

August 16, 2021

Success in Demonstration Experiments for Secondary Battery Recycling Technology That Includes Cobalt Recovery

- Establishment of a World-First New Recycling Process That Integrates Production of Soluble Slag That Enables Lithium Recovery -

Sumitomo Metal Mining Co., Ltd. (SMM) has verified that nickel and cobalt from secondary batteries such as used lithium ion batteries (LIB) can be reused as a raw material for cathode material of LIBs through recovery and purification. Additionally, through our world-first original lithium recovery technology, we have established a new recycling process that is able to recycle copper, nickel, cobalt and lithium from used secondary batteries.

Aiming for the creation of a sustainable circular economy, SMM has been engaging in the practical implementation of horizontal recycling* of metal as battery materials. These recycled metals include used secondary batteries and scrap from manufacturing processes.

In 2017, the existing smelting and refining processes at the Toyo Smelter & Refinery (Saijo City, Ehime Prefecture) and the Niihama Nickel Refinery (Niihama City, Ehime Prefecture) were utilized in the practical implementation of copper and nickel recycling and we were able to realize Japan's first "battery to battery" recycling with used secondary batteries. Moreover, in 2019, through a combination of pyrometallurgical smelting and hydrometallurgical refining processes independent of our existing processes, we developed a new recycling process for the difficult-to-recover cobalt and have continued to test it at the pilot plant we constructed in Niihama City, Ehime Prefecture.

Now, we have optimized processes at this pilot plant, and have been successful in the recovery of a high-purity nickel-cobalt mixture by stably and efficiently separating out the impurities in used secondary batteries. Moreover, we manufactured and evaluated LIB cathode material that we made from the nickel-cobalt mixture. We were able to verify that the performance of those batteries was equivalent to that of batteries manufactured using existing raw materials derived from natural resources. Additionally, we were successful in producing a soluble slag that enables lithium recovery by pyrometallurgical smelting processes which has heretofore been difficult. Through integration of this world-first original technology into our processes, we have established a new recycling process that is able to recycle copper, nickel, cobalt and lithium from used secondary batteries.

This technology and process were also developed to aim the resource recovery rate for used secondary batteries laid out in the European Commission's proposal for a battery regulation that was proposed in December 2020.

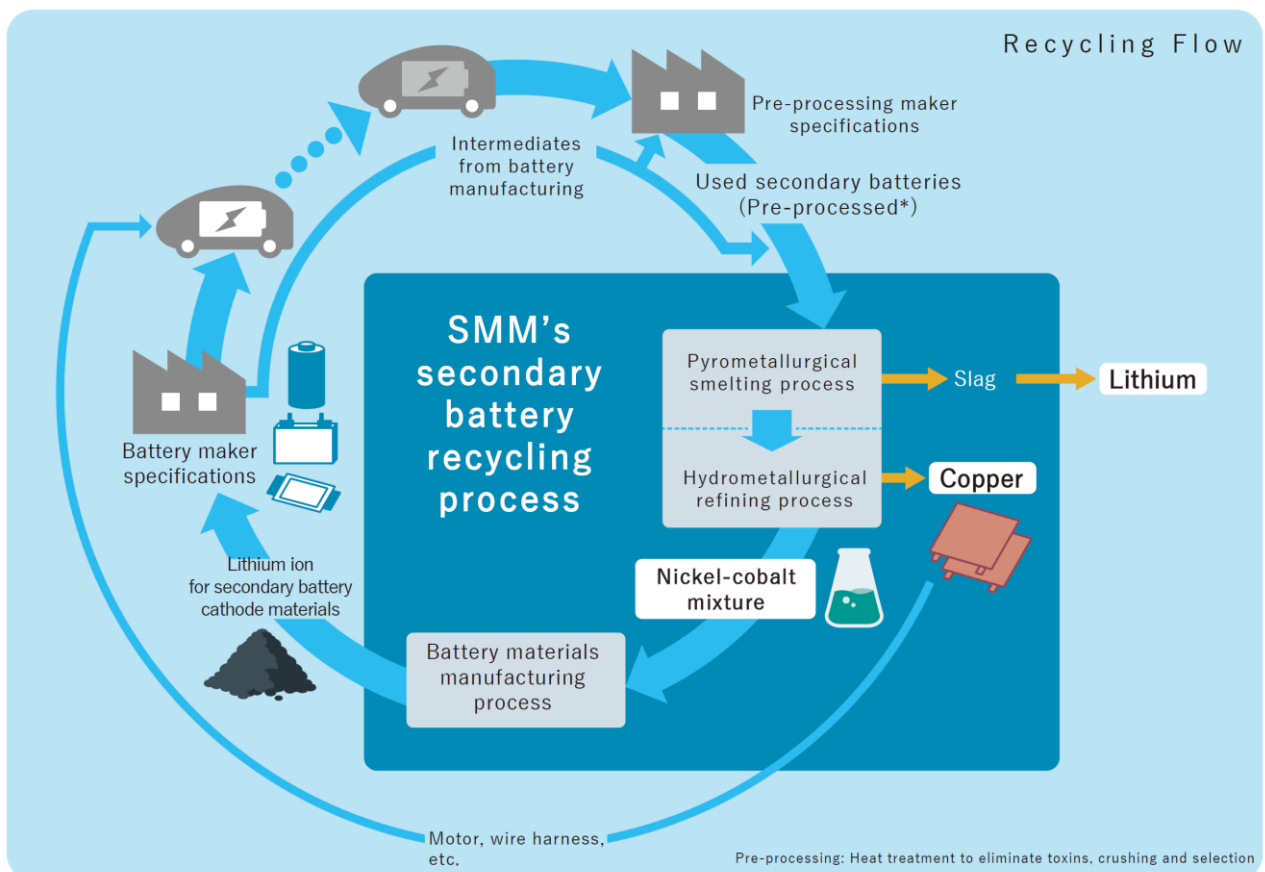
Moving forward, we estimate that the electrification of automobiles is going to further develop worldwide towards a low-carbon society. Through this, the demand for the nickel and cobalt used in EVs is going to expand. However, stable supply is a major issue as these are rare metals, and there are unbalances in the regions producing these resources and the location of extraction technologies. Demand for recycling of these resources is growing greater than ever.

If we are able to commercialize this process, which has verified “battery to battery” recycling, we expect to be able to take the domestic sustainable circular economy to the next level and to make contributions to resource recycling in response to global resource depletion.

Moving forward, through our battery recycling initiatives, SMM will continue to engage in the realization of becoming “a company that generates resources through high technological capabilities” laid out in the “Effective Use of Non-Ferrous Metal Resources” material issue of our “Vision for 2030.”

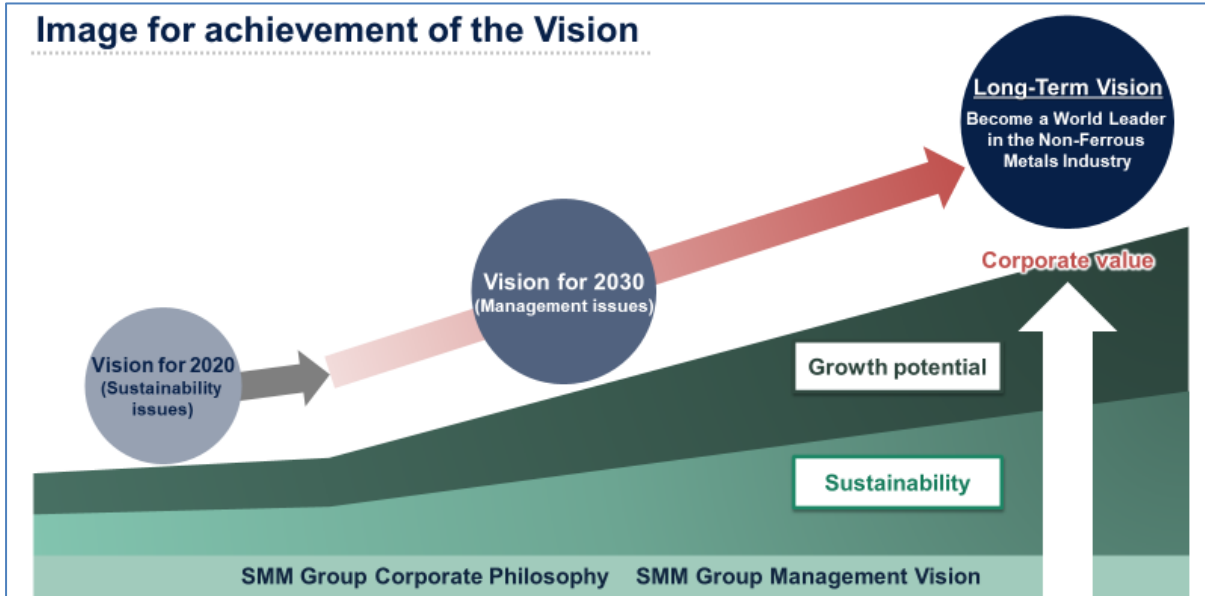
*Horizontal recycling: General term for recycling systems where used products become resources and are recycled into the same products. Includes “battery to battery.”

• Recycling Flow



*Reference

• Vision for 2030: Image for achievement of the Vision



• Vision for 2030: 11 Material Issues and our Vision

	Material issues	Vision
1	Effective Use of Non-Ferrous Metal Resources	A company that generates resources through high technological capabilities 1. A company that stably provides non-ferrous metals to society 2. A company that contributes to society by effectively using impurities through collaborative, open technological development among industry, academia, and government 3. A company that contributes to the construction and maintenance of recycling systems for non-ferrous metals 4. A company that develops and supplies highly advanced materials that contribute to the resolution of social issues
2	Climate Change	A company that actively undertakes climate change countermeasures, by reducing emissions and stably supplying products contributing to a low-carbon society, to achieve zero emissions of greenhouse gases GHGs
3	Significant Environmental Accidents	A company that values water resources and biodiversity, and protects the richness of the sea and land
4	Biodiversity	
	Material issues	Vision
5	Employees' Occupational Health and Safety	A company where all employees put safety first in work, with comfortable workplace environments, safe equipment, and operations
6	Diverse Human Resources	A company where all employees can take a vibrant and active part 1. A company that respects the humanity of each and every employee, and where employees feel pride, motivation, and joy in work
7	Development and Participation of Human Resources	2. A company that provides each and every employee with opportunities to improve his/her capabilities, and grows together with employees
8	Engagement with Stakeholders	A company that is appreciated and understood to be the world leader in non-ferrous metals
9	Co-Existence and Mutual Prosperity with Local Communities	A company that contributes to regional development and earns trust as a member of the local community
10	Rights of Indigenous Peoples	A company that understands and respects the traditions and culture of indigenous peoples
11	Human Rights in the Supply Chain	A company that undertakes CSR procurement (responsible sourcing) across the supply chain

Address inquiries concerning this News Release to:

Sumitomo Metal Mining Co., Ltd.
 Public Relations & Investor Relations Department
 TEL: +81-3-3436-7705 E-mail: Smm_Koho@smm-g.com