Mineral Resources Business

SMM uses the technology accumulated from operating Besshi Copper Mine (opened in 1691) and incorporates it in operations of Hishikari Mine (opened in 1985) and other overseas mines (since 2006). Additionally, SMM acts as a professional mine developer and operator seeking out superior resources in regions around the world, while participating in mining operations, pursuing exploration projects, and proceeding with surveys to develop new mines.

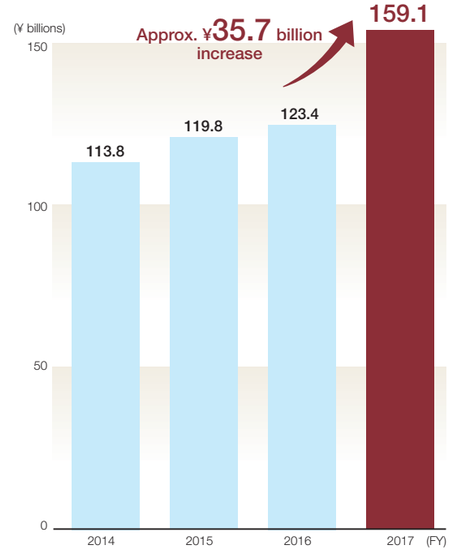
Hiroshi Asahi
Director,
Managing Executive Officer,
General Manager of Mineral Resources Div.

Business Environment and Priority Measures for the 2015 3-Year Business Plan

Prices of non-ferrous metals in FY2017 saw copper and gold continue to go up with prices for both being higher than in the previous fiscal year. We expect the market for non-ferrous metals to continue to perform strongly in FY2018, maintaining levels roughly in line with the balance of supply and demand. Meanwhile, conditions grow more difficult for the environment surrounding resource development, so SMM is focusing on efforts that include advancing technologies in areas such as exploration and mineral processing, while also strengthening partnerships with nations, local communities, and resource companies around the world.

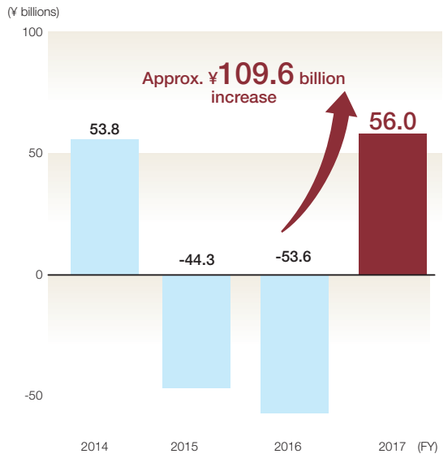
In our mineral resources business, we are promoting full-scale production at the Sierra Gorda Copper Mine and the acquisition of new gold interests as priority measures of our 15 3-Yr Business Plan.

Segment Net Sales



Hishikari Mine continued to operate smoothly so 6.0 tons of gold were sold, as planned. Pogo Gold Mine's production volume was roughly level with the previous fiscal year at 8.4 tons, while production volume for the Morenci Copper Mine declined year-on-year, partially due to a decline in the grade of copper ore.

Segment Profit



Segment profit improved significantly year-on-year due to factors including a rise in copper prices and a decrease of investment loss by equity method associated with the Sierra Gorda Copper Mine, and despite the recording of royalties on Cerro Verde Copper Mine from past fiscal years that were levied on mining businesses.

FY2017 Initiatives

Hishikari Mine operations proceeded according to plan. At the Pogo Gold Mine, despite a decline in the grade of gold ore, an increase in the amount of ore extracted kept performance level with the previous fiscal year. Production volume at the Morenci Copper Mine declined year-on-year due to a decline in the grade of copper ore, but this fiscal year was the first full year of seeing the effects of increasing our interest to 25%, which resulted in an increase in the production and sales volumes reflected in our results.

At the Sierra Gorda Copper Mine, we focused on making improvements through initiatives such as dispatching a team of SMM engineers to provide technical support. As a result, processing volume is currently at a level close to full-scale operations. In FY2017, full year copper production volume increased year-on-year to 97,000 tons.

With regard to acquiring new interests in gold, which is deviating from the targets set forth in the Long-Term Vision, we acquired a 27.75% interest in the Côté Gold Project in Canada. We also decided to withdraw from a nickel exploration project we had been proceeding on in the Solomon Islands.

In the mineral resources segment, net sales were ¥159.1 billion (up 29% compared to FY2016), a significant improvement, due to factors including a rise in copper prices and a decrease of impairment loss at the Sierra Gorda Copper Mine, and despite the recording at Cerro Verde S.A.A. of royalties from past fiscal years that were levied on mining businesses. We also recorded a profit of ¥56.0 billion, the first time in the black in three years.

FY2018 Priority Measures and the Outlook Going Forward

At the Sierra Gorda Copper Mine, we will continue advancing improvements aimed at increasing the stability and efficiency of operations and work on expanding production volume.

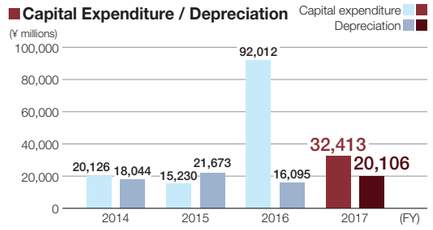
Regarding the Côté Gold Project, in which we have newly acquired an interest, we are currently conducting a feasibility study and are engaged in discussions with the aim of making the decision to transition to construction within FY2018. Operations are expected to begin in 2021. Regarding gold mines, we will continue to focus on our own exploration and activities aimed at acquiring interests. We will also continuously engage in initiatives aimed at acquiring interests for copper mines as well.

With respect to FY2018 segment performance, we are expecting net sales of ¥151.0 billion and profits of ¥51.0 billion.

Due to the voluntary application of IFRS, segment profit for the upcoming fiscal year is calculated based on income before income taxes.

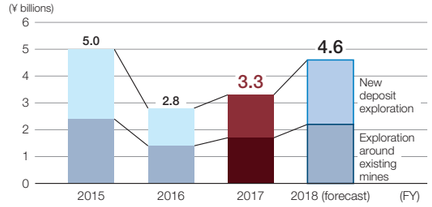
Performance in 2017

Capital Expenditure / Depreciation



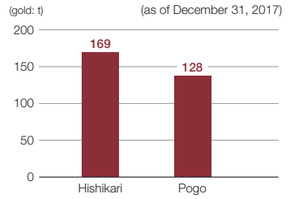
In FY2017, in addition to investment such as developing lower ore bodies at the Hishikari Mine, we acquired a 27.75% interest in the Côté Gold Project in Canada and invested in mining rights.

Exploration Costs



In FY2018, we will proceed with active exploration with a particular focus on gold.

SMM's Metal Interests by Mine



Hishikari Mine
Content of gold in minable ore according to JIS standards
Pogo Gold Mine
Reserve: 24 t
Resource: 104 t
(Canadian standard)

Metal reserves by mine, calculated as of December 31, 2017, are 169 tons (almost no change from last fiscal year) at Hishikari Mine and 128 tons (down 9 tons from last fiscal year) at Pogo Gold Mine.

Mineral Resources Business

Strengths of the Mineral Resources Business and Activities that Support Growth Potential and Sustainability

Strength ❶

Accumulated mining and exploration technology

Along with utilizing the Hishikari Mine as a site for nurturing mining engineers, SMM fosters human resources with expertise in and knowledge of mine exploration, development, and operation. We also dispatch engineers to overseas mines in which we hold an interest.

Strength ❷

Robust relationships of trust with our partners

In preserving our mine interests, SMM goes beyond just investing and dispatches employees and forms cooperative technology relationships. This leads to stable operations and improvements at mines which enable us to earn a high degree of trust from our partners.

Strength ❸

Co-existing with local communities

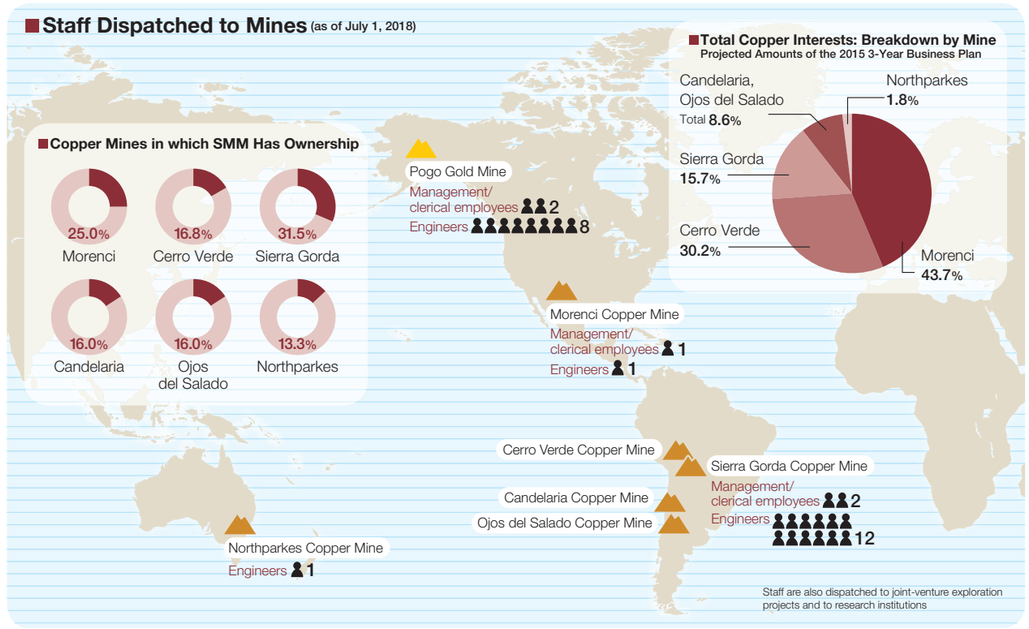
By carrying out dialogue with stakeholders, we listen to the needs and concerns of local communities, striving for responsible environmental management and developing and operating mines in harmony with these groups.

Strength ❹

High-precision techniques for evaluating profitability

When acquiring mine interests, the vast amounts of mine-related information that we have accumulated over many years enables us to conduct highly-accurate profitability evaluations concerning reserves, investment amounts, risk, and other aspects.

Staff Dispatched to Mines (as of July 1, 2018)



Total Copper Interests: Breakdown by Mine

Projected Amounts of the 2015 3-Year Business Plan

Sustainability

Waste Management

The Appropriate Management of Tailings Dams (Slag Accumulation Sites)

The sustainable development and operation of mines requires a variety of initiatives to minimize the impact on the environment. One of these is managing accumulation sites for the spoil, slag and deposits produced by mines.

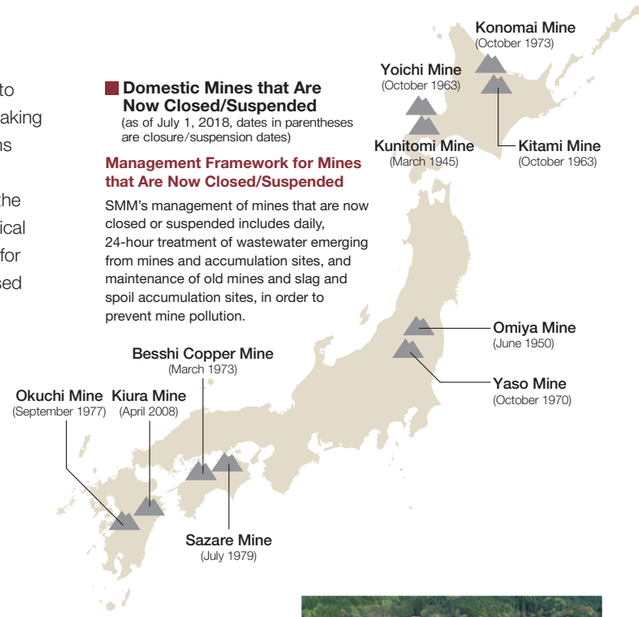
In regard to global conditions, tailings dams have collapsed at mines in Canada and Brazil and, as a result, the ICMM (International Council on Mining and Metals) formulated a new basic policy on tailings dam management in December 2016. In Japan, the Great East Japan Earthquake caused tailings dam accretion leakages at mines no longer in operation, affecting rivers, railways, and farmland. Accordingly, the Ministry of Economy, Trade and Industry revised its Technology Policy in 2012, meaning that at facilities for which "special conditions"[1] apply, stability evaluations for large-scale seismic vibration[2] are mandatory.

As a member of the ICMM, SMM is responding to both domestic and international conditions by undertaking stabilization measures for tailings dams in 56 locations nationwide that are managed by the SMM Group. Of the 10 locations to which the "special conditions" in the Ministry of Economy, Trade and Industry's new technical guidelines apply, measures were deemed necessary for a total of five facilities at the Okuchi (Kagoshima, closed in 1977) and Konomai (Hokkaido, closed in 1973) mines. Roughly ¥4.5 billion was invested on stabilization work at these mines from FY2014 to FY2015. Furthermore, even for tailings dams to which "special conditions" do not apply, seismic resistance is being reevaluated for midscale seismic vibrations based on the previous technical guidelines. Stabilization work is being performed in turn for each of the six locations that were determined to be insufficient.

1. (1) Inner-aggregation slime storage areas filled higher than the base embankment; (2) accumulation sites that are saturated or where the permeation level is within 10 m of the accumulation surface (excluding cases where the permeation level or saturated portion is below the dam crest of the base embankment); (3) accumulation sites with accumulations of 50,000 m^3 or more (including even those below 50,000 m^3 if there are important structures immediately below and or damage could result from an outflow).
2. The highest level of seismic vibrations conceivable at the time of installation.

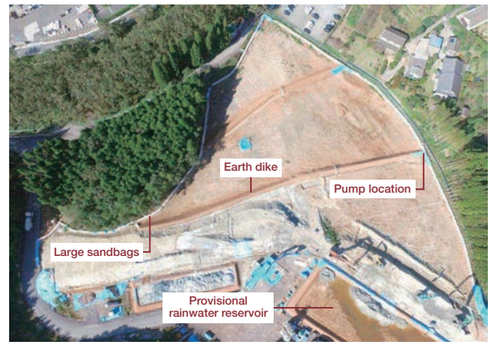
Domestic Mines that Are Now Closed/Suspended

(as of July 1, 2018, dates in parentheses are closure/suspension dates)



Management Framework for Mines that Are Now Closed/Suspended

SMM's management of mines that are now closed or suspended includes daily, 24-hour treatment of wastewater emerging from mines and accumulation sites, and maintenance of old mines and slag and spoil accumulation sites, in order to prevent mine pollution.



Stabilization work at the Okuchi slag accumulation site no. 1 (left) and greened state following the work (above)

Growth

Human Resources Development

SMM's Mining School for Cultivating Mining Engineers

Hishikari Mine is one of the largest working gold mines in Japan. It is also our main business site and plays an important role as a place for cultivating mining engineers and passing on advanced technological capabilities.

As mining operations require engineers with advanced, specialized knowledge and experience, the SMM Group assigns new graduates of mining and geology to Hishikari Mine for four or five years of on-the-job training (OJT) which provides them with specialized skills and the fundamentals of mine operation technologies. After graduating from the Mining School, they are sent to support existing mines overseas, or to identify and develop new mining projects, resulting in engineers who are capable of performing at locations all over the world.

New employees receiving training inside the mine

Mineral Resources Business

Sustainability

Contribution to Society and Local Communities

Awarded the Viola R. MacMillan Award by the PDAC

SMM and IAMGOLD Corporation, a Canadian gold producer, were jointly awarded the 2018 Viola R. MacMillan Award by the Prospectors & Developers Association of Canada (PDAC).

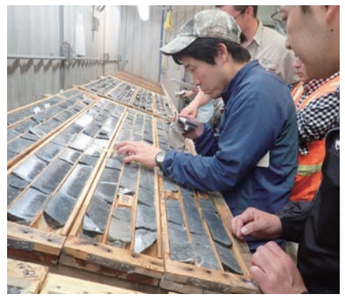
SMM has acquired a 27.75% interest in IAMGOLD's Côté Gold Project and is actively participating in developing the project. The Côté Gold Project is a large-scale open pit mining development project being advanced in the Abitibi region of eastern Canada, one of the world's leading gold belts. Currently it is at the feasibility study stage and upcoming explorations may reveal additional resource volumes.

SMM and IAMGOLD have concluded a joint venture agreement and the project has made great strides forward under our strong partnership. The plentiful expertise to be accumulated in areas such as the management of overseas development projects has proven to be invaluable for SMM's mineral resources business. Furthermore, the Côté Gold Project is not only promising to become an important asset for both companies but is also expected to have significant economic effects for Canada and the local community.

We received this Award because these activities are appreciated. The award is named after Viola MacMillan, who contributed to the operation of the PDAC for many years and is given to individuals or organizations demonstrating leadership in management and financing for the exploration and development of mineral resources. The PDAC has about 7,500 individual and corporate members worldwide and the annual PDAC Convention is regarded as the premier international event for the mineral industry. SMM is the first Japanese recipient of an award from the PDAC.

The award ceremony at the PDAC Convention. From the left: Hiroshi Asahi, Director, Managing Executive Officer and General Manager of SMM's Mineral Resources Division; Edward Thompson, PDAC Award Committee member; Donald K. Charter, Chairman & Director of IAMGOLD.





Field investigations as part of the Côté Gold Project

From:
Stephen J. J. Letwin
President and CEO
IAMGOLD Corporation

A message to the management and stakeholders of Sumitomo Metal Mining Co., Ltd. from Stephen J. J. Letwin, President & CEO, IAMGOLD Corporation

The Côté Gold Project: the joint venture between Sumitomo Metal Mining Co., Ltd. & IAMGOLD Corporation

I am delighted to address this message to the many people who contribute to the success of Sumitomo Metal Mining Co., Ltd., inside and outside the company.

Earlier this year, IAMGOLD Corporation was honoured to share the PDAC 2018 Viola R. MacMillan Award with Sumitomo which recognizes the value of our joint commitment to Côté Gold - one of Canada's largest undeveloped gold deposits - and the innovative spirit which can help us turn this project into a 'mine of the future'.

While Sumitomo and IAMGOLD may be based on opposite sides of the world, we share many values. We are bound by a resolute commitment to operational excellence, financial discipline and the highest standards of sustainability as we strive to benefit not only our businesses, but society as a whole.

It's clear that with Sumitomo's expertise in building and operating world-class mines, IAMGOLD has found a valuable partner. We believe our joint venture represents a significant step forward for both companies.

We thank you for your support and look forward to achieving great things together.

Stephen J. J. Letwin
President & CEO,
IAMGOLD Corporation

Smelting & Refining Business

SMM smelts and refines raw materials procured from a variety of sources, mainly from mines where we have an interest, into such metals as copper, nickel, and gold. SMM possesses world-class smelting and refining technology; we were the first in the world to commercialize recovery of nickel from low-grade nickel oxide ore, which had been difficult with conventional technologies. We are working on polishing this technology and on strengthening our sales and other capabilities through cooperation between the three businesses.

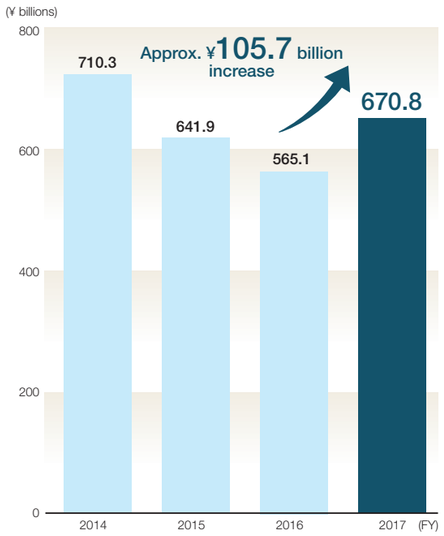
Nobuhiro Matsumoto
Executive Officer,
General Manager of Non-Ferrous Metals Div.

Business Environment and Priority Measures for the 2015 3-Year Business Plan

In the FY2017 business environment, non-ferrous metal prices rose, with the prices for copper and nickel both growing year-on-year, which together with factors such as the depreciation of the yen resulted in favorable conditions overall. Going forward we expect supply and demand for copper and nickel to stay roughly balanced or fall a little short on the supply side, resulting in the same basic price trend continuing. Also, we are expecting demand for the high-purity nickel material that we produce to get even stronger going forward as the expansion of the market for secondary batteries for eco-friendly cars increases.

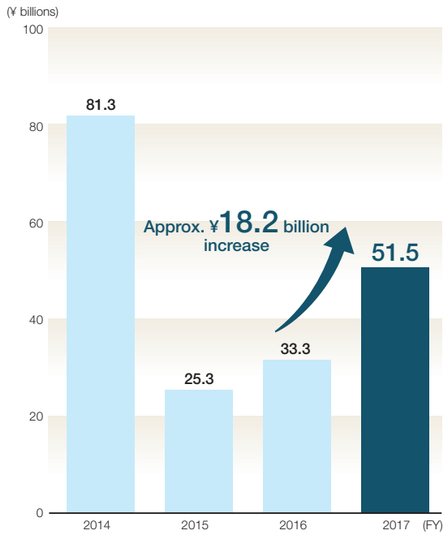
In our smelting and refining business, we are promoting the expansion of Taganito HPAL Nickel Corporation (THPAL), advancing growth strategies using peripheral HPAL technologies, and enhancing competitiveness of the copper smelting business as priority measures of our 15 3-Yr Business Plan.

Segment Net Sales



Production levels and sales volume of gold increased year-on-year, but production levels and sales volumes of copper, nickel, and ferro-nickel decreased. Production volumes of nickel intermediate materials at CBNC and THPAL were roughly level with the previous fiscal year.

Segment Profit



Segment profit grew year-on-year, mainly due to increases in non-ferrous metal prices and depreciation of the yen.

FY2017 Initiatives

Production levels and sales volume of gold increased year-on-year. Production levels and sales volumes of copper and nickel decreased year-on-year mainly due to a decline in ore grades. Production levels at Coral Bay Nickel Corporation (CBNC) and THPAL remained roughly level with the previous fiscal year.

In FY2017, we further enhanced efforts aimed at transitioning operations at the Harima Refinery and achieved a 49,000-ton nickel sulfate production structure. At THPAL, we achieved a 36,000-ton structure.

At the Toyo Smelter & Refinery, in addition to maintaining its 450,000-ton structure at full production we worked on improvements to increase yields and reduce costs. And at Hyuga Smelting Co., Ltd., which produces ferro-nickel, we continued to engage in initiatives to enhance productivity, such as by securing higher-grade nickel ores and increasing the processing capabilities of its electric furnaces.

As a result of these initiatives, the smelting and refining segment's net sales were ¥670.8 billion (up 19% compared to FY2016) and profits were ¥51.5 billion (up 55% compared to FY2016).

FY2018 Priority Measures and the Outlook Going Forward

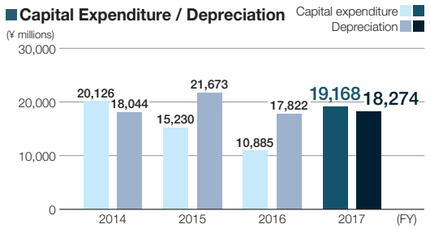
We will maintain the production structures built in FY2017 and continue to implement improvements aimed at increasing productivity and reducing costs. New initiatives will include advancing development of a process for recovering cobalt, which our current recycling process is unable to do, to return lithium-ion secondary batteries to resources. We expect operations at a pilot plant to begin within FY2018.

HPAL technology is one of SMM's strengths and in order to focus on increasing its competitiveness, we plan to start commercial production of scandium at THPAL in FY2018. We are also proceeding with the construction of a plant for recovering chromite, another byproduct of the HPAL process, with production forecast to begin in 2020. Also, to realize our long-term goal of a 150,000-ton nickel production structure, we will proceed with serious considerations regarding investment in the Pomalaa Project being advanced in Indonesia.

With respect to FY2018 segment performance, we are expecting net sales of ¥630.0 billion and profits of ¥61.0 billion.

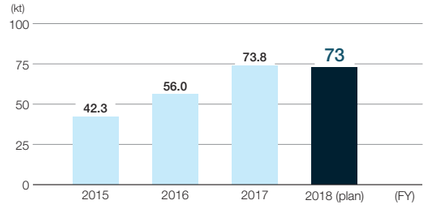
Performance in 2017

Capital Expenditure / Depreciation

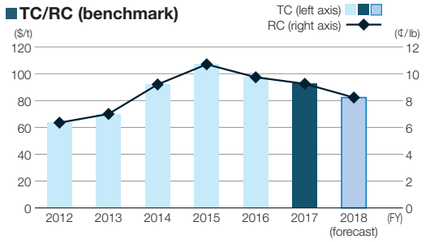


Capital expenditure in FY2017 includes strengthening nickel sulfate production facilities and investment in overseas facilities such as THPAL.

Production Volume of Nickel Sulfate



TC/RC (benchmark)



TC: Treatment Charge
RC: Refining Charge
Costs included as part of the conditions of purchase of metal ores (copper concentrates, nickel ore, etc.). For example, the purchase price for copper concentrates uses the following conditions: LME price at a specific time minus the TC/RC used in the transaction (plus various other conditions).

Due to the voluntary application of IFRS, segment profit for the upcoming fiscal year is calculated based on income before income taxes.

Smelting & Refining Business

Strengths of the Smelting & Refining Business and Activities that Support Growth Potential and Sustainability

Strength ❶

Refineries with robust cost competitiveness

We have achieved world-class cost competitiveness in copper and nickel smelting and refining through measures to improve production efficiency implemented over more than 40 years of operations at the Toyo Smelter & Refinery, and the combination of HPAL technology and the MCLE process[1] of the Niihama Nickel Refinery.

Strength ❷

Use of low-grade nickel oxide ore with HPAL technology

Producing nickel intermediates from low-grade nickel oxide ore using HPAL technology, allows for the efficient use of limited nickel resources and the stable supply of cost-competitive nickel raw material.

Strength ❸

Co-existence with local communities

By carrying out dialogue with stakeholders, listening to the needs and concerns of local communities, and operating our smelters and refineries in harmony with these groups and with responsible environmental management, we strive to stably supply our products.

1. MCLE = Matte Chlorine Leach Electrowinning

SMM Group Refineries and Their Main Products

Growth

Development of New Applications and Effective Use of By-Products

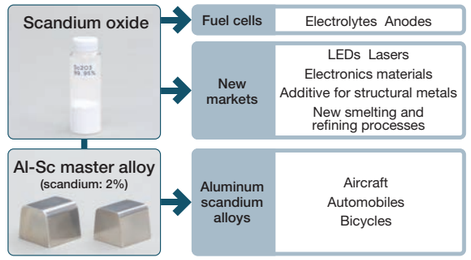
Full-Scale Commercial Production of Scandium and Chromite

SMM is beginning the full-scale commercial production of scandium and chromite. These are produced as byproducts of HPAL technology, which SMM was the first in the world to successfully commercialize, and we are proceeding with the construction of a recovery plant at THPAL.

Scandium is expected to be used in applications such as fuel cells, and SMM has already concluded a long-term sales agreement with a major US-based company that will use it for fuel cells. And chromite is used widely as a material for specialty steels, such as stainless steel.

By proceeding to efficiently recover these resources, SMM will increase the added value of HPAL technology and further improve the superiority of its nickel business.

Potential of Scandium



Growth

Utilizing Unused Resources

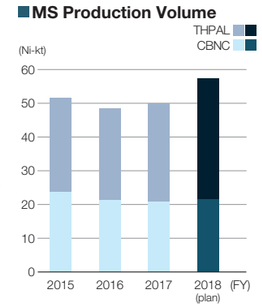
Producing High-Quality Products from Low-Grade Nickel Oxide Ore

At Taganito HPAL Nickel Corporation (THPAL) in the Philippines, we produce a mixed nickel-cobalt sulfide called mixed sulfide (MS). Next, the Niihama Nickel Refinery and Harima Refinery in Japan refine this MS, producing electrolytic nickel, electrolytic cobalt, nickel sulfate, etc. This HPAL process enables the recovery of nickel and cobalt from low-grade nickel oxide ore, which couldn't be smelted and refined with traditional technology. It is garnering attention as a way of effectively using previously untapped resources.

Nickel and cobalt are used in cathode materials for automotive secondary batteries. In recent years, auto manufacturers around the world have been planning to increase production of electric vehicles (EV), so the stable supply of raw materials is a pressing issue. As a result, although commercial production at THPAL started at 30,000 tons per year, the target for its eventual production capacity was revised upwards from initial plans to 36,000 tons per year. Investment in increasing production capacity proceeded according to plan and in FY2017, we achieved a capacity of 36,000 tons. Also, enhancement of the nickel sulfate plant at the Harima Refinery, aimed at processing the increased amount of MS produced into a raw material for battery materials, was completed in 2016.

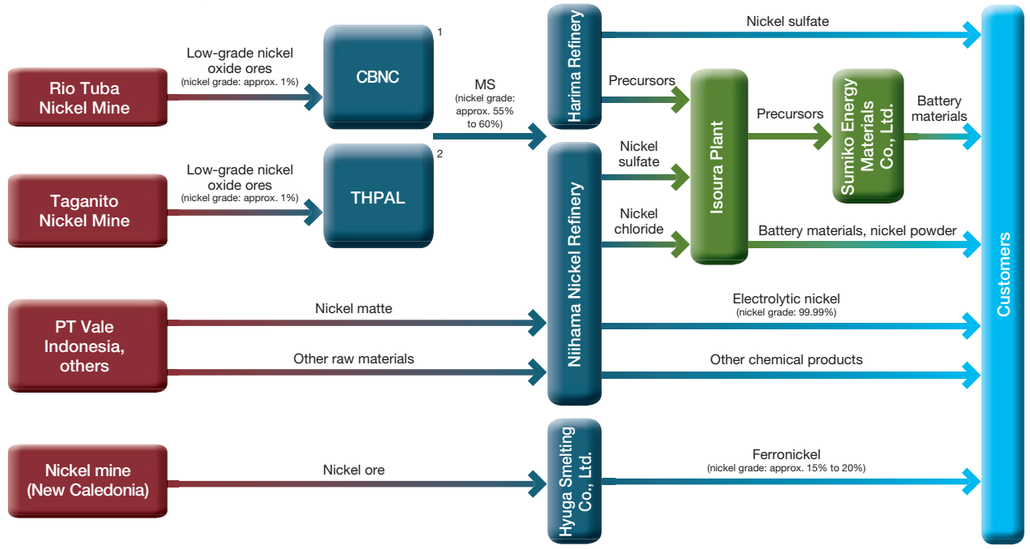
Starting with nickel and cobalt, SMM can procure resources for which demand is expected to rise by our supply chain, and our manufacturing process centered on HPAL technology has realized the commercial production of high quality products at low cost. Being able to manufacture and stably provide users with materials, especially nickel and cobalt, for which supply and demand and prices vary widely, is an SMM strength that other battery material manufacturers do not have.

MS Production Volume



Low-grade nickel oxide ore for THPAL

The Nickel Supply Chain



1. Coral Bay Nickel Corporation (CBNC): Shareholders: Sumitomo Metal Mining Co., Ltd. (54%); Mitsui & Co., Ltd. (18%); Sojitz Corp. (18%); Nickel Asia Corporation (10%). Head Office: Rio Tuba, Bataraza, Palawan Province, Philippines.
2. Taganito HPAL Nickel Corporation (THPAL): Shareholders: Sumitomo Metal Mining Co., Ltd. (75%); Mitsui & Co., Ltd. (15%); Nickel Asia Corporation (10%). Head Office: Taganito, Surigao del Norte Province, Philippines.

Smelting & Refining Business

Sustainability

Contribution to Society and Local Communities

Coral Bay Nickel Corporation (CBNC) Wins Presidential Mineral Industry Environmental Award for Fourth Consecutive Year

CBNC, an SMM Group company in the Philippines, is working on the rehabilitation of tailings dams, which is planting greenery to restore vegetation. The objective of this rehabilitation is to establish a self-supporting, sustainable ecosystem, and through such measures as improving the soil, it is resuscitating a broad tract of green land. CBNC is working with Rio Tuba Nickel Mining Corporation (RTN), a supplier of raw material ore, on social contribution programs in 22 villages (barangays), under the SDMP.[1] Examples of initiatives being advanced include infrastructure development, operation of schools and hospitals, establishment of educational programs, improvement of sanitation, and other initiatives, based on exchanges of ideas with local communities.

CBNC's work with tailings dams and other activities has been appreciated, and in 2017, the company received the Presidential Mineral Industry Environmental Award from the Department of Environment and Natural Resources of the Philippines for the fourth consecutive year. This award is given based on a comprehensive evaluation of the plant that includes environmental management, safety management, regional conservation and contributions to the local community and, as a result, it is the most prestigious award in the Philippine mining industry. In addition, CBNC also received the Best Mining Forest Award (second place) and the Safest Mineral Processing Extraction Award, winning all three awards just as it did in 2016.

CBNC's activities have attracted attention from all over the world, and it has welcomed observation missions from many countries. Going forward, too, the company will work on socially responsible operations, not only by minimizing its environmental impact, but also by further intensifying its social contribution activities, including providing infrastructure for surrounding communities and engaging in local hiring and procurement.

1. SDMP: Social Development and Management Program, a social contribution program established under the Philippine Mining Act.

Award ceremony for the 2017 Presidential Mineral Industry Environmental Award

Sustainability

Consideration of the Ecosystem and Preservation of Biodiversity

Reducing the Environmental Impact of Constructing New Plants

CBNC and THPAL in the Philippines produce electrolytic nickel intermediates. To construct a refinery in the Philippines, we first had to obtain an Environmental Compliance Certificate (ECC) from the Department of Environment and Natural Resources (DENR). This required submitting an Environmental Impact Assessment (EIA).

When constructing the refinery, we sought adequate dialogue with the Philippine government, local authorities and local citizens right from the planning stage. Efforts were made to construct a plant that would have a minimal impact on the environment. For example, a pier used to deliver sulfuric acid and methanol to the plant was made to circle around the coral reef, and wastewater outlets were also positioned to ensure the reef's protection.

CBNC began operations of the refinery in April 2005 based on a design certified by the DENR, and was followed by THPAL in October 2013. The refineries have set up Environmental Management Offices (EMO) as bodies to promote environmental initiatives in operations. Besides environmental surveys by the EMO, the environment is monitored by a team of representatives from organizations such as the DENR, local authorities and NGOs which carry out regular sampling of the air, water, flora and fauna. With this sort of environmental monitoring, we check that the construction and operation of plants do not have serious impacts on the ecosystem, while keeping environmental impacts from wastewater and other factors to a minimum.

Coral transplanting by CBNC

Growth

Human Resources Development

Launching a "Smelting & Refining University" to Cultivate Engineers

From March to July 2017, SMM held a "Smelting & Refining University." This was a new educational program aimed at new employees working in metal-related roles. It was attended by employees recruited in FY2016 who have already been assigned to divisions and, after having gained a little experience, have them learn anew in an off-the-job environment, with the aim of providing them with problem-solving abilities by linking workplace production and theory.

In recent years, universities with non-ferrous metal curricula have reduced the time spent learning about metallurgical processes and there are fewer chances to study the theory behind the actual production of refined products. Also, SMM divisions handling metals have seen an increase in new employees who have majors other than materials (formerly metallurgy), so creating venues where they can acquire specialized knowledge after joining the company has become a pressing human resource development concern.

The 2017 Smelting & Refining University involved two lectures a week, given by lecturers including researchers from the Niihama Research Laboratories and section managers from various plants. Participants said that understanding the differences in production at different plants will prove to be a useful asset and the program gave them a valuable opportunity to acquire specialized knowledge and learn how to approach problems as a smelting and refining engineer. Going forward, we intend to continue holding the Smelting & Refining University program and focus on cultivating smelting and refining engineers to take over the skills and technologies developed by us.

The opening ceremony of the Smelting & Refining University

Growth

Utilizing Unused Resources

Receiving a 2018 Invention and Innovation Award

SMM's "Method for wet-smelting of nickel oxide ore"[1] has won the "Japan Business Federation Chairman's Special Award"[2] at the 2018 Invention and Innovation Awards given by the Japanese Institute for Promoting Invention and Innovation. Also, President and Representative Director (at that time) Yoshiaki Nakazato was awarded the "Award for Achievement in Invention."[3]

The Japanese Institute for Promoting Invention and Innovation established the Invention and Innovation Awards with the aim of contributing to the encouragement and cultivation of innovation, enhancing Japanese science and technology, and promoting industry. SMM received these awards in recognition of realizing the commercialization of a smelting and refining process for recovering nickel and cobalt from low-grade oxide ore using HPAL technology.

The June 12, 2018 awards ceremony

1. Japanese patent number 4525428.
2. The award was accepted by five representatives of SMM, including Adviser Naoyuki Tsuchida and General Manager of the Technology Div. Masaki Imamura.
3. If the inventions that win the award were produced by a corporate organization, then the award is presented to the representative of the organization.

Materials Business

Since the 1960s, SMM has been leveraging the strengths of its mineral resources and smelting and refining businesses to develop its materials business. In recent years, we have been carrying out structural reform centered on advanced materials, cultivating the battery and crystal materials business pillars, and are close to contributing to profits. In addition, we are actively working on developing new areas of business.

Harumasa Kurokawa
Director,
Senior Managing Executive Officer,
General Manager of Materials Div.

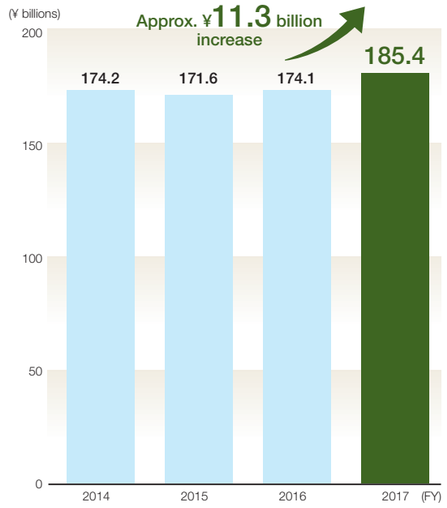
Business Environment and Priority Measures for the 2015 3-Year Business Plan

FY2017 saw a generally strong environment surrounding the electronics materials industry, although many changes were seen. The electric vehicle (EV) market grew, which drove an increase in demand for automobile battery materials, an area SMM is focusing on. Regarding SAW filters used in smartphones, a decrease in smartphone production in China and other countries prolonged inventory adjustments by customers, resulting in a decline in sales.

The EV market is becoming fully established on a global scale, so we forecast continued growth in demand for battery materials. Regarding crystal materials for SAW filters, we predict that customer inventory adjustments will continue for the time being, but the smartphone and other markets are still showing signs of growth, so we expect demand to recover. We will keep a close watch on market movements and maintain a production structure that enables a quick response.

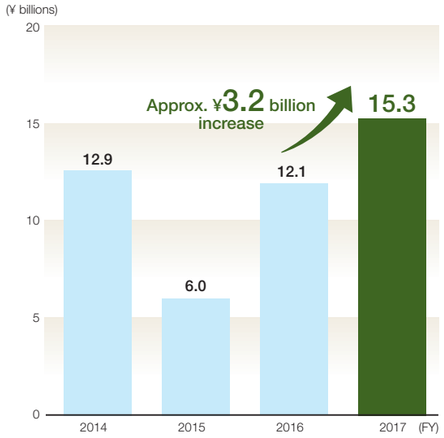
In our materials business, profit contribution from expanded production of battery and crystal materials, and continuous creation of next-generation products and making them strong competitors, have been positioned as priority measures of our 15 3-Yr Business Plan.

Segment Net Sales



Net sales increased due to factors including significant year-on-year growth in automobile battery material production volume and sales following investment in increasing production.

Segment Profit



Segment profit increased due to a rise in demand for battery materials and powder materials for use in automobile applications, despite a significant year-on-year fall in sales of crystal materials for smartphone components due to customer inventory adjustments.

FY2017 Initiatives

For battery materials, we invested in increasing production of NCA, a material used in batteries for EVs, for a 3,550-ton monthly production structure, and proceeded to strengthen facilities. We are also close to completing the enhancement of structures that contribute to profits, such as the expansion of production of nickel hydroxide for use in hybrid vehicles. Sales of crystal materials fell significantly year-on-year due to a slump in demand. In regard to creating new business, we acquired 51% of the shares of SICOXS CORPORATION, a company developing SiC[1] substrates for use in next-generation power semiconductors.

Regarding our withdrawal from the lead frame business, we have completed the transfer of our overseas operations and we continued to undertake structural reform.

As a result of these initiatives, the materials segment's net sales were ¥185.4 billion (up 7% compared to FY2016) and profits were ¥15.3 billion (up 27% compared to FY2016).

FY2018 Priority Measures and the Outlook Going Forward

For battery materials, in FY2017 we realized a 3,550-ton monthly NCA production structure. We have already started enhancing this, aiming for a 4,550-ton monthly production structure, and we will continue to watch market trends closely and consider further increases. For crystal materials, we will optimize production structures to increase efficiency and reduce costs, and put together a structure that enables a quick response to changes in demand.

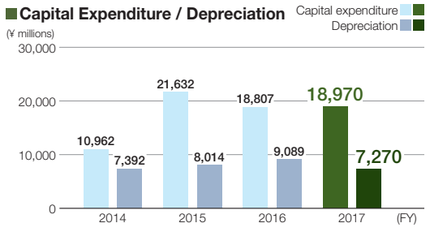
In FY2018, we plan to begin operation of a pilot plant for our SiC business, with the aim of quickly realizing commercialization. We will also continue with the establishment of a pilot plant to produce high-purity nickel oxides for fuel cells to meet the needs of new markets.

With respect to FY2018 segment performance, we are expecting net sales of ¥227.0 billion and profits of ¥15.0 billion.

1. SiC: Silicon carbide

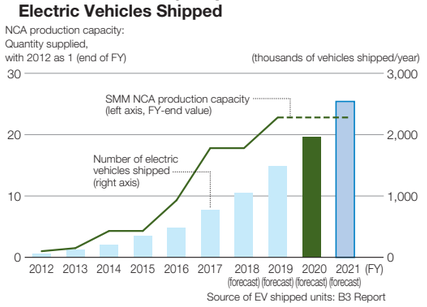
Performance in 2017

Capital Expenditure / Depreciation



We are investing in enhancing battery material production facilities.

NCA Production Capacity and Number of Electric Vehicles Shipped



Source of EV shipped units: B3 Report

It is forecast that demand for electric vehicles will continue to grow significantly going forward. SMM is increasing production of NCA, a cathode material, in accordance with this growth.

Due to the voluntary application of IFRS, segment profit for the upcoming fiscal year is calculated based on income before income taxes.

Materials Business

Strengths of the Materials Business and Activities that Support Growth Potential and Sustainability

Strength ❶

Rolling out products leveraging core technologies

SMM is building a profitable product portfolio leveraging its core technologies, while dedicating effort to products in fields with growing demand—fields related to the environment and energy, as well as information communications. When formulating strategies, we consider how each product fits into the overarching strategy for the materials business, and then make decisions for each business domain.

Strength ❷

Relationships with market-leading customers

We take information provided by customers and connect it to making even better products by reflecting it in quality improvements. Collaboration with customer R&D departments, SMM's smelting and refining business, and others, enables us to produce a stable supply of products that meet customer needs.

Strength ❸

Co-existence with local communities

We are working to maintain employment levels and moving forward with restructuring our business by shifting to growth products and adopting new business projects at each business site in balance with securing profitability for the materials business.

SMM Products in Daily Life

Growth

Utilizing Unused Resources

Achieving Japan's First "Battery to Battery" Recycling

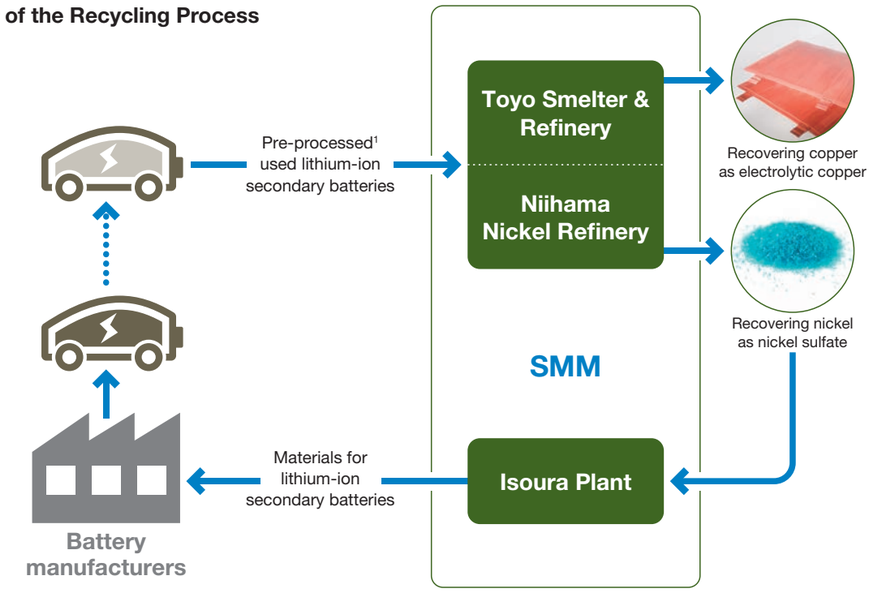
SMM is implementing the first recycling in Japan of lithium-ion secondary batteries. This process recovers the copper and nickel from used batteries. By processing the recovered nickel into battery materials, we have achieved "battery to battery" recycling for waste lithium-ion secondary batteries.

Compared with nickel-metal hydride batteries, the amounts of valuable metals contained in lithium-ion secondary batteries are small, making the development of cost-effective recycling processes difficult.
SMM resolved such issues through a fusion of the advanced technologies it has accumulated. We have established a processing flow that combines the copper pyrometallurgical refining process of the Toyo Smelter & Refinery and the nickel hydrometallurgical refining process of our Niihama Nickel Refinery. By accurately controlling the concentration of impurities in the raw materials, we have recovered copper and nickel. The recovered nickel is first processed into nickel sulfate at our Niihama Nickel Refinery, and then into cathode materials for secondary batteries at our Isoura Plant. Through this cycle, we have achieved Japan's first "battery to battery" recycling from waste lithium-ion secondary batteries.

The high-purity nickel used in lithium-ion secondary battery cathode materials is rare even among nickel products. It is important for SMM, as a manufacturing company, to establish a stable and efficient system to supply materials using this high-purity nickel to customers. It is also an initiative that will contribute to global resource recycling and to the formation of a sound material-cycle society in Japan. SMM will continue to develop unique technologies in our field.

Isoura Plant

Flow of the Recycling Process



1. Pre-processed: to make it harmless by heat treatment or other means

Materials Business

Growth

Development of Products and Technologies that Contribute to Reducing Environmental Impact

Tackling Global Warming Through the Supply of Materials

The SMM Group sees supplying manufacturers in Japan and overseas with specialty materials to support the functions of products with a low environmental impact to be one of its contributions to a more sustainable society. By focusing on energy-related materials, the SMM Group is expanding its business in domains related to the creating, storing, and saving of energy.

In the energy creation domain, we provide nickel oxide powder, which is used in the electrodes of solid oxide fuel cells (SOFC). Fuel cells are clean and highly efficient power generation systems that convert hydrogen and oxygen into electricity and heat, and their use is expected to grow as plans to promote them are being formulated in countries all over the world.

In the energy storage domain, we are contributing to the realization of a mobile society with low environmental impact by engaging in the supply of high-quality nickel-containing materials for cathodes used in the batteries required by environmentally friendly vehicles, such as EV. In the auto industry, initiatives to suppress greenhouse gas emissions are being promoted globally, as demonstrated in Europe, China, and California, and demand for these kinds of vehicles is growing greatly as a result.

In the energy saving domain, we are manufacturing functional inks, such as cesium tungsten oxide (CWO) to block infrared rays. Films with these inks are applied to glass, or included in an interlayer film or directly in polycarbonates, to block the near-infrared rays contained in sunlight, therefore greatly reducing temperature increases. Currently, these are being widely used in vehicle windows, building windows, and semi-transparent roofs when design or allowing daylight in is an important consideration, and are making a significant contribution to energy efficiency.

■ SMM Group's Contribution to Environmentally-Friendly Products

Domain/Product	Energy Creation	Energy Storage	Energy Saving
		 Photo credit: Toyota Motor Corporation	
	Solid oxide fuel cells Nickel oxide powder	Secondary batteries Cathode materials	Smart grid/connected cars LT/LN, FRs,[1] OIs[2]
	Solar cells IWO	Battery materials Nickel sulfate	Vehicles and buildings Near-infrared shielding inks
			High-efficiency motors Magnetic materials

1. FR: Faraday rotator
2. OI: Optical isolator

Growth

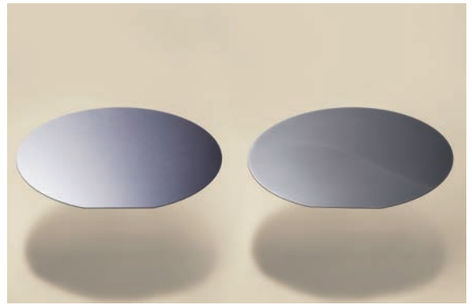
Development of Products and Technologies that Contribute to Reducing Environmental Impact

Development of Silicon Carbide (SiC) Substrates

In October 2017, SMM and Kaga Electronics Co., Ltd. concluded a joint venture contract and stock transfer agreement for SMM to acquire 51% of the shares of SICOXS CORPORATION, a Kaga Electronics subsidiary.

SICOXS is a development company that possesses the technology to manufacture SiC substrates using a bonding technology. Demand is expected to grow for SiC as a material for semiconductors, including power semiconductors, which control electric power. Power semiconductors containing SiC reduce energy loss and make it possible for devices to be made smaller, so new markets for this material are expected to emerge, particularly for use in hybrid vehicles and EV.

The bonding technology possessed by SICOXS can greatly reduce manufacturing costs, which is an issue in the manufacture of SiC substrates. SMM is proceeding with development to mass produce SiC substrates by combining SICOXS' unique technology with the substrate production technologies we have already cultivated. We will also leverage Kaga Electronics' information gathering abilities and sales network in the field of electronics with the aim of realizing swift commercialization.



Silicon carbide wafers

Growth

Development of Human Resources and Making the Most of Diverse Human Resources

Exploring New Businesses with the "Foresight Project"

SMM's biggest strength lies in our business model of collaboration between our three core businesses: mineral resources, smelting and refining, and materials. We are working to deepen this collaboration and generate new added value and are also engaging in creating new businesses developed independently of existing ideas. One initiative aiming to do this is the "Foresight Project," which is being advanced primarily by the Materials Division.

This project introduces ways to foresee future trends, and it involves creating ideas for original new businesses and products that are not just extensions of existing business lines. Project members were selected from across the company using an aptitude test and they held discussions about theories of social change that anticipate the future. These theories were then discussed in regard to the technologies possessed by SMM and in the end created 10 themes. These themes are now being carefully examined by teams from the Technology Division and Materials Division with the aim of quickly forming concrete proposals.

A discussion in the Foresight Project

Research & Development

Masaki Imamura
Managing Executive Officer,
General Manager of Technology Div.

We are concentrating research and development resources on themes that can further contribute to business operations, such as increasing sales and cutting costs, as well as engaging in medium- to long-term research and development with a view to developing next-generation products and commercialization.

We are also establishing a framework for research and development through open innovation involving collaboration with external institutions, such as advancing academic-industrial research and development partnerships, as well as focusing heavily on human resources development.

Business Environment and Priority Measures for the 2015 3-Year Business Plan

Research and Development Strategy and Structure

SMM advances research and development company-wide, with the Technology Division at the core. Within the selection and concentration that we perform in our core businesses of mineral resources, smelting and refining, and materials, we prioritize allocation of research and development costs, and position smelting and refining process technology, powder synthesis and surface treatment technology, crystal growth and processing technology, and exploration, mining, and mineral processing technology as core technologies. We also consider analysis technology, computer aided engineering and analysis technology, and information and communications technology (ICT) as fundamental technologies, and are carrying out focused development on clearly defined technology domains. The core of our research and development is carried out at four research and development sites: Niihama Research Laboratories, the Battery Research Laboratories, the Materials Laboratories, and the Ichikawa Research Center. We are also advancing technological development using technologies such as IoT through the ICT Promotion Office.

Key Research Themes

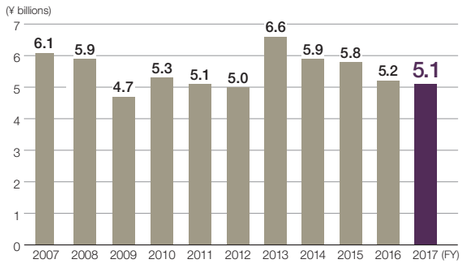
We collaborate with each business division on developing products and production technology and are also focusing on medium- to long-term research and development with a view to developing next-generation products and commercialization.

As for battery materials, we are focused on enhancing functionality, such as increasing the capacity of cathode materials for lithium ion batteries used in hybrid and electric vehicles, and are proceeding with putting those results in mass production. We are also engaged in the development of next-generation materials through initiatives, such as participating in a project for developing solid-state lithium ion batteries being advanced by the New Energy and Industrial Technology Development Organization (NEDO).

For crystal materials, we are developing crystal growth and wafer processing technologies with the aim of reducing the cost of producing lithium tantalate and lithium niobate substrates for SAW filters contained in communication devices, such as smartphones. We are also actively developing original technologies involving silicon carbide (SiC), a new area we are commercializing.

Regarding the smelting and refining process, we are developing a process for separating and refining cobalt from used lithium ion batteries, which cannot be recovered using current recycling processes, and expect to have a pilot plant in operation during FY2018. Furthermore, as well as further evolving our world-class HPAL technology for extracting nickel, we are developing pyrometallurgical smelting and refining processes that differ from HPAL. We are also starting development of techniques for recovering lithium through the application of hydrometallurgy.

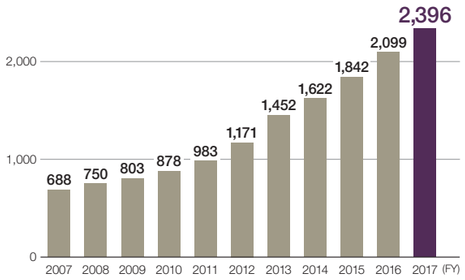
Research and Development Expenses



Recent years have seen a trend of around ¥5-6 billion per year. About 10-20% of the total is mineral resource and smelting and refining-related research and development expenses, while the rest is materials-related research and development expenses and basic research costs.

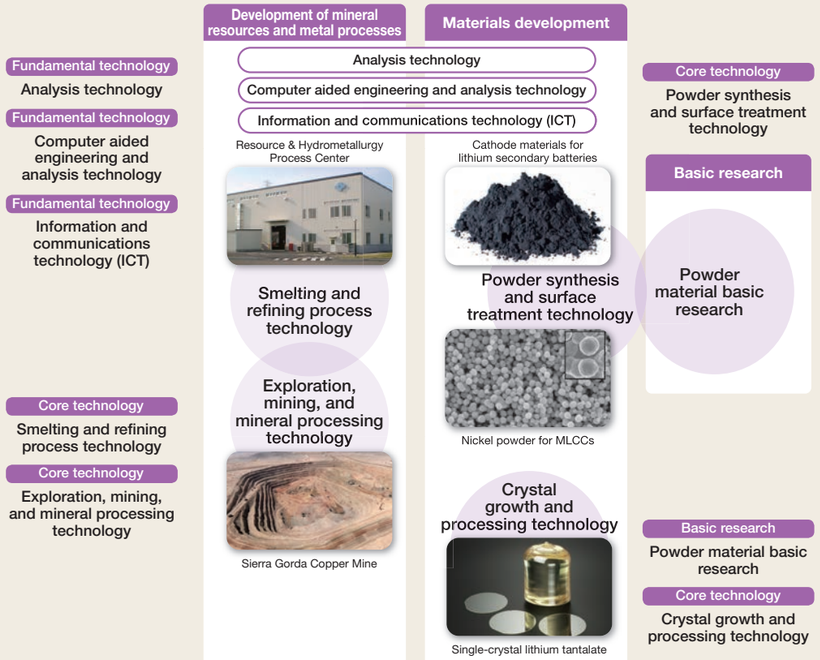
Number of Patents[1] Registered by the SMM Group

1. Numbers are the total of both patent and design registrations



We are actively promoting the construction of a patent network, as well as patent applications that contribute to stable business operation and development, and research and development.

Research and Development by the SMM Group



Growth

Human Resources Development

Open Innovation and Cultivating Personnel

In April 2018 we opened a joint research division with Tohoku University that will operate for five years under an academic-industrial collaborative structure and will engage in joint research on non-ferrous metal smelting and refining and promote the cultivation of human resources. We are also proceeding with a similar joint research and personnel development initiative with Kyushu University.

Additionally, in the area of new materials development, too, we are establishing a framework for joint development with external institutions and cultivating a flexible environment through initiatives such as posting SMM researchers at university research labs. Going forward, we will continue to expand our collaboration with external partners in areas such as open innovation, and focus on personnel development with a medium- to long-term perspective.

Takeshi Kubota (second from right), who was executive vice president at the time, shakes hands with Yoshinori Yajima (third from right), Tohoku University's Executive Vice President for Industry-University Collaboration, at a joint press conference