Media corner

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Members area

About us

Workstream Bodies

Results

News & events



in



Batteries Europe is the platform bringing together all relevant stakeholders in the European batteries research and innovation ecosystem in order to develop and support a competitive battery value chain in Europe.



Discover more

## News

Batteries Europe publishes the Safety Key Performance Indicator "to be used as a guidance for EU R&I actions"

## Upcoming event

IEA 8th Annual Global Conference on Energy Efficiency

# Reinforcing our Dissemination and Communication Capacity

**Batteries**  
+ **Europe**

The integrated Task Forces, in collaboration with BEPA, are open to experts and have the goal to address key challenges of cross-cutting topics and contribute to the strategic documents of Batteries Europe, in close cooperation with the Working Groups.



**Batteries**  
+ **Europe**

6 Integrated Working Groups, in collaboration with BEPA, covering key R&I areas to achieve a competitive, sustainable European battery industrial manufacturing capability, enabling zero-emission mobility and renewable energy storage integration.

Let your ideas get the attention they deserve!



**Batteries**  
+ **Europe**



New and emerging technologies



Raw materials and recycling



Advanced materials



Cell design and manufacturing



Mobile Application and integration



Stationary Application and integration

**BEPA**  
Batteries European  
Partnership Association

# Reinforcing our Dissemination and Communication Capacity

## Attraction of new Experts Campaign

Since September 2022..

**+48** Working Group Experts

**+85** Task Force Experts

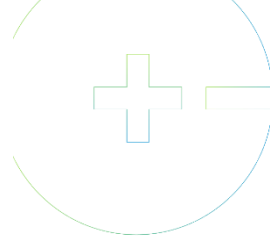
A graphic illustration on a blue background. It features several stylized battery icons with green and black segments, connected by thin blue lines representing a circuit. There are several yellow plus signs scattered throughout the design. In the top left corner, the "Batteries + Europe" logo is displayed. Below the logo, there is a white rounded rectangle containing the text "Join our community".

**Batteries + Europe**

Experts across the entire battery value chain collaborate with Batteries Europe integrated Working Groups and Task Forces on cross-cutting topics. We create technology roadmaps, position papers, reporting methodologies and quantify current Key Performance Indicators serving as guidance for stakeholders in the battery community to adjust their further development efforts.

Join our community

# Contractual Compliance



**BEST Project is delivering on time and within budget**

**12** Deliverables submitted out of **29**. No Deliverables pending

Work Pa	Delivera	Deliver	Deliverable Name	Description	Lead	Type	Dissemir	Due Dat ▲	New Due D.	Delivery Da	Approval Date	Status	
WP1	D1.1	D1	Project Management Plan	The project management plan will describe how t...	KIC S	R	PU	31 Jul 20;		29 Jul 20;		Submitted	
WP1	D1.3	D3	Risk Management Plan	Risk assessment including risks foreseen, estim...	KIC S	R	R-UE/E	31 Jul 20;		31 Jul 20;		Submitted	
WP6	D6.1	D24	Plan for Communication, i	A Communication and Dissemination Master Plan t...	CLER	R	SEN	31 Jul 20;		29 Jul 20;		Submitted	
WP6	D6.2	D25	Update of Batteries Europ	Deliverable 6.2 is designed to support the outr...	CLER	DEM	SEN	31 Jul 20;		31 Aug 20		Submitted	
WP2	D2.1	D6	Batteries Europe Governai	A ToR document will be prepared for each Govern...	ZAB/	R	PU	31 Aug 20;		16 Sep 20		Submitted	
WP1	D1.2	D2	Data Management Plan	Plan describing the data management life cycle ...	ZAB/	R	PU	31 Oct 20		31 Oct 20		Submitted	
WP3	D3.1	D10	Templates for Roadmaps a	The aim of this deliverable is to create a comm...	SINT	R	SEN	31 Oct 20		31 Oct 20		Submitted	
WP3	D3.6	D15	KPIs Benchmarking & Targ	The scope of this deliverable is to define set ...	CIC E	R	PU	31 Oct 20		02 Feb 20		Submitted	
WP6	D6.3	D26	Batteries Europe video	The video aims to communicate the role of the p...	CLER	DEC	PU	31 Oct 20		28 Oct 20		Submitted	
WP3	D3.2	D11	Delivery of the European !	The aim of these deliverables (2 reiterations) ...	SINT	R	PU	31 Jan 20		30 Jan 20		Submitted	
WP2	D2.2	D7	Proceedings of all Batteri	The document will describe and gather the relev...	ZAB/	R	SEN	30 Apr 20		27 Apr 20		Submitted	
WP6	D6.4	D27	Communication and disse	The communication activities reports will prese...	CLER	R	PU	30 Apr 20		25 Apr 20		Submitted	
WP3	D3.4	D13	R&I Roadmaps & Roadmap	The aim of this deliverable is to create and d...	SINT	R	PU	31 Jul 20;				Pending	

Validate

# What Next



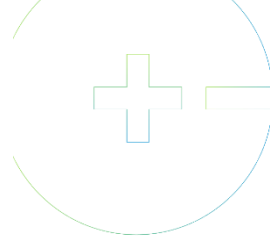
## **Governance and Management-wise**

- Project management plan update
- Proceedings of BE Governing Bodies

## **Content-wise**

- Strategic Research and Innovation Agenda
- KPIs update
- Position Paper on Cross Cutting Topics
- Overview of International RDI Funding and International Benchmark
- Guidelines on Common Reporting Methodologies

# Governance and Management



## Management

- To secure a controlled management of BEST Project that is supporting the existence of the Platform Batteries Europe, the Secretariat will rely on **best practice on project management**. In continuation of such work, BEST Consortium will deliver:
  - Updated version of the **Project Management Plan**
  - Updated version of the **Proceedings of all Batteries Europe Governing Bodies**
  - Updated version of the **Communication and Dissemination Report**



# Content-wise

## More will be delivered by Batteries Europe Community

- **SRIA** (under the lead and in collaboration with BEPA). September 2023
- Update of **KPIs Benchmarking**. September 2023
- **Position Papers** on Cross Cutting Topics. April 2024
- Overview of **International RDI Funding and International Benchmark** (Preliminary work presented today by VDI-VDE-IT). April 2024
- Guidelines on **Reporting Methodologies**. December 2024
- **Updated Road Map**. January 2025



# Battery Innovation System of Japan



## Main Players

### POLITICAL ORGANISATIONS

- Ministry of Economy, Trade and Industry (METI)
- Ministry of Education, Culture, Sports, Science and Technology (MEXT)
- The New Energy and Industrial Technology Development Organisation (NEDO)

### RESEARCH ORGANISATIONS

- National Institute of Advanced Industrial Science and Technology (AIST)
- National Institute for Materials Science (NIMS)
- Kyoto University
- Waseda University
- Tokyo Institute of Technology



### INDUSTRY ASSOCIATIONS

- Consortium for Lithium Ion Battery Technology and Evaluation Center (CBTEC)
- The Battery Association of Japan (BAJ)
- The Battery Association for Supply Chain (BASC)

### COMPANIES

- Asahi Kasei (Materials)
- GS Yuasa International Ltd (Batteries)
- Mitsubishi Chemical Corporation (Materials)
- Panasonic Energy (Batteries)
- Prime Planet Energy & Solutions (Batteries)
- Rosoco (Materials)
- Sumitomo Metal Mining (Materials)

## Strategic Documents



## Country Specific Information

As an early technology leader, Japan began funding lithium-ion batteries, especially the development of solid-state batteries and certain types of alternative batteries. Total battery funding by NEDO between 2009-2022 for Solid EV and R&D (1, 2 and 3 projects) is estimated by ca. 58 billion yen. In the Battery Industry Strategy (2022), the government revised Japan's conventional battery strategy from solid-state batteries to new-generation high-performance batteries. It aims to strengthen the domestic production base of liquid-electrolyte lithium batteries, increase production capacity, and secure the domestic and global market for lithium-ion batteries so that Japanese companies do not further lose the market competition before solid-state

batteries are commercialised. Japan imports about 90% of its primary energy requirements and is vulnerable to energy supply disruptions overseas. In recent years, new energy security factors have been studied. These include expanded use of renewable energy to respond to climate change and cyber security improvements that will enable mass deployment of renewable energy.

## Research Priorities

Next-generation batteries → Innovative and enhanced batteries for EVs from material design to battery system design → Fluoride solid-state battery, zinc-air battery, conversion-type battery, sulphide battery → High performance batteries, materials and production technology → reduction of the amount of critical raw materials needed → reduction of GHG during the production process → recycling technology

## Policy Goals

- 2030**
  - Domestic production capacity of EV and energy storage batteries at 150 GW/year
  - Annual production of 500 GWh (20% share of the global battery market)
  - All solid-state batteries full-scale commercialised
  - GHG emissions in Japan reduced by 46% from 2013 levels
  - Recruitment: 30,000 trained workers for battery manufacturing and supply chain
  - Prices in vehicle battery packs price of max. 10,000 yen/kWh, a system price of max. 700,000 yen/kWh for household storage batteries with solar panels, and a system price of max. 60,000 yen/kWh for storage batteries installed in factories and other business sectors
- 2035**
  - Innovative battery chemistries (such as fluoride batteries, zinc batteries and polyanion battery) commercialised
  - Electrified vehicles (EV, FCV, PHEV, and HEV) 100% of new and passenger vehicles
- 2050**
  - Carbon neutrality

## Funding Instruments

TIME	FUND	FOCUS	BUDGET
2009-2022	NEDO SOLID-EV	Material evaluation technology for all-solid-state batteries	2,571 billion yen in 2021
2021-2030	NEDO Green Innovation Fund (The development of next-generation batteries/vehicles)	High-performance batteries, battery materials, recycling technology	10.5 billion yen
2021-2025	NEDO RISING-B	Next-generation batteries for EV	2,975 billion yen in 2021
2021-2022	METI programmes to expand lithium-ion battery production	<ul style="list-style-type: none"> <li>• Large-scale production/recycling technology</li> <li>• Clean Energy Vehicles and Infrastructure (to encourage the purchase of EVs, PHEVs and FCVs and the development of charging and hydrogen fuel infrastructure)</li> <li>• Acceleration of introducing stationary batteries aiming to increase the ratio of renewable energy</li> </ul>	10.0 billion yen 53 billion yen 13 billion yen in 2021



Batteries Europe (Batteries+) is a EU-funded project that has received funding from the European Union's Horizon Europe Research and Innovation Programme under Marie Skłodowska Curie Grant 101019162.



# Batteries + Europe

Thank you for your attention!

[www.batterieseurope.eu](http://www.batterieseurope.eu)

 @BatteriesEurope



Batteries Europe Secretariat is a EU-funded project that has received funding from the European Union's Horizon Europe Research and Innovation Programme under Grant Agreement N. 101069676.

## Wrap-up and closure of the Meeting

*Stefano Saguatti (BE Advisory Steering Board Member - MANZ)*



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[www.batteries-europe.eu](http://www.batteries-europe.eu)

 @BatteriesEurope

## Tomorrow: BE/BEPA Working Group Meetings

WG:	WG1	WG2	WG3	WG4	WG5	WG6
Where	EIT House	EIT House	SINTEF	SINTEF	EIT House	EIT House
	Rue Guimard 7	Rue Guimard 7	Rue Guimard 9	Rue Guimard 9	Rue Guimard 7	Rue Guimard 7
When:	Meeting: <b>9.00-10.30</b> , Brunch 10.30-11.30	Meeting <b>11.00-12.30</b> , Lunch 12.30-13.30	Meeting: <b>9.00-10.30</b> , Brunch 10.30-11.30	Meeting <b>11.00-12.30</b> , Lunch 12.30-13.30	Meeting: <b>9.00-10.30</b> , Brunch 10.30-11.30	Meeting <b>11.00-12.30</b> , Lunch 12.30-13.30

Keep your badge!



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