

Glossary

Term	Explanation	Pages
CASE	An acronym for Connected, Autonomous, Shared/Service, and Electric. The term is becoming increasingly recognized as a key word indicating major trends in the automobile industry.	68, 70, 74
Copper concentrates	A raw material used in copper smelting, consisting of about 30% copper content with sulfur and iron as most of the remainder. Copper concentrates are produced mainly from sulfide ores. At present, ores extracted from overseas mines generally have a grade of about 1%. The ores are then “dressed” at the mine to enhance the grade and produce concentrate. The raw materials imported by copper smelting and refining plants in Japan are primarily copper concentrates.	6, 15, 47, 124
Coral Bay Nickel Corporation (CBNC)	The SMM Group's first HPAL plant. Located in the Province of Palawan in the Philippines, CBNC produces mixed nickel-cobalt sulfides (MS) using HPAL technology for export to the Group's Niihama Nickel Refinery and Harima Refinery.	3, 14, 26, 32, 46, 52, 63, 64, 66, 67, 90-93, 101, 111, 117, 121, 124-127, 135, 136, 138, 141
EITI	An acronym for Extractive Industries Transparency Initiative. EITI is a framework for multinational cooperation that enhances transparency in the flow of funds from the so-called extractive industries, those that are involved in oil, gas, and mineral resources, to the governments of resource-producing countries, to prevent corruption and conflict and thereby promote responsible resource development that leads to growth and the reduction of poverty.	117, 140
Electrolytic copper	A high-purity copper material produced through electrolytic refining in a solution (electrolysis). At our Group's Toyo Smelter & Refinery, we dissolve copper concentrate in a flash furnace, pass it through a converter and a refining furnace, cast anodes in plate form, and produce electrolytic copper through electrolytic refining. Electrolytic nickel and electrolytic cobalt are also produced through electrolytic refining.	6, 35, 62, 63, 65, 72, 118, 125
HPAL	An acronym for High Pressure Acid Leach. This technology enables the recovery of nickel from nickel oxide ores that had been conventionally difficult to process. The SMM Group was the first company in the world to apply it successfully on a commercial scale. HPAL causes oxide ores to react stably with sulfuric acid under high-temperature and high-pressure conditions, to produce a high-grade nickel raw material.	2, 3, 12, 14, 16, 18, 19, 26, 32, 35, 37, 42, 43, 46, 52, 53, 55, 62-67, 90-93, 101, 111, 117, 121, 125-127, 130, 135, 136, 138, 141
Human rights due diligence	An approach to human rights protection based on the United Nations Guiding Principles on Business and Human Rights approved by the United Nations Human Rights Council in 2011, this is a series of processes for performing preventive investigations to avoid and mitigate the negative effects that organizations have on human rights, and for taking appropriate corrective action based on the findings. The SMM Group built system for human rights due diligence in FY2014 and has followed it since then.	26, 27, 95, 102, 106, 107, 129, 130
Hydrometallurgical refining	A refining method in which metals and impurities are dissolved in a solution, and chemical reactions are used to separate them. The method is stable and enables continuous processing, but incurs the costs of chemical reagents.	72, 141

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ICMM	An acronym for International Council on Mining and Metals. This is an organization composed of worldwide metal and mining companies and related industry bodies. Its mission is “In collaboration with others, we will strengthen the social and environmental performance of the mining and metals industry and build recognition of its contribution to local communities and society at large.”	27, 98, 114, 117, 139, 140
LME	An acronym for London Metal Exchange. The LME specializes in the trading of non-ferrous metals such as copper, nickel, aluminum, lead, and zinc. Metal trading prices determined at the LME are used as international benchmarks for metal sales prices and raw material purchase prices.	110
LT/LN	Lithium Tantalate and Lithium Niobate. These are used in chips for information and communication terminal SAW filters.	3, 43, 55, 68, 69, 71-73, 76
Matte	A term for metal sulfides. Niihama Nickel Refinery produces electrolytic nickel using nickel matte (of about 75–80% purity) sourced from P.T. Vale Indonesia.	64, 66, 124
MCLE	An acronym for Matte Chlorine Leach Electrowinning. This is a manufacturing process adopted at the SMM Group's Niihama Nickel Refinery. Matte and mixed nickel-cobalt sulfides (MS) are dissolved in chlorine at high temperature, then electrolysis is used to produce high-purity nickel. MCLE is more competitive than other methods in terms of cost, but poses significant operational challenges, and only two other producers outside of SMM have commercialized it using similar technology.	2, 3, 35, 64, 66
MLCC	An acronym for multi-layer ceramic capacitor. These are capacitors made of multiple layers of ceramic dielectric bodies for greater capacity. In addition to consumer applications, in recent years they are being used often in electric automobiles so demand is expected to increase. The nickel paste produced by our Group is used in the internal electrodes of MLCCs.	36, 70, 75
MS	An acronym for mixed sulfides of nickel and cobalt. CBNC and THPAL produce a mixed nickel-cobalt sulfide intermediate containing about 55–60% nickel by weight. It is used as a raw material in the production of electrolytic nickel, nickel sulfate, and other products.	46, 63, 66
Nanban-buki	A smelting and refining method that uses lead to remove silver and impurities contained in crude copper. An alloy made by melting and rapidly cooling lead and crude copper containing silver is heated, and silver-containing lead, which melts out at a melting point below that of copper, is heated atop ash. The lead is absorbed by the ash and only the silver remains. This allows the collection of silver while obtaining high-purity refined copper.	2, 3, 12, 16
NCA	An acronym for a type of secondary battery cathode material composed primarily of N (nickel), C (cobalt), and A (aluminum).	46, 53, 55, 68, 69, 71, 76

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Nickel oxide ores (laterite ore)	While predominantly higher-grade sulfide ores are used in nickel refining, nickel oxide ores are more prevalent than nickel sulfides. High refining costs and technical issues have limited the use of oxide ores in nickel refining to date, but the SMM Group has succeeded in refining nickel from low-grade oxide ores based on HPAL technology.	3, 9, 66, 67, 91, 124, 141
NMC	An acronym for a type of secondary battery cathode material composed primarily of N (nickel), M (manganese), and C (cobalt).	46, 76
Off-JT	A method of training conducted away from the workplace or separate from normal work. Its aim is the acquisition of advanced work capabilities or other knowledge and skills not directly connected to normal work based on systematic knowledge and theory.	50, 108
OJT	An acronym for On-the-Job Training, this is a method of training for the acquisition of knowledge and skills through the performance of actual work in the workplace under the guidance of superiors or senior colleagues. Its aim is the fast acquisition of work execution capabilities.	50, 61, 94, 108
Pyrometallurgical smelting	A refining method in which precursor ore is smelted at high temperature in a furnace and metals are separated in a molten state. While this technique allows processing large volumes of ore at once, it also requires periodic repair of the heatproofing equipment.	72
Secondary battery cathode materials	Materials used in the cathodes of batteries (secondary batteries) that can be charged and reused. The constituent components of secondary batteries break down roughly into cathode material, anode material, a separator, and electrolytic solution. The SMM Group produces the cathode materials used in electric and hybrid automobiles, as well as lithium-ion secondary battery cathode materials.	3, 21, 70-72, 74-76
Smelting & Refining	This refers to the extraction of valuable metals from ore and other raw materials, and is mainly divided into pyrometallurgical refining and hydrometallurgical refining. The SMM Group's Toyo Smelter & Refinery in Saijo, Ehime Prefecture uses pyrometallurgical refining in its upstream processes (treatment processes), while Niihama Nickel Refinery in Niihama, Ehime Prefecture uses only hydrometallurgical refining throughout.	2, 3, 10-16, 18-21, 24, 27, 34-36, 41, 43, 45-47, 51-55, 62-67, 69, 72, 74-76, 84, 85, 88, 90, 91, 110-112, 114, 115, 118, 120-124, 126-128, 130, 134, 139-141
Taganito HPAL Nickel Corporation (THPAL)	The SMM Group's second HPAL plant. Located in the Province of Surigao del Norte in the Philippines, THPAL produces mixed nickel-cobalt sulfides (MS) using HPAL technology for export to the Group's Niihama Nickel Refinery and Harima Refinery.	3, 14, 26, 32, 42, 43, 46, 52, 53, 55, 62-67, 90-93, 101, 111, 117, 121, 125-127, 130, 135, 136, 138, 141
TC/RC	An acronym for treatment charge and refining charge. These are costs that make up a part of the terms of purchase of metal raw materials (copper concentrate, nickel ore, etc.). As an example, the LME price at a given point in time, minus the TC/ RC used in the transaction (plus other terms) is used as the purchase price of copper concentrates.	65