

# ADVANCED MATERIAL FOR BATTERIES PARTNERSHIP – AMBP

*Cross-Regional Innovation Partnership falling under the Thematic Smart Specialisation  
Platform on Industry Modernisation*

## ***AMBP at a Glance***

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### **Coordinator**

Dr. Emmanuel Boudard  
Co-Founder, N-ABLE  
[Emmanuel.boudard@n-able.io](mailto:Emmanuel.boudard@n-able.io)  
[www.n-able.io](http://www.n-able.io)  
+33 628 078 976



### ***Purpose:***

*This “AMBP at a glance” is extracted from the Scoping Note of the AMBP Partnership. It shall provide a clear picture of where the Partnership stands in terms of scope and activities as well as process-wise. The scoping Note is a living document formalizing the state of play. It will be updated along the progress of the Partnership.*

## 1. Introduction to the process

The Advanced Materials for Batteries Partnership (AMBP) is the “interregional partnership on batteries” put forward by the European Battery Alliance (EBA 250) in its action plan.

The AMBP Partnership was launched on 8 October 2018 in Brussels, by three leading regions: West Slovenia (coordinator), Andalusia, and Castile and Leon. The Partnership facilitates the development of innovation investment projects through interregional cooperation. The process is bottom-up, open, inclusive and based on a transparent governance.



The role of the European Commission is to facilitate the process through dedicated EU actions and specialized experts. It has setup three Thematic Smart Specialisation Platforms (managed by the Joint Research Centre, Institute for Prospective and Technological Studies) on: Industry Modernisation, Agri-Food, and Energy. The AMBP Partnership is one of 21 partnerships under the Industry Modernisation platform<sup>1</sup> and benefits from this support.

## 2. The AMBP Partnership ambition and achievements

The AMBP Partnership has defined its ambition and taken steps to achieve it.

**AMBP ambition.** The future of the battery market is expected to reach a yearly level of €250 billion from 2025 onwards, offering the opportunity of creating 4-5 million jobs<sup>2</sup>. Regional actors are willing to act together to combine their forces to create jobs. The AMBP Partnership aims to take stock of this opportunity and accelerate the volume manufacture and deployment of advanced materials and battery cells with a 2025 Horizon. We work toward the generation of a pipeline of business investment projects and build upon existing regional assets to leverage complementary assets across the Partnership.

Failing to do so would translate in many jobs lost in Europe for the transportation sector (jobs currently devoted to manufacturing the engine and its components) because the battery captures 40% of the value of the product (cars, trucks, boats, bicycles, etc..). In addition, manufacturing electrical vehicles (or trucks, boats, etc..) need far less manpower than a conventional vehicle (automotive suppliers are already closing some of their plants) because components of an electrical vehicle are simpler (the electrical engine is far simpler than the diesel or gasoline engines).

As there is a lack of integration of value chain segments across regions, collaboration is needed by linking complementary competences across regions. It is also necessary to reach a critical mass of investment which is lacking while batteries are an expensive technology field with very high levels of capital expenditures (e.g. a Gigafactory cost is about 1 billion with 50% depreciation after 2 years), double-spending (many regional actors), sub-critical investments in innovation (China, Japan and Korea are leading the sector), and information asymmetries at many levels (technology watch, players not knowing each other, market intel, etc.).

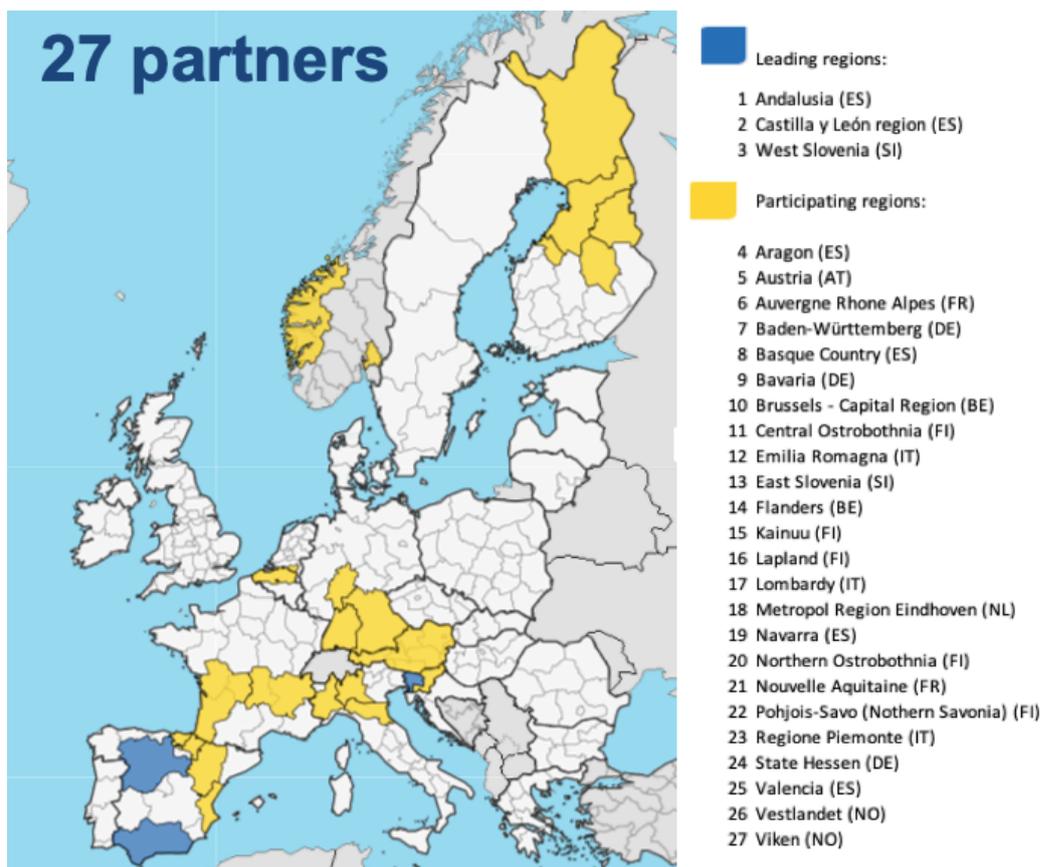
<sup>1</sup> <https://s3platform.jrc.ec.europa.eu/batteries>

<sup>2</sup> Source: <https://www.eba250.com>

**Steps taken so far.** The preliminary steps known as “learn” and “connect” phases were conducted. They included the following activities (selection):

1. Mapping of key capabilities and areas of common interest;
2. Scoping meetings with 38 representatives on 22 & 23 January 2019;
3. Four thematic areas meetings (May-June);
4. Aligning with other EU battery initiatives both at national and EU levels: such as the Important Project of Common European Interest (IPCEI) on batteries, or the EBA 250, ETIP/previously SET-Plan Working Group on Batteries, battery 2030+, ERRIN Energy Working Group, Alistore ERI Community, EIT KIC Raw Material or Inno Energy, etc.
5. Multiple bilateral and group interactions;
6. Several notes and reports including the scoping note.

**Geographical Coverage.** The number of regions committed to the Partnership grew from 8 (October 2018) to 27 (August 2019). Few more regions are under discussion<sup>3</sup> depending on the project developed where stakeholders may seek the adhesion of their region to be able to participate in the business cases (for example, Extremadura (ES), and Västerbotten (North Sweden have expressed their interest).



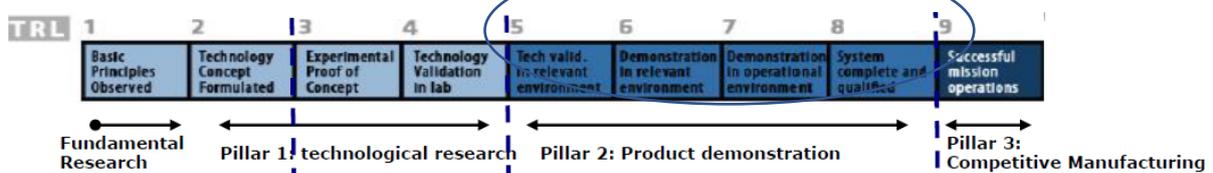
Source: <https://s3platform.jrc.ec.europa.eu/batteries>

<sup>3</sup> The partnership is open to all regions willing to join providing they sign the ‘letter of intent’ and fill in the short mapping as the Partnership includes/covers only some of the capabilities necessary to achieve its current goals. We are open to any other capability needed/ identified along the way. Many more stakeholders / regions could be involved.

**Achievements.** The Partnership has identified and reported:

- Driving challenges and resulting Mission, Vision, and Rationale;
- 6 priority thematic areas and their description;
- A first batch of more than 10 investment projects, some of them being further developed into fully-fledged cross-regional innovation investment plans.

**Each investment project** should comply with a set of minimum requirements: a minimum Technology Readiness Level (TRL) of 5 or 6 to technically reach a TRL 8, commercialisation reached in the end of the project (TRL9), be industry-driven, be based on a cross-regional setting with triple helix organisations from at least 3 Member States, and demonstrate cross-regional added value.

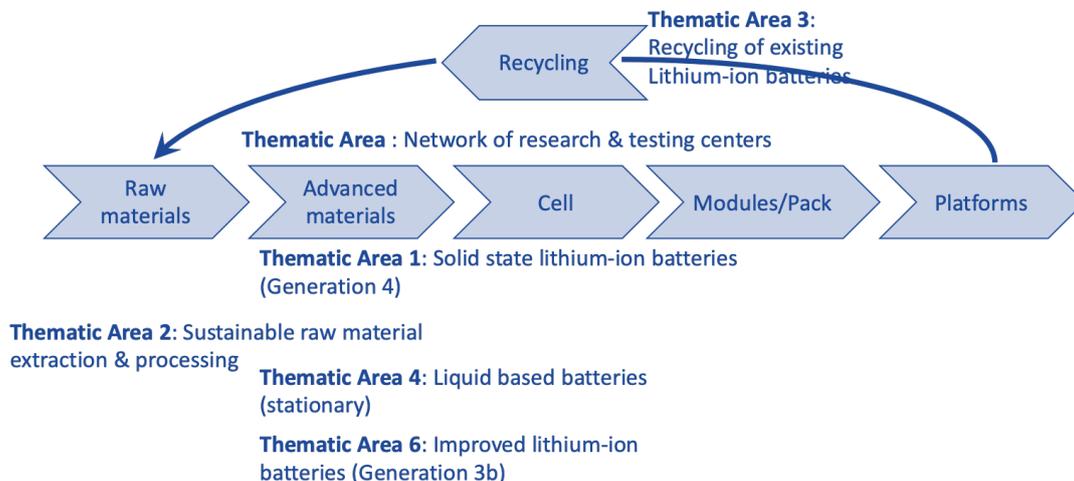


The goal is to create synergies between private and public investments to commercialise and scale-up interregional innovation projects.

### 3. The AMBP thematic areas and projects

The AMBP Partnership has identified 6 Priority thematic areas (also called Pilots). Each thematic area consists in an application area in which innovation investment projects are delineated and operationalised with industry.

**Complementary:** the Partnership complements other EU initiatives to achieve a complete battery value chain in Europe (e.g. the European Battery Alliance and the Important Project of Common European Interest - IPCEI). The Partnership will **add value** by developing key components in the value chain through **cross-regional collaboration** (raw materials, active materials, battery cells components, and recycling). The graph below positions the thematic areas to achieve a comprehensive battery value chain in Europe.



The Priority thematic areas, and the projects under development currently are the following:

**Thematic area 1: Solid state lithium-ion batteries (Generation 4) (Lead Region: Bavaria)**  
**Thematic area 6: Improved lithium-ion batteries (Generation 3b) (Lead Region: Auvergne Rhône Alpes)**

These areas are looking at increasing scale with improved productions processes. The main objective is to reduce the cost of battery components.

Project description thematic areas 1 & 6	Timeline
<p><b>Efficient manufacturing process for customised alumina for Li-ion batteries</b></p> <p>The project will provide a more efficient alumina manufacturing process to better address the increasing batteries market. The focus will be on the dehydration step with a breakthrough micro-wave technology demonstrated through a preliminary project</p>	36 months
<p><b>Artificial graphite for battery anode material</b></p> <p>The project will adapt a very efficient LWG-Castner graphitization technology to develop a low-cost, scalable, with low CO2 footprint, anode production in Europe. Currently, European producers of anode use natural graphite, or artificial graphite made with poor energy performing Acheson technologies. As the automotive manufacturers request low prices, an efficient graphitization process provides an important opportunity. In addition, artificial graphite has better properties compared to natural graphite: artificial graphite cycle life can be twice long as natural graphite, has better purity (99.99 % VS 99.5 %), it is not necessary to round or to coat it, and it has better swelling resistance.</p>	36 months
<p><b>Modular processing platform (MPP) for Gen4</b></p> <p>The project will develop a modular technology platform for the production of the next generation of polymer solid-state batteries (Gen4a). This generation of batteries will provide at least 2x energy density (volumetric), no toxic substances, not flammable (safer and no need for strong cage), and mass-manufacturing processes based on current polymer processes. The project will enable an automated, standardized facility for the polymer solid-state batteries manufacturing and a small series production of Solid-State Battery cells (~ 1 Ah, 500 Wh/l)</p>	36 months
<p><b>Battery Module Manufacturing Enabling Technologies</b></p> <p>No description available yet</p>	-
<p><b>In process Testing for electrodes, cells and assembly</b></p> <p>No description available yet</p>	-
<p><b>NextBatt4EU (Next battery for Europe) -Novel anode and cathode materials for 3b generation of lithium-ion batteries</b></p> <p>The project aims to produce new breakthrough anode and cathode materials in order to secure and diversify European battery supply chain. This project brings together two emerging material suppliers and an industrial battery supplier for electric mobility and stationary applications. The anode will be an innovative silicon-based composites into the anode material battery market, while the cathode will be an innovative cobalt free cathode. The result will be higher energy density Gen 3B lithium-ion pouch cells &gt;800 Wh/l (at the cell level).</p>	36 months

**Thematic area 2: Sustainable Raw Material, Extraction and Processing (Lead Region: Castilla y León)**

This area is looking into the sourcing raw materials in Europe that are usually sourced from elsewhere – countries such as Congo for Cobalt (linked to children mining), or Asian countries owning high share of key materials–.EU extraction would provide a responsible and

environmentally friendly supply chain through advanced technics (to comply with EU and national regulations).

Project description thematic area 2	Timeline
<b>Projects under development</b>	-

### Thematic area 3: Recycling of existing Lithium Ion Batteries (Lead Region: Bavaria)

This area is about developing a safe collection chain for increasing the percentage of recycled batteries and increasing the level of recycled materials (from few key minerals to most of the components).

Project description thematic area 3	Timeline
<b>Tracing / transportation of recycled LiB</b> No description available yet	-
<b>Developing and commercialising shredding and separation processes for sustainable, local battery recycling.</b> No description available yet	24-36 Months

### Thematic area 4: Liquid based batteries (stationary) (Lead Regions: Basque/ Valencia)

This area is looking at increasing scale with improved productions processes for stationary applications (bigger batteries).

Project description thematic area 4	Timeline
<b>Develop and upscale Zn-air batteries</b> Zinc air batteries are currently used in stationary applications due to their lower specific power (W/L) compared to current lithium technology state-of-art. This project will look at combining Zn-air technology (high energy) with Li-ion technology (high-power). The combination of both technologies has the potential to decrease the cost of batteries for both stationery and mobility applications. Zn-air batteries have received much interest in recent years due to their high energy density (6,100 Wh/L and 1,100 Wh/kg), very low potential product cost (< 10\$/kWh3), flat discharge voltage of 1.35 V, environmentally friendliness (zinc is abundant in nature and the active material at the cathode is oxygen from the air), safe and economic viability. However, Zn-Air battery have a poor cyclability compared to the theoretical possibilities (1,200 Wh/kg and 6,100 Wh/L).	36 months

### Thematic area 5: Network of research & testing centers (Lead Region: West Slovenia)

This area intends to provide comparable tests and performance measurements across various active materials and batterie technologies.

Project description thematic area 5	Timeline
<b>Network of prototyping &amp; testing centres</b> The main objective is to provide multi-point access to the equipment needed for faster deployment of advanced materials along with advanced testing centres (equipment and knowhow). Having unified procedures for testing, comparing various technologies on the same metrics would provide a better chance to establish European production facilities of cells	5 years

#### 4. Next steps

**Current 'stage' of the Partnership** (Learn, Connect, Demonstrate, Commercialise, Upscale): currently at the edge between Connect and Demonstrate stages as we are developing the business plans. The Partnership may end with the commercialise stage, should regional financial support be granted at some point but without it, no commercialisation could be expected as support to cross-regional activities would be needed.

**The main next steps.** They are anticipated as follows:

- Finalise project description for the above projects (and/ or possibly others new) – this is the on-going phase which should be brought to full speed with European Commission financial modelling support (to operationalise the investment plans);

The description of an investment project shall depict elements such as...

- Scope (coverage, ambition, market)
- Activities (project description, operations, planning, risks)
- Basic financials (costs, income, revenue generation, impacts, funding **and** financing)
- Organisational modalities (partners, structure, timeline, quality)
- Cross-regional added value (additionality, hurdles...)

- Prepare commitments which has been made from each partner: commitments are currently indicative as no formality was operated yet (no contractual arrangement, MoU, NDA, etc.). This work will take off in the coming weeks as investment project leads are now developing baseline cases to be further operationalised into business plans (September/October).
- Pursue regional meetings (brokerage events) to attract private stakeholders and build the portfolio of projects. The next meeting is planned in Slovenia next October 1<sup>st</sup>.