European Battery Alliance

Deliverable:

Report on strategic importance of raw materials mining in Europe

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Status

☒ Final	
☐ In Progress. Please explain:	☐ Iterative Process – This year's results have been 100% achieved. ☐ Delay – This year's results were not fully achieved.

Tracking Changes

Level of Dissemination

☒ EIT and InnoEnergy
☐ Public

Author(s)

	[Official Name KIC Partner]	[Name and Surname]
Main Author	KIC InnoEnergy	Laura Perez Casado
Contributor	KIC InnoEnergy	Ilka Von Dalwigk

Executive Summary

Access to sustainable raw materials for batteries raw materials is paramount for a resilient European battery value chain. Advanced (Li-ion) battery technology is currently the main choice for electro-mobility and expected to dominate the market in the coming years. Various raw materials are required in lithium-ion batteries including lithium, cobalt, nickel, manganese, graphite, silicon, copper and aluminum. The supply of some of these materials, in particular cobalt, natural graphite and lithium, is of concern today and for the future in view of the large quantities needed and/or very concentrated supply sources. The sustainability of the extraction and exploitation of these resources is fundamental, and recycling of materials will increasingly become important for diversifying the EU's supply and should continue to be encouraged in the context of the transition to a circular economy.
EIT InnoEnergy has been engaged in various activities addressing the topic of the strategic importance of raw materials mining in Europe.

In this document, there will be specific focus on the general activities analyzed on a high level to show the progress throughout the year 2020.

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Abbreviations and Acronyms

Table 0-1 Acronyms

ASIDI	Average System Interruption Duration Index
BAU	Business as usual
CAPEX	Capital expenditures
CBA	Cost Benefit Analysis
DER	Distributed Energy Resources
DMS	Distribution Management System
DSO	Distribution System Operator
EC	European Commission
EEGI	European Electricity Grid Initiative
EU	European Union
FD	Fault Detection / fault detector
EBA	European Battery Alliance
ERMA	European Raw Materials Alliance
EV	Electric Vehicle

1 Introduction

The European Battery Alliance (EBA) officially launched by Vice-President Maroš Šefčovič in charge of the Energy Union on October 11th 2017, intends to act as a call addressed to the European industry to seize the opportunity of a technology, namely Battery, that will be at the core of the energy transition. The main goal of the EBA is indeed to create the necessary momentum to support the European Industry in the field of safe and sustainable batteries which could amount to 250 b€ of an annual European market by 2025 (that covers the needs all along the value chain from access to raw and refined materials for cell production all the way to repurposing and recycling), and make European champions emerge as a credible alternative to North American and Asian players and to eventually avoid the risk for Europe to become fully dependent of foreign batteries.

This report covers the topic of the strategic importance of mining the raw materials for battery manufacturing in Europe, compared to China and other countries, from political, environmental and supply chain perspective.

1.1 Background

Following-up the political launching of the EBA, Vice-President Šefčovič gave mandate to EIT InnoEnergy to mobilize and steer the industry towards the delivery of first recommendations on enabling framework conditions to create a pan-European and cross-sectoral batteries ecosystem, capable of converting a technological leadership into competitive products and services. These recommendations formulated by the so-called EBA@250, the industrial workstream of the EBA led by EIT InnoEnergy, notably contributed to the Strategic Action Plan on Batteries issued by the European Commission in May 2018. In practice, this process thus gave birth to a reinforcing and growing industrial ecosystem of stakeholders coming from the entire battery value chain and driven by the shared ambition of making Europe one major stakeholders in the Batteries sector in the coming years (see Figure 1).

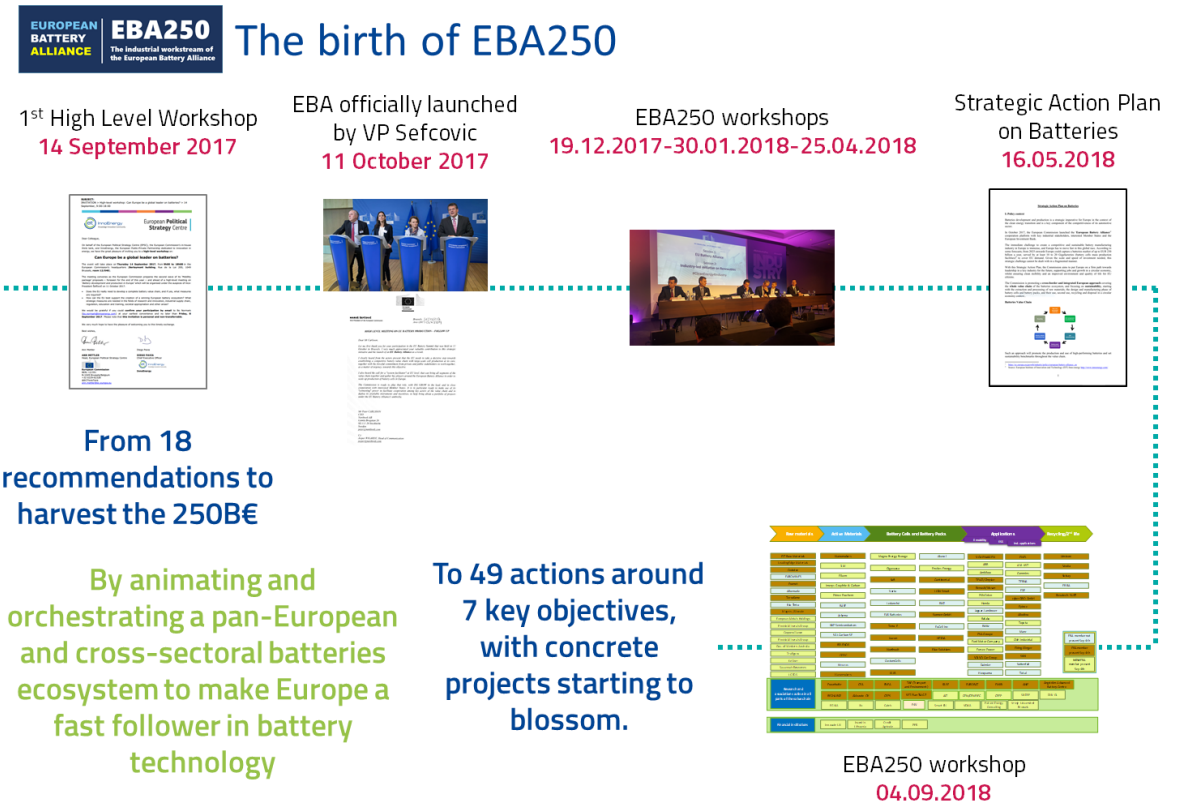


Figure 1. The birth of EBA250

The main idea behind development of EBA is to provide a framework that includes secure access to sustainable raw materials, support for technological innovation and consistent rules on battery production. The immediate objective is to create a competitive manufacturing value chain in Europe with sustainable battery cells at its core. To prevent a technological dependence on our competitors and capitalize on the job, growth and investment potential of batteries, Europe has to move fast in the global race. According to some forecasts, Europe could capture a battery market of up to €250 billion a year from 2025 onwards. Covering the EU demand alone requires at least 10 to 20 'giga factories' (large-scale battery cell production facilities), that is the reason why there is a requirement of a combined effort to address this industrial challenge.

In Figure 2, one can see the different key players for each step of the value chain when it comes to the production of batteries.

Figure 2. Number of key players representing the different parts of the battery value chain

Within the strategic action plan for batteries defined by the European Commission, a comprehensive set of concrete measures were adopted to develop an innovative, sustainable and competitive battery "ecosystem" in Europe. The plan aims to:

- Secure access to raw materials for batteries from resource-rich countries outside the EU and facilitate access to European sources of raw materials, as well as access secondary raw materials by recycling in a circular economy of batteries
- Support scaled European battery cell manufacturing and a full competitive value chain in Europe. the Alliance is bringing key industry players and national authorities together and work in partnership with EU countries and the EIB to support integrated (cross-border) manufacturing projects at scale
- Strengthen industrial leadership through accelerated research and innovation support to advanced (e.g. Lithium-ion) and disruptive (e.g. solid state) technologies
- Develop and strengthen a highly skilled workforce along the whole value chain to close the skills gap. This includes providing adequate training at EU and country level, re-skilling and upskilling, and making Europe attractive for world-class experts in the field
- Support the sustainability of EU battery cell manufacturing industry with the lowest environmental footprint possible. This entails setting requirements for safe and sustainable battery production in Europe

- Ensure consistency with the broader EU regulatory and enabling framework (Clean Energy Strategy and Mobility Packages, trade policy, etc.)

1.2 Scope of the document

The main aim of this deliverable is to document the projects in which the European Battery Alliance has been working on during the year 2020 related to the strategic importance of raw materials mining in Europe.

1.3 Structure of the document

The document comprises the most important projects that the European Battery Alliance has decided to focus on during 2020. In order, the above-mentioned projects will be presented:

- Pipeline of business opportunities
- Mobilising key stakeholders as a response to China's proposal for a new ISO Technical Committee to develop standards for lithium (ISO/TSP 284)
- Support in different external activities

2 Raw materials for a sustainable and resilient battery value chain as top priority

The value chain approach has been the signum of the EBA250. For the growth of a resilient European battery value chain, the development of a domestic supply chain is key. This topic has been highlighted in all EBA stakeholder workshops since the start, and specifically in a dedicated workshop during 2020.

To make the entire battery value chain truly sustainable, sustainability and ethical sourcing are important aspects in the extraction of raw materials. The production of battery raw materials is today energy-intensive and far too often connected with impacts on the local environment and poor labour conditions. In Europe, it is possible to impose high requirements on the entire supply chain if this new industry is built up with sustainability as a guiding principle while stimulating demand for sustainably produced batteries.

Europe is already today well equipped to source those materials with high environmental and ethical standards to a large extent within Europe. The proposed mandatory due diligence for battery materials in the recently presented battery regulation is another important tool to guarantee sustainable and ethical sourcing- also for raw materials sourced outside of Europe.

Additionally, in Europe, the environmental advantages can be further improved by extracting raw materials in fully electrified mines and through efficient recycling processes. However, these aspects are not part of this deliverable.

It should be noted that the EU today produces only 1% of all battery raw materials overall. 54% of global cobalt mine production is originated from the Democratic Republic of the Congo, followed by China (8%), Canada (6%), New Caledonia (5%) and Australia (4%). Refined cobalt production comes from China (46%), Finland (13%), Canada and Belgium (both 6%). Around 90% of global lithium mine output is produced in Chile (40%), Australia (29%) and Argentina (16%), mostly from brine and spodumene sources. China (45%) hosts the majority of the world's lithium hard-rock minerals refining facilities. Chile (32%) and Argentina (20%) dominate refined lithium capacity from brine operations (EC, 2019). Cobalt, natural graphite, and lithium are listed as critical in the 2020 list of CRMs for Europe.

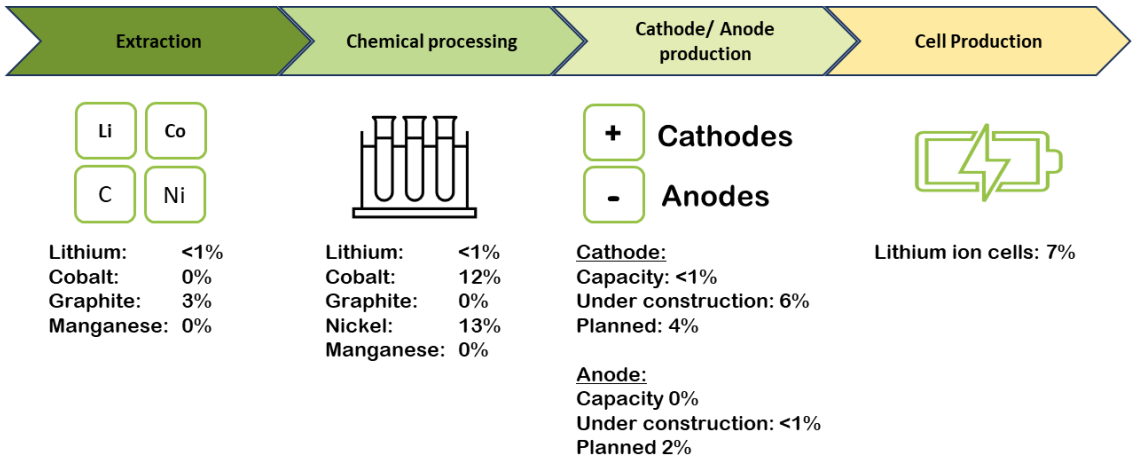


Figure 3. Europe's lithium ion supply chain capacity in 2020: Source Benchmark Minerals

The growing demand for battery raw materials and other metals and minerals needed for the green transition already had positive affects on the mining community. The Fraser Institute's 2019 annual survey of mining and exploration companies ranked Europe as the most attractive region in the world for mining investments. However, the fast-growing demand for batteries will affect the supply side, especially access to raw materials risks to become a bottleneck for the growing battery industry in Europe.
In order to meet the rapidly growing demand, mining operations need to be accelerated in Europe. Especially given the fact that new mining operations take much longer time to be build than a battery or car plant.

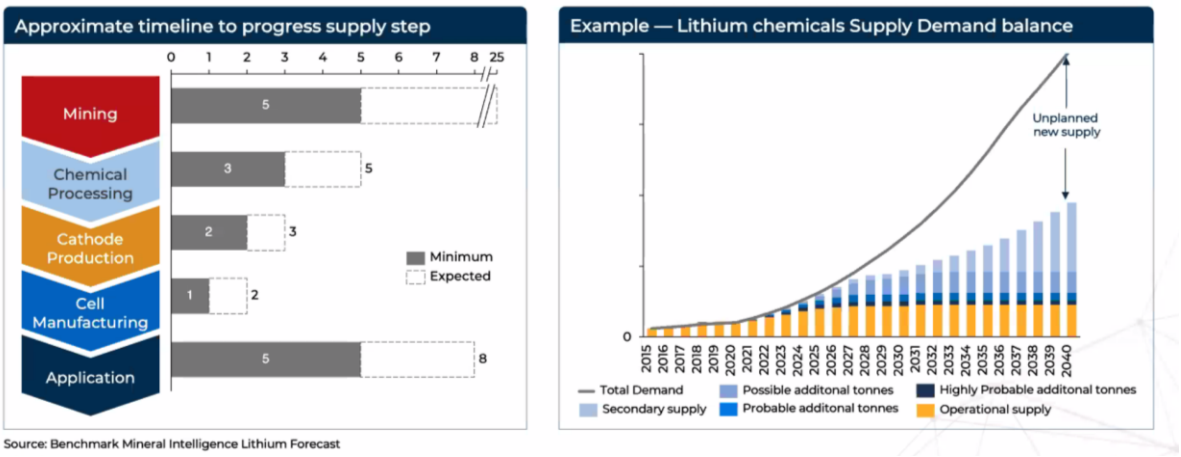


Figure 4. Forecast of expected lithium demand and timelines to build new capacity along the value chain

New mining projects are being developed, many of them as BIP Projects (addressed in the deliverable The Business Investment Platform) but refining capacity is still lacking.
The objective of the EBA for the next 5 years is to become the fast followers in the upstream steps in the value chain, up to the cell manufacturing level, and secure the autonomy of Europe in these critical steps of the value chain (raw materials, refining, process manufacturing).

3 Pipeline of business opportunities

EIT InnoEnergy supports several mining projects within its BIP platform to accelerate access to battery raw materials sourced in Europe. EIT InnoEnergy has in the course of 2020 identified business opportunities in responsible and sustainable sourcing of raw materials for Li-ion batteries.
Four of those projects are lithium mines, Vulcan Energy in Germany, Savannah Resources in Portugal, Infinity Lithium in Spain, and European Metals in the Czech Republic. Graphite has been getting increased attention as well and MSC Skaland has been added to the BIP Portfolio. Those projects are presented in the deliverable "Business Investment Platform".

Additionally, projects connected to the extraction and refining of other battery raw materials, such as manganese and nickel are in the BIP pipeline.

The topic of the importance of mining in Europe was also addressed addressed in a stakeholder meeting in September 2020 and will be subsequently further developed with input from industrial stakeholders in the coming year.

Find in Annex I the pipeline of projects in which we have been focusing our efforts during 2020.

4 Mobilizing key stakeholders as a response to China's proposal for a new ISO Technical Committee to develop standards for lithium (ISO/TSP 284)

China has proposed to establish a new ISO Technical Committee (TC) to develop a set of international standards for battery-grade lithium and recycled lithium from batteries. China proposed itself as the secretariat for the new work. The attached proposal went out to the ISO membership (including all 27 national standardization bodies in the EU Member States) in February. Voting closed in May 2020 and the proposal received enough votes to pass.

This proposal is important because China dominates the midstream and downstream segments of the lithium value chain for Li-ion batteries, as it hosts the majority of the global lithium refined production and three-quarters of the global installed manufacturing capacity for Li-ion batteries. Meanwhile, as part of the shift towards a clean energy transition, the EU is accelerating the development of its own manufacturing industry for advanced batteries. Several industrial projects have emerged across Member States, covering the entire value chain from lithium mining and processing to battery cells and recycling.

As pointed out by the European Commission, the EU has an interest in transparent development of standards at the international level as a means of removing technical barriers to international trade, and should ensure that it continues to engage actively in standard-setting at the international level, as the standards set in the international standardisation organisations have consequences for the Single Market and global supply chains.

EIT InnoEnergy has therefore responded to the Commissions request and informed relevant stakeholders in the network on this upcoming proposal and encourage industrial partners in several member states to participate in the working groups that are currently being formed.

The decision was taken to take part in the Technical committee in Sweden and thereby act as a focal point for other industrial stakeholders on this topic.

5 Proposal for a new battery regulation

EIT InnoEnergy has been closely following the work on the proposal for a new battery regulation that was forwarded by the Commission in December 2020.
EIT InnoEnergy highlighted this work in two different virtual meetings. The EU Commission was invited to present the ongoing work to the EBA250 network meeting at the Virtual EBA event on 1st of May focusing on Sustainability and the recent virtual EBA event on December 15 focusing entirely on the presentation of this new legal framework also addressing topics related to ethical sourcing, traceability, and supply chain due diligence.

6 Support in different external initiatives

EIT InnoEnergy is on the advisory boards for two initiatives addressing access to raw materials as well as recycling:

6.1 The Finnish Battcircle project:

Both the European Union and the Finnish Government have recently recognized the strategic importance and enormous business potential of metals related to energy storage, specifically lithium-ion batteries and their value chain. As the battery industry is currently dominated by Asian-based conglomerates, there is a real risk that Europe is missing out on new business opportunities, whilst simultaneously becoming ever more dependent on the foreign supply of both raw materials and end products. As far as Finland is concerned, the Finnish mining sector is producing battery metals like copper, nickel, cobalt and zinc, and the metallurgical industries are refining raw materials sourced both domestically and imported from worldwide. In 2015, it was estimated that the revenue of the battery metal related industries was about 600 M€ and the level is increasing year on year.

The key objective of the BATCircle project is to find ways of adding value to the battery metals sector. This will be achieved by more efficient screening and utilization of the domestic mineral resources, enhancement of the metal refining processes, more efficient recycling of battery metals, improved co-operation between the companies and research organizations as well as through the identification of new business opportunities between partners. The BATCircle consortium comprises four universities (Aalto, University of Oulu, University of Eastern Finland, Lappeenranta University of Technology), two research centres (GTK, VTT), eight large companies, 14 SMEs and two cities. The cooperation is expected to lead to the formation of a domestic battery metals ecosystem that follows the principles of circular economy.

6.2 The Battery 2030+ initiative

The need to achieve sustainable and rechargeable batteries with the highest possible energy and power content, in addition to a long life, is of utmost importance to reach the goal of a fossil-free society. Versatile and high-performance energy storage systems reduce the carbon footprint of the transport sector, stabilize the power grid and support a broad range of strategic industries. In nearly all aspects of modern life, batteries enable innovation.

BATTERY 2030+ is the large-scale and long-term European research initiative addressing the challenges we face to invent the batteries of the future. The initiative has a long-term focus, which is necessary to address the obstacles preventing current and future battery technologies from performing close to their theoretical limits, while at the same time minimizing environmental impact and cutting down life-cycle carbon footprint. BATTERY 2030+ will follow a "chemistry neutral" approach to explore a wide range of battery chemistries and technologies. This will provide breakthrough technologies to the European battery industry across the full value chain, enabling European leadership in both existing markets (road transport, stationary energy storage, etc.) and future emerging applications (robotics, aerospace, medical devices, internet of things, etc.). With this large-scale European effort, BATTERY 2030+ will also attract new and young talents, which is vital for long-term competence building in this field. BATTERY 2030+ is thus initiating a strong battery research movement to create open discussions about the fundamental research needs for Europe.

The ideas that BATTERY 2030+ proposes will allow Europe to reach and overcome the ambitious battery performance targets agreed upon in the Strategic Energy Technology plan (SET-plan) proposed by the European Commission. BATTERY 2030+ brings a long-term vision within Batteries Europe – the European Technology and Innovation Platform (ETIP) – developing a strategic research and innovation agenda for the full value chain.

EIT InnoEnergy has been actively participating in the networking meeting of both initiatives.

7 Conclusions

Since the start of the European Battery Alliance, access to raw materials produced in Europe has ben highlighted as an important part of a resilient and sustianable battery value chain. Consequently, mining projects for battery raw materials is a top priority for us. According to the above-mentioned information, the current achievements of the work show that there is an interest from external parties to join the cause and that InnoEnergy has responded successfully.

The following illustration shows a slection of ongoing projects on the extraction, refining and recycling of battery raw materials that have been launched since th start of the EBA.

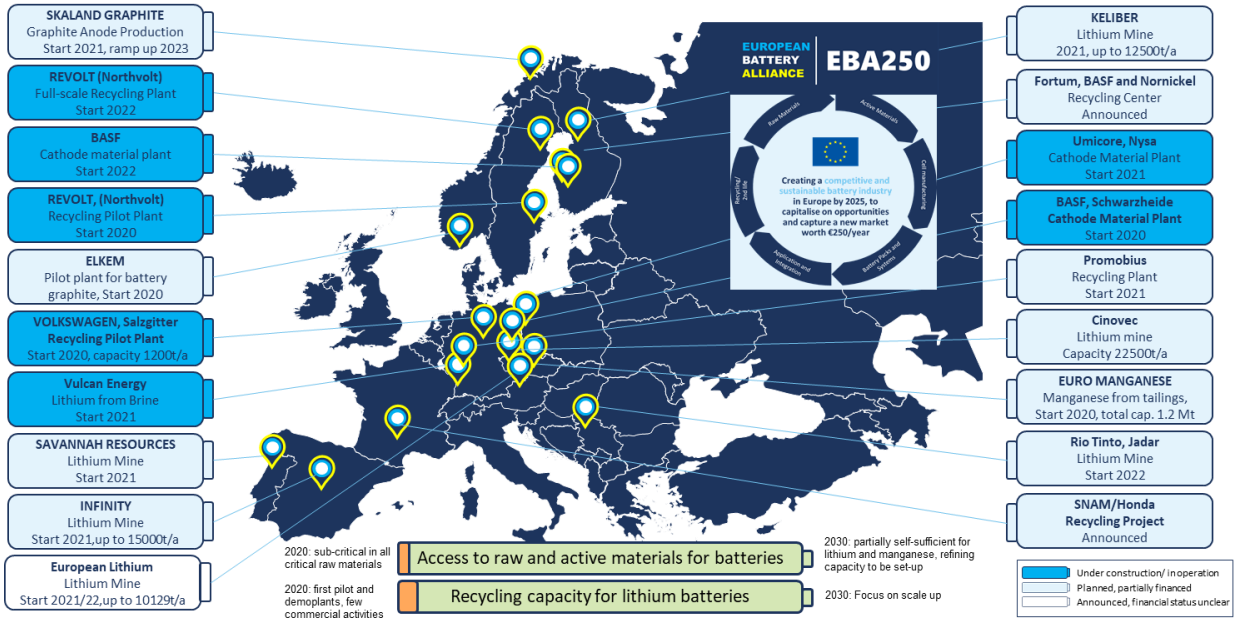


Figure 5. Selection of planned battery materials projects in Europe (raw materials, refined materials and recycling)

The continuation and further investments in mining and refining projects of battery raw materials as part of the BIP pipeline and supporting activities such as taking part in the standardisation work for lithium and shows the continued trust the stakeholder network places in us when it comes to support the industry in this sector.

Despite the high ranking by the Fraser's insitute placing EU as the most attractive region for mining investments a continued focus on the supply chain for batteries materials need to be given in order to accelerate new mining and refining projects in Europe, as has been shown in our analysis.

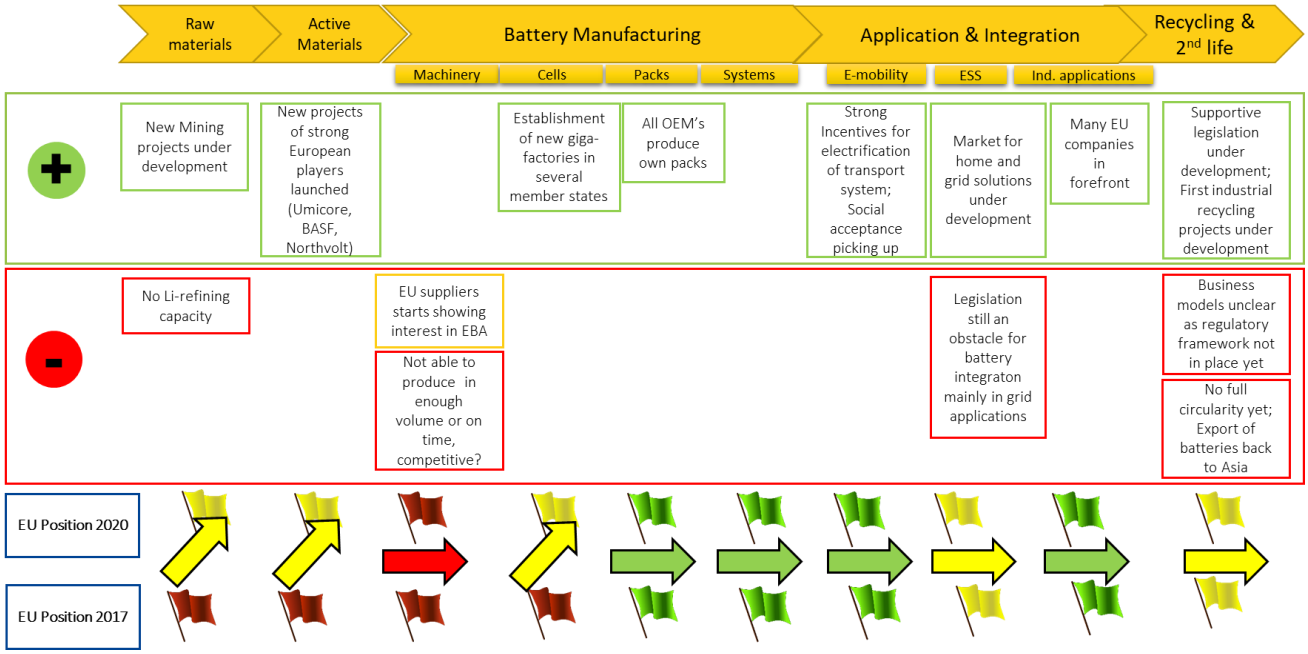
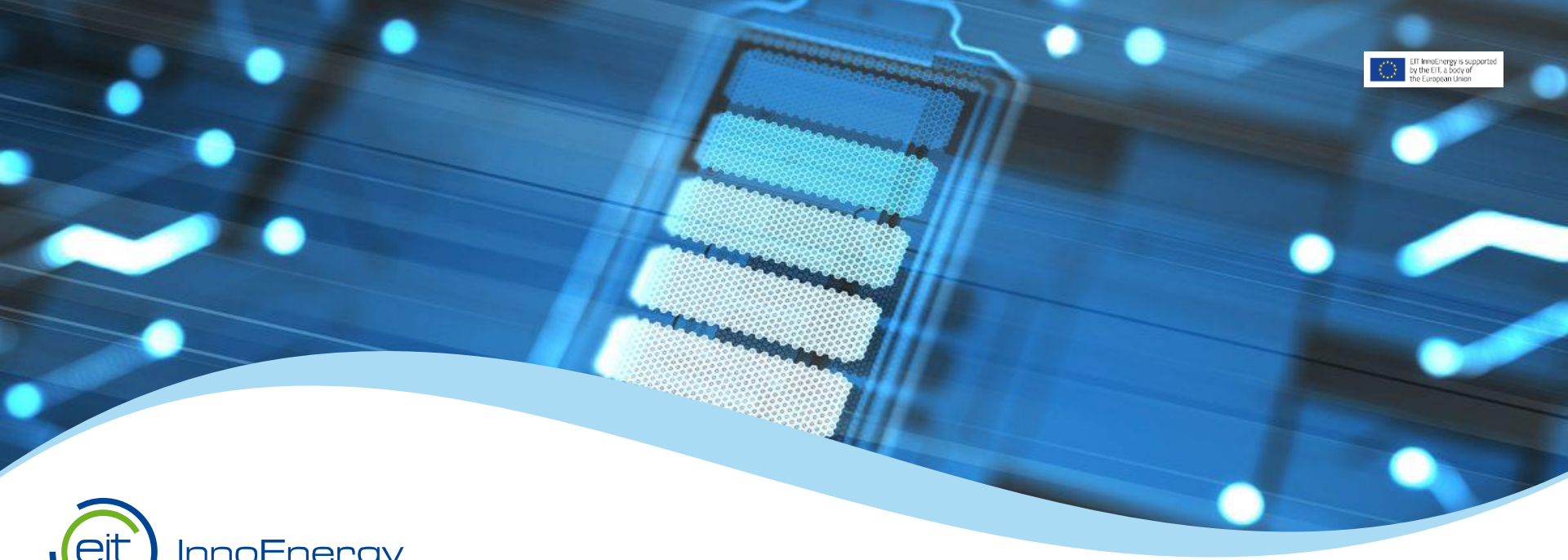


Figure 6. Assessment of EU's position along the value chain

It is thus, foreseen that the European Battery Alliance will keep focus on the area of raw materials for the battery value chain during the upcoming years. It should be further investigated on how the activities of the ERMA on "raw materials for storage" could complement the EBA without risking to dilute activities and stakeholder efforts in this area.

Annex I

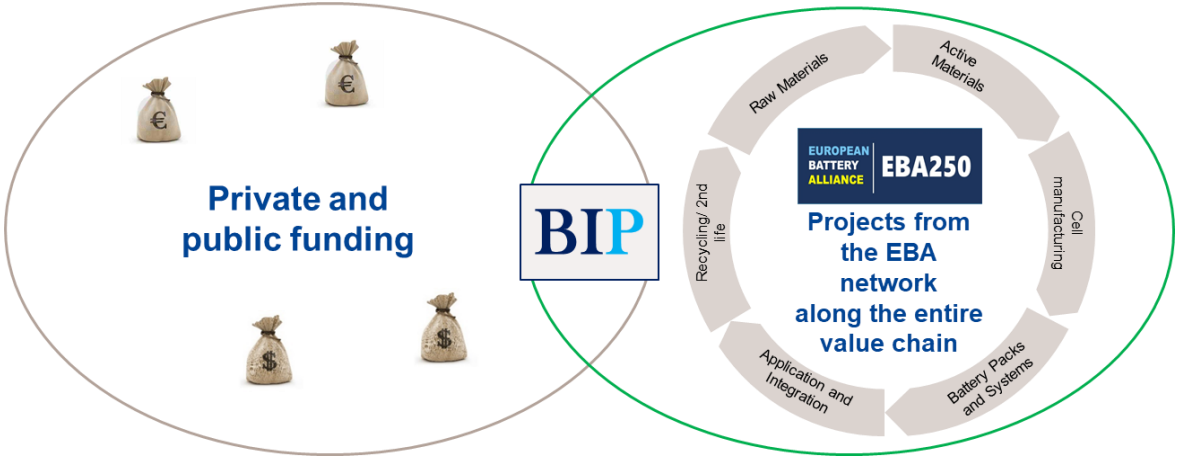


EIT InnoEnergy is supported by the EIT, a body of the European Union

InnoEnergy
Knowledge Innovation Community

EBA 250 – the industrial workstream of the European Battery Alliance and its Business Investment Platform

One stop shop: € Supply side meets and transacts € demand side



- Enhancing the robustness of the investment cases, the objective of the BIP is to:
  - Shorten the time to investment
  - Reduce business risk for the investee
  - Reduce investment risk for the investor

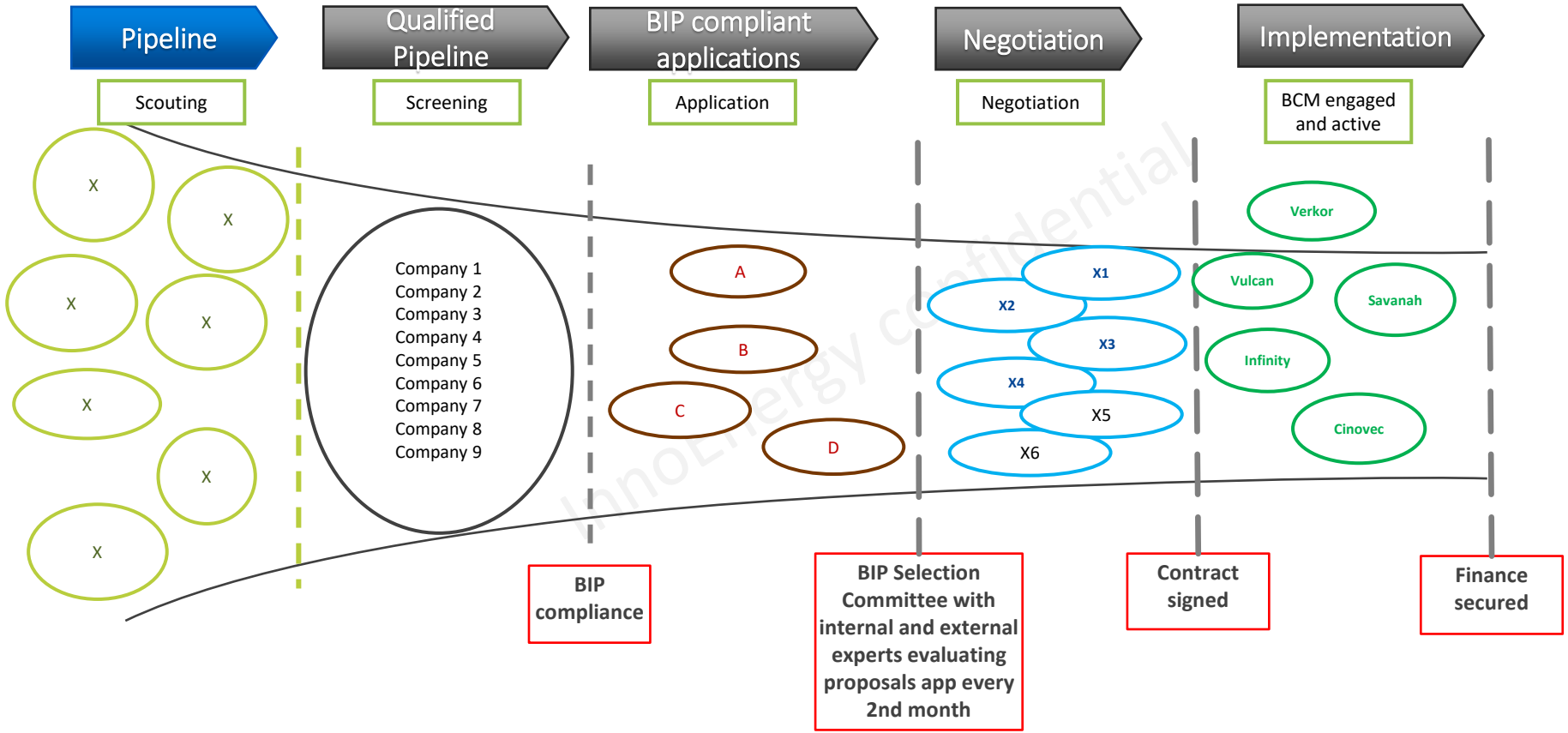
70 B€ targeted transactions for the period [2019-2023]

EBA@250 – Business Investment Platform BIP (2/2)

DashBoard Industrial Projects (Oct 2019- August 2020)

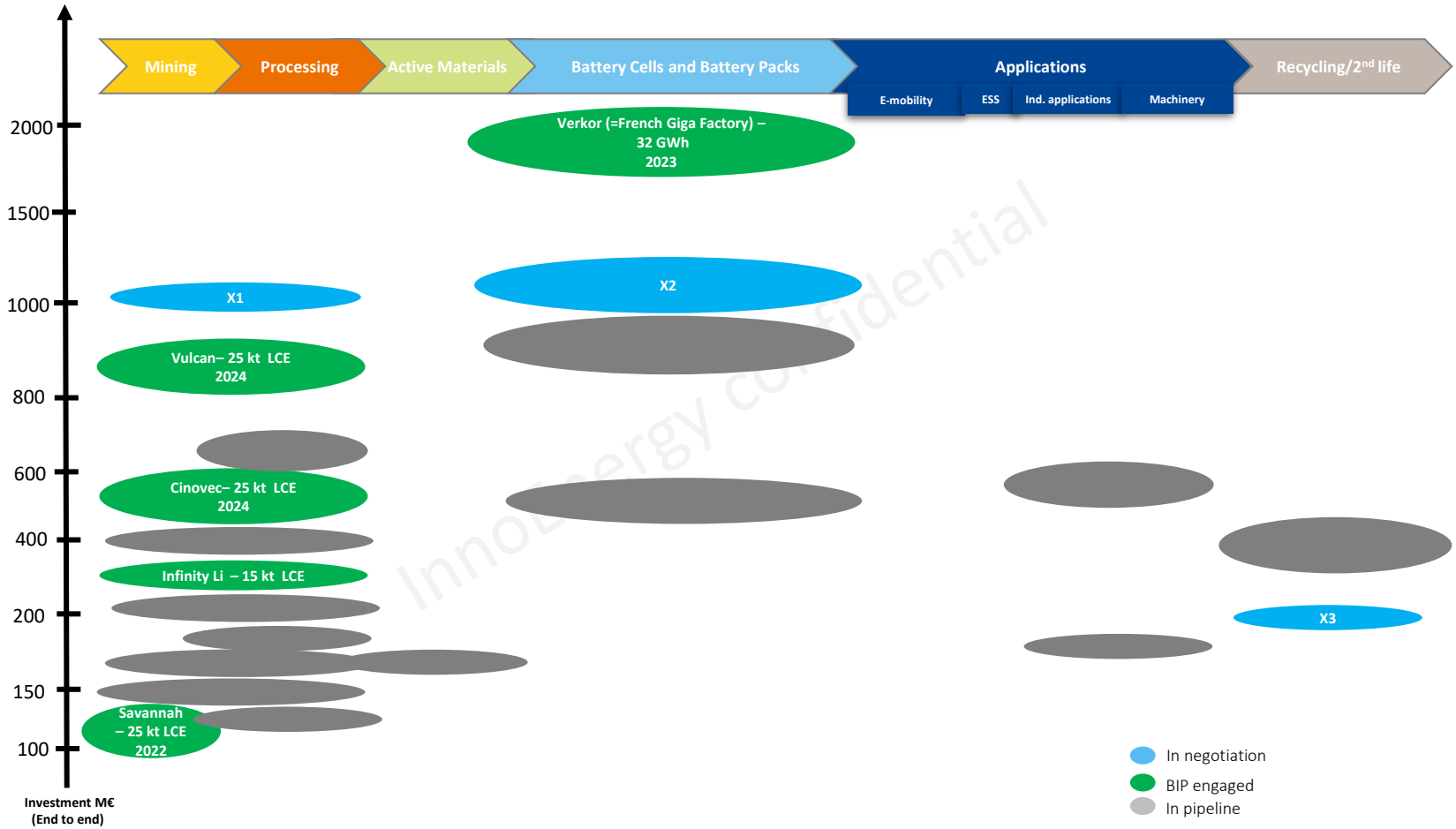
Business Investment Platform @EUROPEAN BATTERY ALLIANCE | BIP

Business Investment Funnel



EBA@250 – Business Investment Platform BIP (1/2)

DashBoard Industrial Projects (Oct 2019- August 2020)



Sample projects accepted in the BIP program

SAVANNAH

AIM London Stock Exchange Börse Stuttgart BÖRSE FRANKFURT

SAVANNAH RESOURSES PLC AIM: SAV, FWB:SAV and SWB:SAV

27 May 2020

Agreement with EIT InnoEnergy

Savannah Selected to Receive Support from the Business Investment Platform

Savannah is pleased to announce that it has entered into an 'Added Value Services Agreement' with EIT InnoEnergy, as part of the Business Investment Platform ('BIP') launched last September to accelerate the development of a European battery industry. EIT InnoEnergy is the innovation engine for sustainable energy across Europe and is responsible for the EBA250 initiative, the industrial development activities of the European Battery Alliance ('EBA'). To further accelerate transactions in the European battery value chain, EIT InnoEnergy has co-designed the BIP with industrial players and public and private financial institutions from the EBA network. The ultimate goal is to facilitate an additional flow of €70 billion of investment into EU based battery-related projects required to meet peak European demand by 2023.

Vulcan Energy Resources secures EU-backed investment in Vulcan Zero Carbon Lithium™ Project

9 July 2020

RESOURCES
VULCAN ENERGY
Zero Carbon Lithium™

Vulcan Energy Resources (ASX:VUL), Perth, Australia, today announced it has signed an investment agreement with European Union-backed **EIT InnoEnergy SE**, Eindhoven, The Netherlands, for staged cash investments into Vulcan. This agreement is expected to significantly accelerate the momentum of Vulcan's **Zero Carbon Lithium™ Project** in Germany's Upper Rhine Valley.