

# Sustainable Batteries

## New legislation pushing for a circular and climate neutral economy in the EU

The European Commission (“EC”) is proposing to modernise EU Legislation on batteries and to deliver the first initiative announced in the new Circular Economy Action Plan. The proposal is another step towards achieving the goals of the European Green Deal and contributing to the zero-pollution ambition set in it. By 2050, sustainable batteries are vital for green transport, clean energy and for achieving climate neutrality. The proposal addresses the social, economic and environmental issues related to all types of batteries.

*“Clean energy is the key to European Green Deal, but our increasing reliance on batteries in, for example, transport should not harm the environment. The new batteries regulation will help reduce the environmental and social impact of all batteries throughout their life cycle. Today's proposal allows the EU to scale up the use and production of batteries in a safe, circular and healthy way”* – Frans Timmermans, Executive Vice-President for the European Green Deal

The proposed legislation will ensure that batteries placed onto the EU market are sustainable, high-performing, and safe along their entire life, utilising the lowest possible environmental footprint and materials obtained in full respect of human rights as well as social and ecological standards. The new standards will cover all batteries (i.e. industrial, automotive and portable) promoting competitive sustainability in Europe. The EC aims that, in providing legal certainty, it will help unlock large-scale investments and boost production capacity.

The EC proposes to establish new requirements and targets on the content of recycled materials and collection, treatment, and recycling of batteries at the end-of-life part. They aim to increase collection and recycling of portable batteries from 45% in 2020 to 65% in 2025 and 70% by 2030. The legislation builds on the Battery directive (2006) to accommodate changes in battery use and demand across the globe which is set to exponentially increase 14-fold by 2030, mostly driven by electric transport.<sup>1</sup> This exponential growth in demand will come simultaneously with a rise in raw material needs, which will have a large environmental impact if efficient recycling processes and sustainable practices are not implemented to begin transitions towards a circular economy.

One such company engaging in the transition towards more sustainable batteries is Northvolt, a Swedish battery manufacturer who is pioneering battery recycling technology and aims to secure 50% of recycled materials in new cells by 2030. The first block will become operational in 2022 with the capacity to recycle approximately 25 kt of battery cells per year.

Current battery recycling has a large CO<sub>2</sub> footprint as it involves significant energy consumption, therefore improving the battery recycling process is key to reducing this environmental footprint. The current industry standard process utilises hydrometallurgical techniques which extract lithium from shredded lithium battery materials, known as black mass, in the form of lithium carbonate which can be converted to lithium hydroxide for battery manufacture. This does, however, require further steps and reagents and, consequently, is less efficient.

<sup>1</sup> European Commission

BASF is pioneering a new process which differs from standard hydrometallurgical techniques by removing lithium from the process in the initial stages as opposed to at the end like in standard hydrometallurgical processes. This allows for the conversion of black mass directly into a high purity lithium hydroxide, which reduces energy consumption and the use of unnecessary reagents. BASF are currently preparing to build their first pilot plant before commercialising the technology. We expect that this will become an integral part of the battery circular economy within the EU.

Additionally, the EU has recently selected BASF, Eramet and Suez to partner on a project, which is to receive €4.7m in funding, to develop an innovative closed-loop process for recycling lithium-ion batteries from electric vehicles. The project will seek to scale up this process and integrate it into the industrial sector across the entire life cycle of the battery; from end-of-life to recycling to the manufacture of new electrode materials. BASF and Eramet have further partnered to assess the development of a nickel and cobalt hydrometallurgical refining complex in Indonesia to produce cathode active materials for electric vehicle batteries to begin to address the identified rising raw material demand.

However, recycling is just one of the ways in which companies are seeking to introduce more sustainability to batteries; Johnson Matthey’s eLNO technology aims to provide a family of nickel rich cathode materials which have increasingly lower levels of cobalt to deliver higher energy density for electric vehicle batteries whilst reducing the dependence on the short supplies of ethically sourced cobalt.

Other companies have decided to approach battery sustainability with a focus on the sustainable sourcing of battery materials. The BMW Group recently announced that, in partnership with BASF, they had commissioned a study into the impact of water consumption in the lithium extraction process to improve the sustainability of ‘e-mobility’ and understand the full extent of the impact of this extraction methodology. “We believe sustainability is an integral part of all purchasing activities. So, as we accommodate the planned growth in electric vehicles in the supplier network, we are at the same time integrating our sustainability requirements into all contract awards.” – Dr Andreas Wendt, member of the Board of Management of BMW AG responsible for Purchasing and Supplier Network.

**Challenges**

- Cobalt is currently a small but crucial part of the cathode in lithium-ion batteries and with 65% of the global production concentrated in the Democratic Republic of Congo (DRC) and much of the rest in Russia, there are political risks to the supply chain.
- Currently, the best alternatives to cobalt cathodes are less affordable and inferior on performance.
- Lithium-ion recycling is currently in its infancy. Global demand for lithium and cobalt is expected to reach approximately 900kt and 300kt respectively by 2025, but only 12-15kt of cobalt is being recovered (2017)<sup>2</sup> and only tiny amounts of lithium, so there is a long way to go. The legislation will need to balance the realistic ability of battery materials to be efficiently recycled with the mandated recycled content.
- As production of lithium continues to outgrow demand, with an estimated surplus of c. 300kt expected by 2025,<sup>2</sup> pressure is growing to make EU batteries competitive with the global market by developing cost effective recycling solutions.

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<sup>2</sup> *McKinsey & Company*