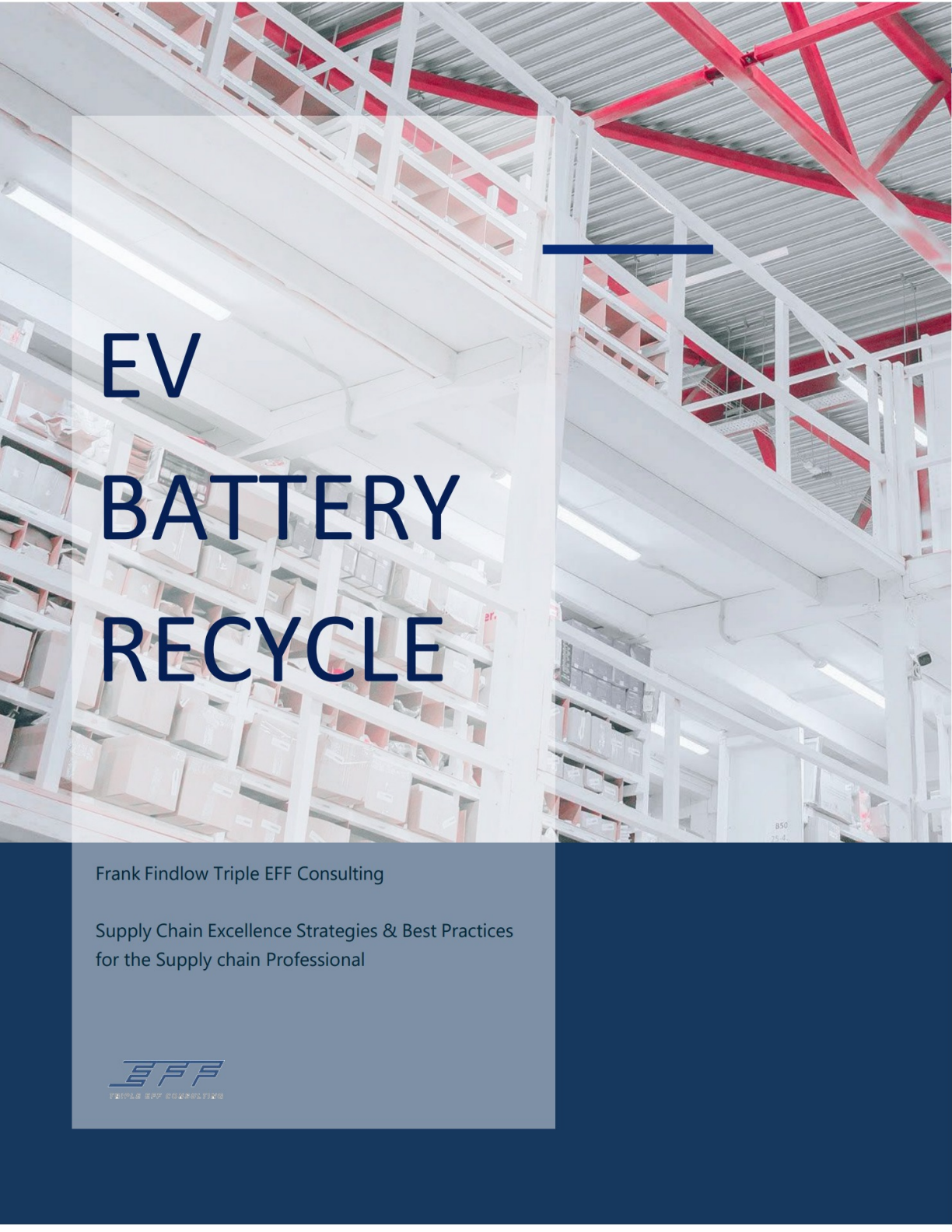




EV BATTERY RECYCLE

Frank Findlow Triple EFF Consulting

Supply Chain Excellence Strategies & Best Practices
for the Supply chain Professional



Executive Summary

The paper provides useful background information on the Indonesian EV battery recycling practices and the impact on sustainability and ESG compliance.

Background

The global electric vehicle (EV) battery market is expected to grow from \$17 billion to more than \$95 billion between 2019 and 2028.

With increasing demand to decarbonize the transportation sector, companies producing the batteries that power EVs have seen substantial momentum. This is a global industry and is growing at pace. One of the challenges is what to do with the battery after it is past its natural use by date?

Development of new battery technologies: Advances in battery technology, such as solid-state batteries and high-nickel batteries, are likely to play a significant role in shaping the future EV battery supply chain. These technologies could offer higher energy density, longer range, and improved safety, leading to new sourcing strategies and production methods.

An electric vehicle battery is utilized to control the electric motors of a battery electric vehicle (BEV) or hybrid electric vehicle (HEV). These are often rechargeable (secondary) batteries made of lithium-ion. These batteries have been developed with a high amp-hour (or kilowatt-hour) capacity in mind.

Batteries for electric vehicles are defined by their high power-to-weight ratio, specific energy, and energy density. Smaller, lighter batteries are desirable because they reduce the electric vehicle's weight and thus improve its performance. In contrast to liquid fuels, extremely active battery technologies have a significantly lower specific energy, which often impacts the vehicle's maximum all-electric range.

Due to their high energy density in relation to their weight, lithium-ion and lithium polymer batteries are the most prevalent battery types in modern electric vehicles. Nickel-cadmium, nickel-metal hydride, lead-acid (and, less frequently, zinc-air and sodium nickel chloride) batteries are used in electric vehicles. The quantity of energy stored in batteries is expressed in ampere hours or coulombs, with the overall amount of energy frequently expressed in kilowatt-hours.

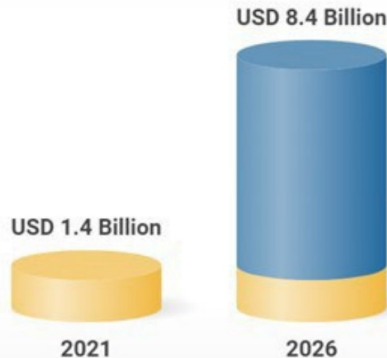
Innovations in lithium-ion battery equipment have been driven by consumer electronics, laptop computers, mobile phones and power tools. The BEV and HEV markets have benefited from these advancements in terms of performance and energy density. Unlike previous battery chemistries, particularly that of nickel-cadmium, the chemistry of lithium-ion batteries enables them to be discharged and recharged on a regular basis and at any level of charge.

The battery pack accounts for a sizable portion of the cost of a BEV or HEV. As of 2018, vehicles with an all-electric range of more than 250 miles (400 kilometers), such as the Tesla Model S, have been commercialized and are now available in a variety of vehicle sectors.

Increasing recycling and reuse: As the number of EVs on the road grows, so will the volume of batteries that reach the end of their useful life. Recycling and reuse will become increasingly important in managing this waste stream and securing a supply of raw materials for battery production.

Global Electric Vehicle Battery Reuse and Recycling Market

Market forecast to grow at a CAGR of 43.10%



<https://www.researchandmarkets.com/reports/5521856>

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Of interest:

Hyundai Motor Group and LG Chem are reportedly promoting the establishment of a joint venture electric vehicle (EV) battery plant in Indonesia. Indonesian government officials are visiting Korea to discuss investment conditions.

Indonesia's SOE minister and the chairman of Indonesia Investment Coordinating Board, BKPM visited Seoul South Korea recently. The Indonesian government has been working hard to attract LG Chem's battery plant following Hyundai Motor's car plant outside Jakarta. Hyundai Motor and LG Chem are considering setting up their first battery joint venture in Indonesia.

The proposed battery plant will be built on a 100-hectare site in Batam, Indonesia. The government of Indonesia has signed agreements on investment in battery factories with large companies from two countries. These agreements involve investment of 70 trillion rupiah (5.5 trillion won) and 100 trillion rupiah (eight trillion won), respectively.

The chairman of BKPM did not mention the names of the companies, but the coordinating minister for maritime affairs and investment of Indonesia, told the local

press on Sept. 15 that Indonesia has signed investment agreements on developing lithium batteries with LG Chem of Korea and CATL of China.

The SOE minister said on Sept. 16 that he will visit Korea for meetings with Korean companies. Accordingly, the Indonesian officials are expected to meet with officials of Hyundai Motor Group and LG Chem during their visit to discuss investment conditions related to the planned battery plant.

But Hyundai Motor Group and LG Chem say nothing has been decided on the joint venture for electric vehicle batteries in Indonesia.

Hyundai Motor is investing 1.8 trillion won in Indonesia to build a car factory capable of producing 250,000 units a year. Although its initial goal was to complete the project by the end of 2021, the COVID-19 pandemic has delayed the completion of the plant. Not only internal combustion-powered cars but electric vehicles can be produced at this plant, according to industry sources.

Recycling

When items are recycled, as much as 95 percent of the energy used to produce a new item is saved. That saved energy can then be used on something else, or simply not used. Recycling causes less waste. An item sent to a recycling facility doesn't take up space in a landfill, allowing that space to be used by something that truly belongs in the trash. Recycling also prevents waste from being generated as a by-product of producing something new.

Recycling helps reduce greenhouse gases. Emissions are lowered by not requiring the entire process of consuming raw materials, production, shipping and disposal to occur. Recycling allows a new product to be created from an old one, skipping steps and helping the environment.

Natural resources are also saved when new ingredients and materials are not used in production. Everything, from coal and gas for power generation to diesel for shipping, is reduced when an item is recycled. These natural resources can later be used elsewhere.

Recycling creates jobs, provides a source of tax revenue, and can improve the budget of a city sponsoring recycling programs. New businesses must be created to handle recycling needs, and cities can benefit from the added business licenses, permits and other fees required to run those businesses.

Battery recycling machines work by breaking down used batteries into their component parts, such as lead, acid, and plastic, which can then be processed and reused. The process typically involves the following steps:

Sorting: Used batteries are sorted by type and composition to ensure that they can be processed efficiently and safely.

Shredding: The batteries are shredded into small pieces to facilitate further processing.

Separation: The shredded pieces are then separated into their component parts using a combination of physical and chemical processes.

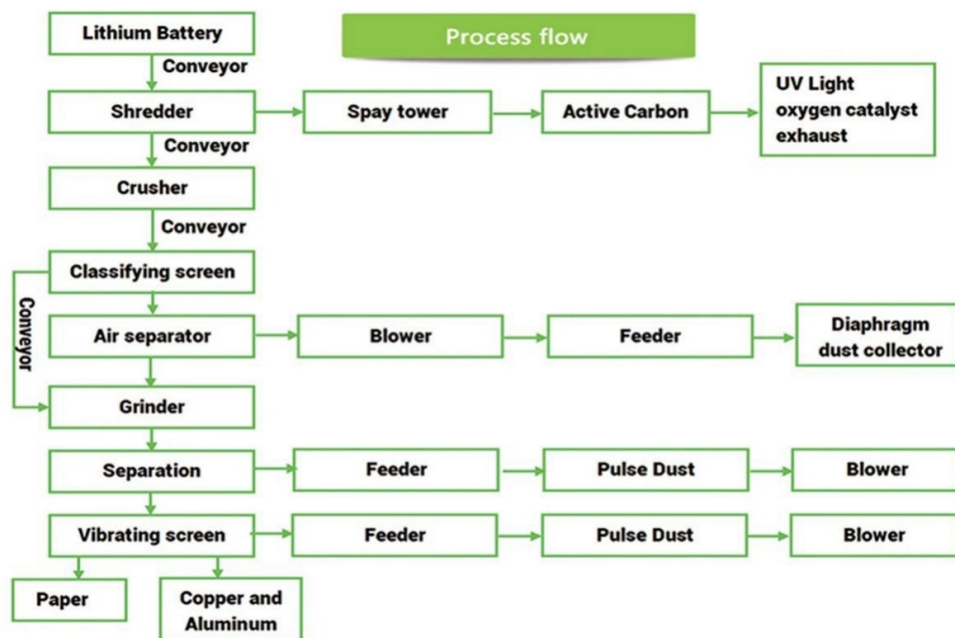
Smelting: The lead and other metals are melted down to form new products, such as lead ingots.

Neutralization: The sulfuric acid is neutralized using an alkaline solution, producing water and sulfates, which are then disposed of in an environmentally safe manner.

Refining: The plastic components are melted down and refined to produce new plastic products.

Battery recycling machines are designed to be efficient, safe, and environmentally friendly, ensuring that the materials recovered from used batteries can be reused in new products while minimizing waste and pollution.

The flow chart below shows the process:



Lithium-ion battery recycling line research mainly focuses on the recovery of high-value anode metals cobalt and lithium. Copper in the negative electrode of waste lithium batteries is an important production raw material that is widely used.

Toner attached to it can be used as an additive, such as plastic and rubber. According to the structural characteristics of lithium batteries, an environmentally friendly physical separation process is adopted to achieve efficient separation and recovery of waste lithium batteries.

Lithium battery recycling production line is used for the disassembly and recycling of soft packaging batteries, mobile phone batteries, surgical batteries, cylindrical batteries, etc.

The final products are graphite powder, lithium cobalt oxide, aluminum, and copper.

The waste lithium-ion battery recycling and processing equipment of an automated processing machine will crush the materials step by step through shredders, crushers and grinders, and separate them by air separation facilities.

The whole set of equipment adopts a closed negative pressure system to reduce dust pollution and has pulse dust collection facilities that collect dust generated during the separation process and subsequent processes.

BATTERY HUB

Indonesia, the region's largest economy, has plentiful reserves of nickel laterite ore, a vital ingredient in the lithium-ion batteries used to power EVs, and has been making a push to attract foreign carmakers.

Officials are betting Indonesia, which is already Southeast Asia's second-largest car production hub, can become a major regional player in lithium battery production and feed the fast-rising demand for EVs.

The country announced earlier in 2019 plans to introduce a fiscal scheme that will offer tax cuts to EV battery producers and automakers, as well as preferential tariff agreements with other countries that have a high EV demand.

Indonesian ministers told Reuters in December that Korean carmaker Hyundai Motor Co plans to start producing EVs in Indonesia as part of an around \$880 million auto investment in the country.

Japan's Mitsubishi meanwhile announced in mid-2018 it would work with the Indonesian government to research infrastructure that could accommodate EVs.

Analysts are cautious however on how quickly Indonesia's EV ambitions can be carried out, as some of its lithium battery projects require complicated nickel smelter technology.

The ministry's statement on Thursday gave no details on how Toyota, which already makes batteries for hybrids and hybrid plug-ins, would implement its investment plans.

Toyota was not immediately reachable for comment but said in June it would partner with China's Contemporary Amperex Technology Co Ltd (CATL) and EV maker BYD Co Ltd for battery procurement.



The parent company of the red plate mining industry, Mining Industry Indonesia (MIND ID), collaborated with a British electric vehicle manufacturer, Arrival Ltd. The inauguration of the cooperation between the two was carried out on Friday (30/9) at the Embassy of the Republic of Indonesia (KBRI) in London, England.

MIND ID and Arrival Ltd will jointly develop a technology-based micro-factory to create commercial electric vehicles in Indonesia and Southeast Asia.

With foreign investment in this industry, we can improve the sustainability of the industry and become more competitive in the global market. The MoU (memorandum of understanding) between MIND ID and Arrival is just one of the ways we try to collaborate with strategic partners to unlock more value.

In the memorandum of understanding, MIND ID has appointed PT Industri Baterai Indonesia (IBC) as the implementer of the cooperation program, including conducting a feasibility study with Arrival Ltd. In addition, a market and feasibility study will also be carried out for the expansion of electric vehicle business projects, aluminum supply, and

battery supply for the expansion of the electric vehicle business in Southeast Asia.

At the same time, MIND ID and PT Indonesia Asahan Aluminium (Inalum) will play a role in the global supply chain for aluminum. MIND ID, together with IBC, will join the global supply chain for batteries. The two will also conduct a feasibility study together for electric vehicle battery technology.

The SOE minister said that the Indonesian government encourages every industry that produces raw materials in the country to downstream its derivative products. According to him, product downstreaming will open job opportunities. It should be noted that Indonesia has abundant mining resources, and we continue to downstream the mineral and coal industries to increase industrial value.

Indonesia is a major producer and exporter of electric vehicle raw material, nickel. The country supplies 27 percent of nickel demand in the global market. That is why, downstreaming in Indonesia needs to be carried out concretely.

IBC will focus on developing an end-to-end EV (electric vehicle) ecosystem, from the exploration and processing of nickel as an electrical battery component, to EV production and battery recycling.

He explained that the transportation sector is one of the contributors to high emissions. The electric vehicle industry is one of the solutions to reduce increasing global emissions. Electric vehicles are an environmentally friendly transportation alternative because they do not produce emissions that can pollute the air.

The PRESIDENT DIRECTOR OF MIND ID stated that the plan to build and invest in the Arrival Ltd micro-factory in Indonesia will further attract foreign investors to invest in the country.

The cooperation between MIND ID and Arrival Ltd must be fast and precise in its realization. Support and synergy are needed to accelerate the realization of the program, one of which is in the form of incentives and convenience for the electric vehicle ecosystem in Indonesia.

This the link to a [manufacturer of battery recycling machinery](#).

In this briefing we have provided you with some insight into EV Battery recycling.

We are of the firm belief that ***“Knowledge not shared is Energy wasted”***.

This is one of the main reasons why we have prepared this paper, the other reason is to help you on your way to get to ***“What good looks like for your business”***.

Contact us to learn more

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