Global Environmental Considerations

Environmental Management

Basic Approach

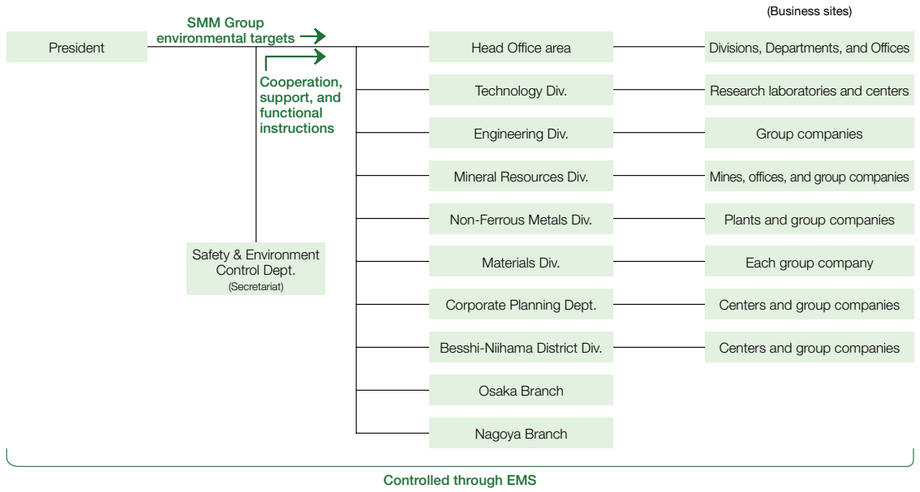
Many chemical substances are handled by SMM Group businesses during mineral resource processing and manufacturing. If an accident should occur, there is the risk of seriously affecting the local environment. The SMM Group emphasizes the need to prevent environmental contamination by supplying equipment and strengthening management, and by providing training for relevant staff members. Every year, drills are held in order to help minimize the effects and prevent external impacts in the unlikely event an incident does occur. We have also worked to improve facilities, and we installed a system that automatically shuts off the discharge if any abnormalities are detected just before the wastewater port.

Environmental Management System and Education

Environmental Management Initiatives

Every year, the President sets targets (SMM Group environmental targets) in consideration of the environmental risks faced by the SMM Group. In response, business sites and group companies of each business division integrate these targets into their environmental management systems, established according to the ISO 14001 standard. As for environmental management systems which serve as the basis for environmental preservation activities, the Head Office, branches and all production bases and sites responsible for closed and suspended mines in the SMM Group have acquired ISO 14001 certification. In addition, any new production bases are also required to acquire certification as quickly as possible. Furthermore, since the occurrence of accidents at any time during the development of a mine creates the risk of significant environmental impacts, SMM works with our partners to mitigate environmental risks even at mines we do not operate, such as mines in which we hold an interest.

Environmental Promotion Framework



Internal Environmental Audit Seminars

The SMM Group has adopted an in-house qualification system for internal environmental auditors, the key people in workplace environmental management, and completion of a training course is a requirement for obtaining the qualification. The Safety & Environment Control Department implements training for all internal environmental auditor instructors at business sites in Japan, and for new environmental auditors as well. Because of the 2015 revisions to the ISO 14001 standard, in FY2016 we carried out educational seminars for moving to the new standard. There were two seminars in the area around our Head Office, and a total of 40 seminars held in the areas around 27 business sites, which provided training to 738 participants. Additionally, training seminars for new environmental auditors were held in the Head Office area, the Besshi area, and at Shinko Co., Ltd., and 56 participants completed these seminars.

Response to Environmental Risks

The SMM Group handles large amounts of chemical substances during the manufacturing of products, particularly in smelting and refining operations, and for that reason some business sites bear considerable environmental risk. Each site continuously performs environmental management and runs accident response drills corresponding to the magnitude of risk. In addition, every year, the heads of every division that exercises control over business sites, inspect those business sites (including group companies) to check whether environmental management is being implemented appropriately. Moreover, in the Niihama District, where the SMM Group's largest smelter and refining facilities are located, the Safety & Environment Control Center (Besshi-Niihama District Division) provides guidance to business sites located within the district on their initiatives for environmental management. The center also provides support for group business sites located within the local region, such as by regularly holding meetings for the exchange of information.

In the Materials Division, a Safety & Environment Control Department was established to provide the business sites under its control with support and guidance on environmental management. Since FY2008, the Safety & Environmental Control Department has continued its environmental care activities, visiting these business sites to check on the status of activities to reduce the risk of environmental accidents. During these visits, any issues found are shared with the head of the business site and the heads of operational divisions. Countermeasures are considered at the business site, leading to improvements in the level of environmental management. In FY2016, environmental care activities were held for 37 business sites, including overseas sites.

In addition, close-call events are reported to the Safety & Environment Control Department when they exceed voluntary standards and/or have an effect on operations. In the event of an incident, the Safety & Environment Control Department will provide advice after checking the causes and the response taken. In addition, the department also makes efforts to prevent similar close-call events from occurring elsewhere, such as by alerting each business site in the SMM Group, where necessary, and requiring them to check and report back on their control status, and by encouraging preventive action to be taken if factors are present similar to those that caused the incident.

There were no major leaks in FY2016. Furthermore, although 16 complaints related to environmental matters were lodged against the SMM Group, these were all handled in an appropriate manner. Going forward, we will work to continually raise the level of our operations.

Risk Management for Mining Waste

The SMM Group carries out appropriate management of mining waste, such as spoil, tailings, and neutralized sludge, generated by the mineral resources business.

Spoil and tailings containing sulfide minerals can oxidize and generate sulfuric acid, which can easily become a source of acidic water that contains heavy metal ions; therefore wastewater from mines is properly processed in water treatment facilities before release.

The Pogo Gold Mine further alleviates risk by surrounding all mineralized spoil with dehydrated flotation tailings so as to isolate it from the outside environment. Tailings containing cyanogen are stabilized by mixing them with cement for use as backfill in the mine, while all other tailings are stored outside the mine after undergoing dehydration to reduce volume. Lowering the volume of the tailings reduces the area required for accumulation sites and alleviates risk related to the structural stability of sites.

Seismic Retrofit Work at Mining Waste Accumulation Sites in Japan

In the 2011 Great East Japan Earthquake, there were accidents that involved the outflow of sediments at three accumulation sites belonging to other companies in the Tohoku region. Japan's Ministry of Economy, Trade and Industry reviewed the technical guidelines related to accumulation sites and required assessments of resistance to large seismic vibrations for sites that are subject to "special conditions." SMM has been implementing assessments of earthquake resistance at accumulation sites since 2012. As it was determined that countermeasures are required for five out of ten accumulation sites subject to "special conditions," seismic retrofit work was conducted from FY2014 through FY2015. We are also gradually assessing earthquake resistance at accumulation sites not subject to "special conditions," and plan to take countermeasures where necessary.

Environmental e-learning

The SMM Group has established two e-learning courses on environmental laws with the objective of raising levels of compliance, and employees, especially managers and supervisors involved in environmental management and internal environmental auditors, are taking part in the courses. Moreover, course content, which is updated in line with legal amendments, is also used after learning to check legal requirements and for education on environmental laws in the workplace. The e-learning course on Japan's main environmental laws introduced in the second half of FY2008 covers ten laws that are deeply related to the business of SMM and provides explanations of mandatory standards and notification procedures. As failing to comply with these requirements constitutes a violation of the law, employees must be certain to keep them in mind when conducting business. In the second half of FY2013, a new e-learning course entitled Basic Environmental Laws was released in order to deepen understanding about the underlying spirit of the law and to encourage employees to execute their duties to the best of their ability. Given not only compliance with regulations and obligations, but also the voluntary risk management and information disclosure demanded of businesses today, the course provides a stepping stone for properly conducting business. This course covers 12 laws, including the Basic Environment Act, the Basic Act on Biodiversity, and the Basic Act on Establishing a Sound Material-Cycle Society.

Approach to Biodiversity

Basic Approach

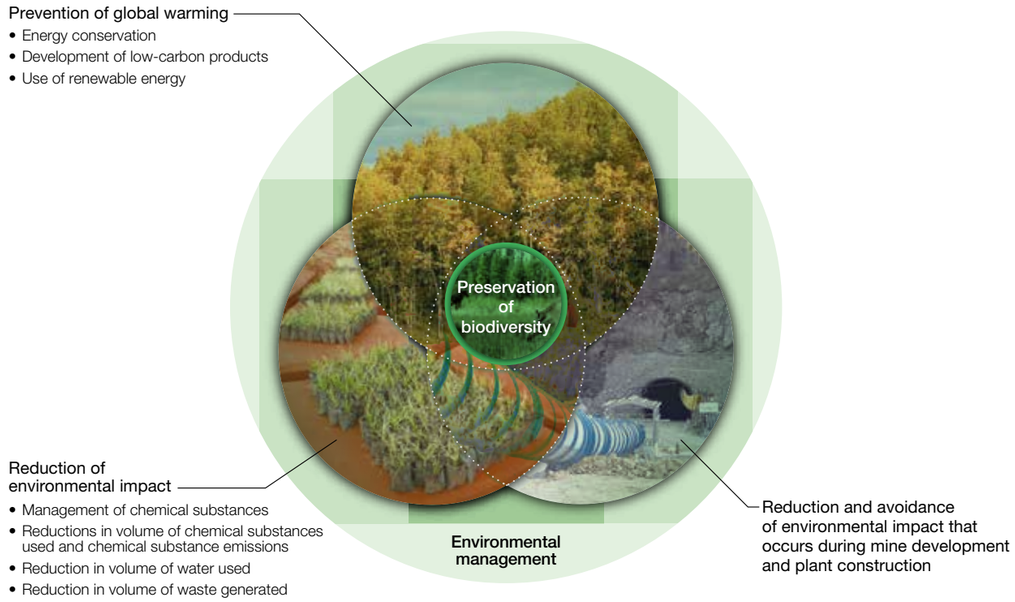
SMM has declared that “advancing biodiversity preservation initiatives” is one of the concrete measures for bringing about our Vision for 2020. In addition, our approach to biodiversity adopts the three perspectives of pursuing global warming countermeasures, reducing environmental impacts, and preserving ecosystems.

SMM views climate change due to global warming as a threat to biodiversity as well as a serious risk to SMM Group business activities. We are expanding our low carbon impact products business (creating, storing, and saving energy) and proceeding to reduce CO_2 emissions by installing energy-saving technology and taking advantage of renewable energy.

For all of our core businesses—mineral resources, smelting and refining, and materials—direct and indirect impacts on biodiversity are unavoidable, but we are striving to decrease and avoid environmental impacts in our development, operations, and product use.

When developing mines and building smelting and refining plants, we survey the surrounding ecosystems and give consideration to the effect on these systems when choosing the location of roads and facilities. Furthermore, we also carry out activities to monitor ecosystems and plant trees.

In FY2013, the SMM Group prepared a pamphlet entitled Biodiversity and SMM’s Business Activities to raise awareness among domestic Group employees. In FY2015, we made pamphlets in English, Spanish, Chinese and Malaysian, and are promoting awareness of biodiversity at the SMM Group’s overseas facilities.



Prevention of Global Warming

Development of Products and Technologies that Contribute to Reducing Environmental Impact

The SMM Group sees its supplying of specialty materials for 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 aims to expand its business in domains related to the creating, storing, and saving of energy.

In the auto industry, regulations regarding gas emissions continue to tighten globally, as demonstrated in Europe and California, and demand for environmentally friendly vehicles, such as hybrid and electric vehicles, is growing greatly as a result. Our Materials Division is engaged in supplying nickel-containing materials for cathodes used in the batteries required by these vehicles.

SMM creates an intermediate material by smelting and refining ore from nickel mines, which is then used as material for producing the nickel hydroxide and lithium nickel oxide used in high quality cathodes. We are currently greatly increasing output to respond to strong demand, and while we are looking forward to the contribution to our earnings, it will also contribute to reducing the environmental impact of vehicles.

Our Materials Division is also manufacturing various infrared shielding inks, such as cesium tungsten oxide (CWO), to block infrared rays. These inks are attached to glass as a film or directly included within glass and polycarbonates to block the near-infrared rays contained in sunlight, therefore greatly reducing temperature increases.

These are primarily used in vehicle windows, building windows, and semi-transparent roofs when design or allowing daylight in is an important consideration, and are contributing to energy efficiency.

Activities to Reduce CO_2 Emissions at SMM Business Sites

● Domestic Group CO_2 Emissions

The Group’s FY2016 volume of energy-derived CO_2 emissions inside Japan decreased approximately 29 kilotons due to CO_2 emission reduction efforts, such as energy saving activities. There was a further reduction of approximately 37 kilotons due to the effects of electric power supplier emission factors. As a result of this, total emissions were about 1,421 kilotons, which was a decrease of around 285 kilotons compared to FY2015.

We are continuing efforts to reduce CO_2 emissions in FY2017 and forecast a reduction of about 15 kilotons.

● Smelting and Refining Business in Japan

Unit energy consumption in the domestic smelting and refining business improved by approximately 14.0% in FY2016 compared with FY2015. The main reason for the improvement was our achievement of planned production volumes of copper and nickel, thanks to stable operations. Meanwhile, unit CO_2 emissions improved by about 17.7% due to lower production of high-energy products (prime western grade zinc and ferro-nickel) and lower emissions factors of electric power suppliers.

● Overseas Business

In our overseas business, energy-derived CO_2 emissions decreased approximately 20 kilotons, to approximately 1,037 kilotons.

● Domestic Transportation

Indirect CO_2 emissions produced in domestic transportation in FY2016 were 23 kilotons, a decrease of around 1.4 kilotons (5.9%) compared to FY2015. The main reason behind this improvement was an increase in the use of ship transportation and improved load efficiency.

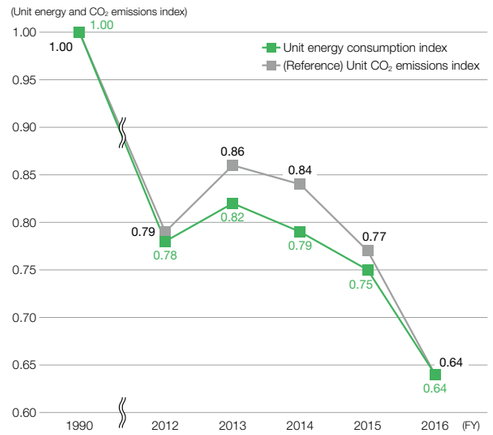
● Introduction of Renewable Energy

In FY2016, we began operating solar power plants and purchasing steam produced by woodchip boilers. This reduced CO_2 emissions by 5.5 kilotons for the year.

● Initiatives as a Member of The Japan Mining Industry Association

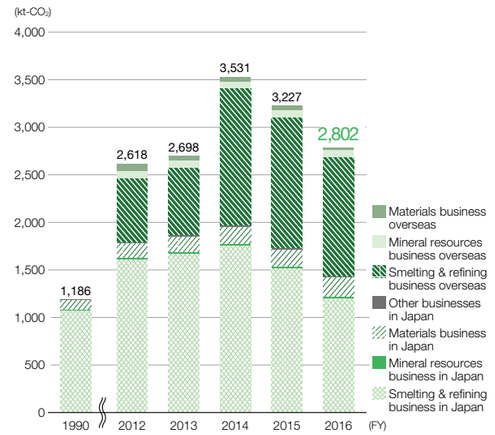
The Japan Mining Industry Association, a non-ferrous metals industrial organization, took part in the planning of a “Commitment to a Low Carbon Society” led by Keidanren (the Japan Business Federation) as the basis for announcing the industry target of an “18% reduction in unit CO_2 emissions by FY2030 in comparison to FY1990.” SMM has already achieved this target in the Japanese smelting and refining business, and we are working towards the goal of further reducing CO_2 emissions by continuing to lower overall CO_2 emissions by 1% each year and by adopting renewable energy.

Unit Energy and CO_2 Emissions Index[1]
Scope: Smelting and refining business in Japan



1. Unit energy and CO_2 emissions index: The amount of energy consumed and CO_2 emitted during the production of 1 ton of product, assuming the FY1990 value to be 1 (including fuels used as reducing agents).

CO_2 Emissions
FY1990 Scope: Business sites in Japan
FY2012–2016 Scope: All business sites in Japan and Overseas



• Emissions in Japan and overseas which do not relate to electric power are calculated using emission factors conforming to the Japanese Act on Promotion of Global Warming Countermeasures. These include non-energy-derived CO_2 emissions (334 kt-CO_2) that are outside the scope of the above act.
CO_2 emissions derived from purchased electricity in Japan are calculated using the emission factors of the electric power suppliers.
Emission factors for overseas are based on International Energy Agency (IEA) data.

Global Environmental Considerations

Reduction of Environmental Impact

Management of Chemical Substances

Given that many of the SMM Group's products are chemicals and that many diverse chemical substances are also used in the manufacturing processes for these products, all business sites have their own system for managing chemical substances within their environmental management system, which is operated under the direction of the relevant division. For example, when a business site intends to use a new chemical, it conducts a preliminary study including hazard statements, laws and regulations and other applicable information, and deliberates on safety for people and the environment in a meeting at the business site before deciding whether to adopt the chemical.

Furthermore, regardless of whether there are legal obligations, an SDS[1] is issued for all chemicals that are transferred or provided to customers or to other business sites within the SMM Group.

Products created by the SMM Group's materials business are incorporated by our customers into electrical and electronic products and circulated widely to domestic and foreign markets. Therefore, with an eye on the value chain, information on the chemical substance content of SMM's chemicals is assessed across the supply chain to provide customers with information on SMM's products. Screening of development themes for new products also puts an emphasis on products with low environmental impact that can be used more safely by customers.

Overseas regulations such as the RoHS Directive[2] and REACH Regulation[3] are also taken into account. The development of products that eliminate substances prohibited under RoHS and registration of chemical substances exported to the EU with REACH are being progressively promoted.

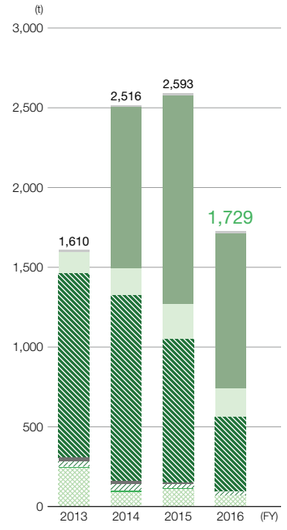
1. SDS (Safety Data Sheet): A document listing information on a chemical, including the chemical substance, the product name, the supplier, hazards, safety precautions and emergency procedures.
2. RoHS Directive: The Restriction of Hazardous Substances Directive.
3. REACH Regulation: The Regulation on Registration, Evaluation, Authorisation and Restriction of Chemicals.

Reduction in Volume of Chemical Substance Emissions, etc.

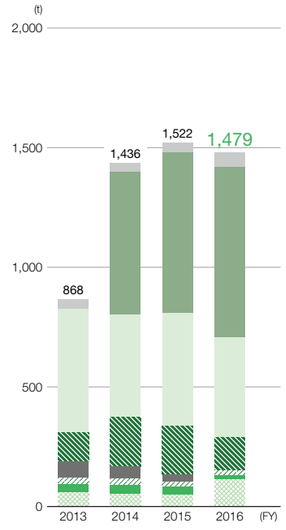
● Soot and Smoke Emissions

The volume of FY2016 SOx emissions decreased 33% year-on-year. Hyuga Smelting Co., Ltd. saw a 48% decrease due to an improvement in heavy oil combustion efficiency and a reduction in coal use accompanying a decrease in production, while THPAL saw a 26% decrease by using low-sulfur coal. Emissions of NOx decreased about 3% year-on-year, primarily due to a 33% reduction at the Hyuga Smelting Co., Ltd. from reduced use of coal, as with SOx. The volume of soot and dust emissions increased 13% year-on-year. The end of zinc production at the Harima Refinery meant emissions were near zero, while Hyuga Smelting Co., Ltd. saw a 57% decrease due to improved dust collection in its exhaust system. However, abnormalities in dust collection by CBNC's exhaust system resulted in an increase of 370%.

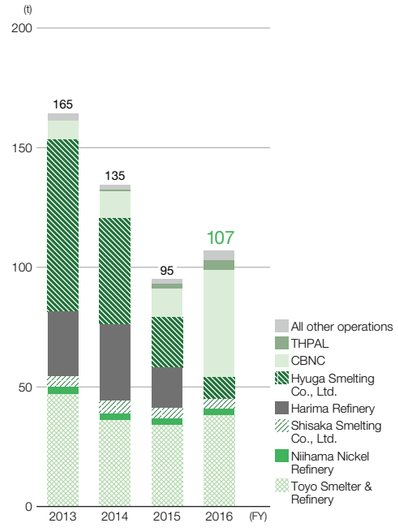
Volume of SOx Emissions



Volume of NOx Emissions



Volume of Soot and Dust Emissions



● Chemical Substance Releases and Transfers

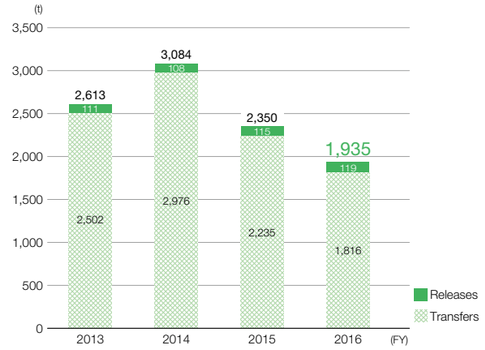
The following is an overview of FY2016 releases and transfers of chemical substances in Japan managed in line with the Pollutant Release and Transfer Register (PRTR) system. The SMM Group had 27 data-submitting sites (27 in FY2015) and 42 substances requiring registration (41 in FY2015).

The total release and transfer volume (releases + transfers) decreased by about 18% from FY2015 to 1,935 tons due to a decrease in transfers. The decrease in transfers was due to the end of our handling of materials such as chromium and chromium (III) compounds, lead, and manganese and its compounds following the end of zinc production at the Harima Refinery.

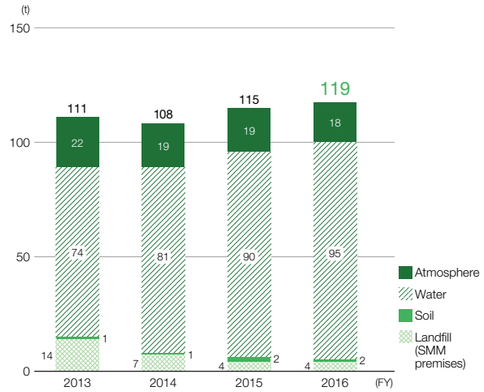
In terms of release volumes, discharges into the atmosphere decreased. This was primarily due to a reduction in dichloromethane emissions by the Ome District Division. Discharges into water increased by about 6%, primarily due to a rise in boron emissions accompanying an increase in water discharged by the Hishikari Mine.

The SMM Group's production processes released no ozone depleting substances.

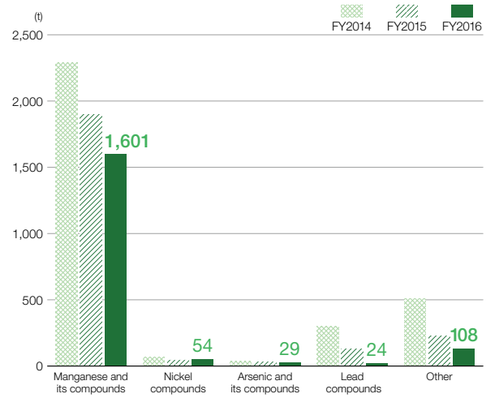
Release and Transfer Volume of PRTR Substances



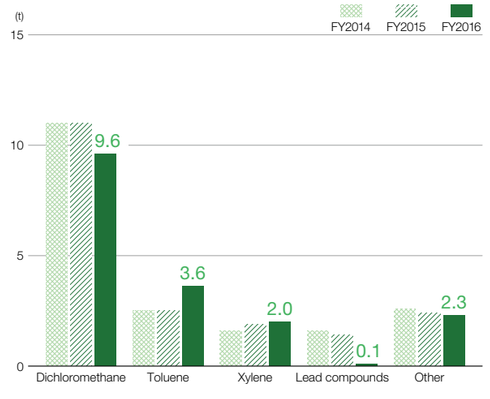
Breakdown of Releases



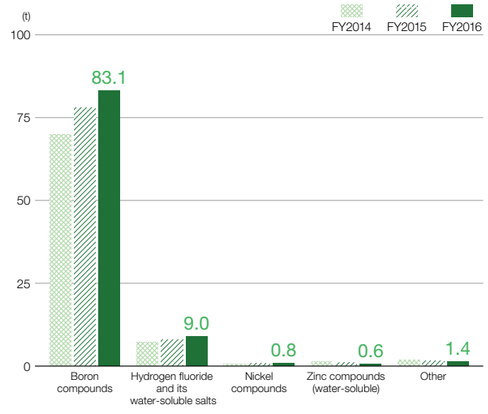
Breakdown of Transfers



Breakdown of Releases into the Atmosphere



Breakdown of Releases into Water



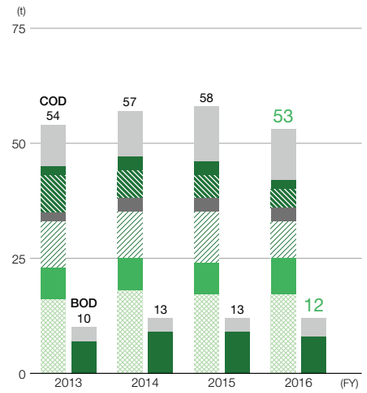
Global Environmental Considerations

● COD and BOD Pollutant Loads

The COD[1] pollutant load in FY2016 decreased by about 9% from FY2015, while the BOD[2] pollutant load decreased by about 5%. Many SMM Group business sites face onto Japan's Seto Inland Sea and are subject to controls on the total amounts of COD, nitrogen and phosphorous emissions under the Act on Special Measures Concerning Conservation of the Environment of the Seto Inland Sea.

1. COD (Chemical Oxygen Demand): Measured for emissions into seas, including emissions into rivers flowing into enclosed seas.
2. BOD (Biochemical Oxygen Demand): Measured for emissions into rivers, excluding emissions flowing into enclosed seas.

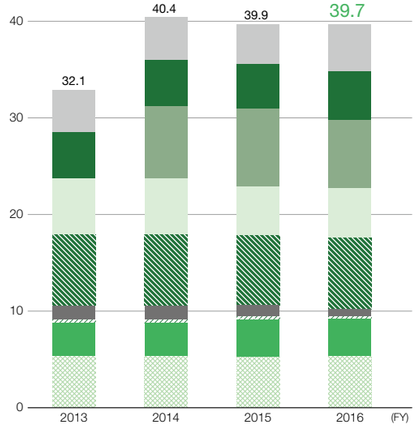
COD and BOD Pollutant Loads



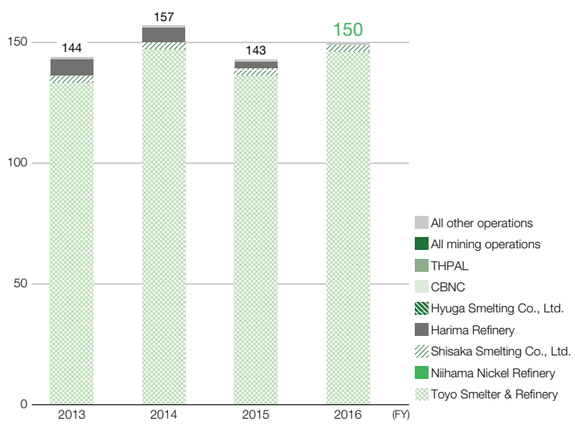
● Water Usage

At 40 million m³, freshwater used by the Group was nearly unchanged year-on-year. Seawater usage increased 5% year-on-year. This was due to increased production at the Toyo Smelter & Refinery.

Water Usage (Freshwater)



Water Usage (Seawater)



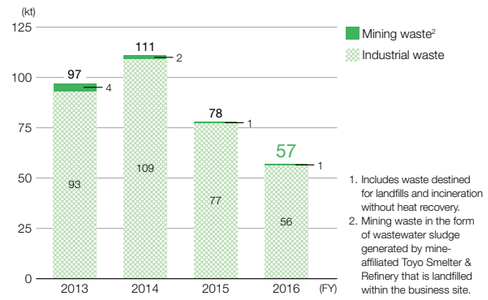
● Final Disposal Volumes of Industrial and Mining Waste

The SMM Group has long been making efforts to reduce industrial waste in Japan and the amount of wastewater sludge (mining waste) that undergoes final disposal from the mine-affiliated Toyo Smelter & Refinery.

The total final disposal volume in FY2016 was 57 kilotons, which was a decrease of about 21 kilotons from FY2015. The main contributing factor was the elimination of slag emissions following the end of zinc production at the Harima Refinery.

The total volume of waste generated from all sites, classified according to processing method, direct or contracted disposal, and hazardous or non-hazardous, is shown on p. 87.

Final Disposal Volumes[1] of Industrial and Mining Waste in Japan



1. Includes waste destined for landfills and incineration without heat recovery.
2. Mining waste in the form of wastewater sludge generated by mine-affiliated Toyo Smelter & Refinery that is landfilled within the business site.

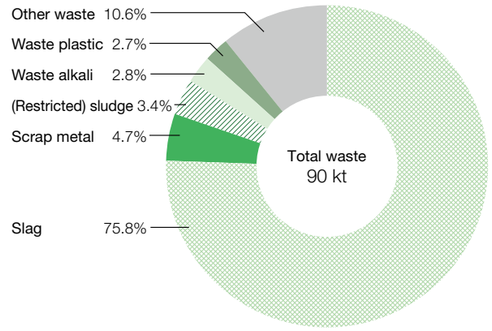
Volume of Waste (Hazardous[3]/Non-hazardous[4])

(kt)

		Total	Hazardous	Non-hazardous
Processing method	Recycling	43	11	32
	Landfill	8,050	53	7,997
	Incineration	2	1	1
	Volume reduction, etc.	2	1	1
	Total	8,097	66	8,031
Direct/ contracted	Direct disposal	7,996		
	Contracted disposal	101		

3. In general, this depends upon definitions in the countries concerned. Since Japan does not have such laws or regulations, SMM applies the following definition: "Specially controlled industrial waste and waste delivered to controlled landfill sites (excluding designated inert waste that should have been delivered to landfill sites for inert industrial waste, but was disposed of at controlled landfill sites due to the distance limitation)."
4. Waste other than hazardous waste.

Breakdown of Industrial Waste (in Japan) by Type of Waste



Reduction and Avoidance of Environmental Impact that Occurs during Mine Development and Plant Construction

Example of Biodiversity Considerations in the Mineral Resources Business

The Pogo Gold Mine in Alaska, U.S.A., required 83 separate permits before operations could begin as it falls under extremely stringent environmental protection standards enforced by state and federal governments.

SMM undertook exhaustive environmental considerations right from the design stage, seeking to preserve ecosystems as well as infrastructure sustaining indigenous communities in the mine vicinity. Particularly important issues were protection of rivers where salmon return to spawn and prevention of adverse effects on moose habitats. Groundwater from the mine is purified by a treatment plant and partially reused in production processes. In gold extraction, water used during the extraction process is isolated within a closed system to make sure it is not released. The impact of mine operations is confirmed through annual monitoring of the salmon run, as well as by catching and analyzing fish to check for abnormal levels of heavy metals.

We have also tried to minimize the impact of mine access road construction on moose habitats by circumventing breeding grounds and not allowing traffic other than mine-related vehicles.

Water quality monitoring in rivers around the Pogo Gold Mine

Example of Biodiversity Considerations in the Smelting and Refining Business

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 certified environmentally responsible design 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.

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.