WITH MATERIALS



Special Feature Earth's Abundant Energy **The Challenge to Generate Geothermal Power**

CONTENTS

02 SPECIAL FEATURE

Earth's Abundant Energy The Challenge to Generate Geothermal Power

12 COMMUNITY

Visiting a Town with MM Stuttgart Technical Center

<u>14</u> PEOPLE

MY STORY

Yui Morimoto Quality Assurance Section, Naoshima Smelter & Refinery, Metals Company

16 TECHNOLOGY

The Power of Materials Builds Society Communication Infrastructure

18 PRODUCT

The Secrets of Materials Fire-resistant plastic

19 TOPICS

20 SUSTAINABILITY

Forests and Materials Forest Guardians

Earth's Abundant Energy The Challenge to Generate Geothermal Power

Mitsubishi Materials is developing a renewable energy business in order to contribute to the building of a recycling-oriented society while respecting the limited resources the earth has to offer.

We are harnessing the technologies and knowhow we have fostered through developing coal and metal mines in the past to generate geothermal and hydroelectric power, and we are also working on solar power generation.

Among these types of renewable energy, geothermal power in particular has been attracting attention recently. In Japan, a country blessed with geothermal resources, there are high expectations for its potential to provide a stable supply of electricity regardless of the weather.

Mitsubishi Materials has been working on geothermal power development for over 50 years and is newly developing it still today. In this special feature, we will introduce some of the challenges and our employees' thoughts on the geothermal power generation business.

geothermal resources rank third in the world

Renewable energy not influenced by the weather Contributing to a decarbonized society with low CO2 emissions

Toward solving energy issues and global warming The Future Geothermal Power **Generation Is Moving Toward**

Humanity has been relying on fossil fuels such as coal, oil, and natural gas since the Industrial Revolution. However, coal is estimated to run out in the next 100 years, and oil and natural gas in the next 50 years.

We will not be able to sustain our society unless we secure energy by means other than fossil fuels. Fossil fuels also emit greenhouse gases, which are the main cause of global warming. Extreme weather is already occurring around the world and bringing about many problems, such as rising sea levels and impacts on ecosystems.

Thus, in order to halt global warming as soon as possible, many countries are acting together to effectively reduce their greenhouse gas emissions to zero and aiming to become carbon neutral. One way to achieve this is through the use of renewable energy.

Mitsubishi Materials has been contributing to carbon neutrality by working on geothermal, hydroelectric, and solar power generation. Among these, geothermal power generationwhich we have been working on since the 1960s—is a purely domestic energy source that can provide a stable supply of electricity regardless of the weather. We are developing an integrated geothermal power generation business, rom geothermal resource surveys to plant engineering and operation management. We hope to use the know-how and technological capabilities we have accumulated until now to contribute to solving the world's energy issues and global warming.



After generating electricity, the steam is converted into water in a condenser, cooled in a cooling tower, and then circulated back to the condenser to be used in steam cooling.

Benefits the community as well

The hot water remaining after steam separation can be used as energy for greenhouse cultivation, aquaculture businesses. etc.

Provides a stable supply of energy

Geothermal energy is a type of renewable energy that is not influenced by the weather or seasons. It can provide a stable supply of electricity.

Among renewable energy sources, it is the second lowest CO2 emission power generation method after hydropower.

Contributes to achieving carbon neutrality

Power line

THE HISTORY

of Our Geothermal Powe Generation Business

1965 Surveys start in Kazuno City, Akita Prefecture.



Commercial operations start at the **Onuma Geothermal Power Station** (Kazuno City, Akita Prefecture), the third oldest geothermal plant in Japan



1994

Hachimantai Geothermal Corporation (now Hachimantai Green Energy Co., Ltd.) is established to manage operations.

1995

Commercial operations start at the Sumikawa Geothermal Power Station (Kazuno City, Akita Prefecture).



2010

Yuzawa Geothermal Power Corporation is established.

2014

Environmental surveys start in Hachimantai City, Iwate Prefecture. 2015

Appi Geothermal Energy Corporation is established.

2019

Yuzawa Geothermal Power **Corporation starts commercial** operations at the Wasabizawa Geothermal Power Plant (Yuzawa City, Akita Prefecture), the first large-scale geothermal power plant opened in Japan in 23 years



2019

Appi Geothermal Energy Corporation begins construction of the Appi Geothermal Power Plant (Hachimantai City, Iwate Prefecture). Operations are scheduled to start in 2024



G eothermal Resource Survey Finding the Energy Underground

When launching a new power plant in Mitsubishi Materials' geothermal power generation business, the planning department conducts a business feasibility assessment to determine risks and profitability, and after conducting various explorations and surveys with skilled techniques onsite, we decide to commercialize the project.

The most important thing about geothermal development is that it contributes to the local community.

I am involved in planning and promoting new projects in our renewable energy business, which includes geothermal power generation. Currently, the planning and technology departments promote new projects, while dividing up roles between them. Up until last year, the planning and technology departments were not separate, and all the staff involved with geothermal development were in Tokyo, so those in charge would have to travel to the site each time surveys or construction were to be carried out. However, since this year, we have placed the technology department in Kazuno City, Akita Prefecture, where our fields are concentrated. This allows us to respond swiftly onsite. The planning department gathers the latest industry information and draws up plans in Tokyo, while the technology department focuses on technical aspects such as surveys and drilling. In this way, we have established a system that develops the locational advantages and the areas of expertise of each department.

Our strength lies in the technological capabilities we have developed over 50 years of geothermal development. We believe it is necessary to pass on that strength while also keeping up with the latest technologies and changing social needs. This will enable us to respond flexibly to the development of various geothermal and other renewable energy SOURCES

In recent years, decarbonization efforts have come to be directly linked to corporate value and community revitalization. Moving forward, I would like to be able to work not only for the company's profits, but also to improve corporate value and contribute to the local community. To this end, I need to understand not only knowledge and skills related to the business, but also a wide range of fields including law and accounting. By acquiring know-how while being involved in new businesses studies, I will strive to become an employee who can flexibly come up with ideas and promote new businesses persuasively.

Chika Umeda

Energy Business Strategic Planning Dept. Energy Business Div. Environment & **Energy Business Company**



Understanding local communities

Project identification / Survey planning

Around 80% of the locations where geothermal resources can be expected are located within national parks. Also, they are often located near hot spring areas. Therefore, communication with local communities is essential to protect the natural environment and coexist with local industries. We conduct a literature review, select promising sites, collect information, and develop a survey plan. We then evaluate the economic feasibility and begin to consider commercialization.

Resource surveys (3 to 5 years)

• Ground surface surveys

Before

feasibility

study

Feasibility study

phase

We conduct geological, geophysical, and other surveys in order to understand the subsurface structure.

Geothermal areas are often found in mountains, so surveys are done on foot in fumaroles and hot spring areas in addition to rivers and mountain forests. Therefore, we strive to ensure safety by using safety equipment (such as gas detectors), working in groups, and taking other precautions.

> The most difficult task is to estimate the existence of the geothermal reservoir deep underground. To achieve greater accuracy, the Mitsubishi Materials Group conducts a series of geological, geochemical, and geophysical surveys to make a comprehensive judgment.

Preparing roads and sites

We prepare roads and drilling sites for drilling test wells.

Drilling test wells

We actually drill wells to understand the detailed underground structure and confirm steam plumes.

When drilling wells, we conduct in-house technical studies from the planning stage to improve the success rate.

Conducting environmental impact assessments

We conduct environmental impact assessments for projects with an output of 10,000 kW or more. We study, estimate, and evaluate environmental impacts, and disclose the results to the public.



In addition to Kazuno City (Akita Prefecture) and Hachimantai City (Iwate Prefecture), where our geothermal power plants are already in operation or under construction, we are participating in a geothermal resource survey ongoing in the Esan area of Hakodate City (Hokkaido) to explore the potential for geothermal power generation. We continue to take on challenges to solve energy issues.

In the Esan area of Hakodate City, Hokkaido

06

Bears are especially common in Hachimantai, so we take thorough precautions against bears. We make noise with bear bells, air horns, etc., act in as large a group as possible, and carry bear repellent spray (the main ingredient is capsicum).

At existing Onuma and Sumikawa Power Stations we sometimes drill new production and reiniection wells. We also apply our many years of expertise to drilling wells in new areas.

Tirelessly taking on challenges

New projects are also underway

Plant engineering **Realizing High-Efficiency Power Generation**

Passing on experience to the next generation and creating the future of geothermal power generation

I am currently working at the Appi Geothermal Power Plant (scheduled to start operations in 2024) construction site. located in the Mt. Hachimantai National Forest in Hachimantai City. Iwate Prefecture. Since geothermal power plants are usually built in the mountains where there are no roads. construction begins by clearing forests and building bases and roads. In cooperation with the prime contractor and local forestry companies, we build bases that will not affect the surrounding environment. We then drill a production well to extract steam from underground and a reinjection well to return the hot water that comes out with the steam



Drilling work. Four production wells and three reinjection wells are being drilled at the Appi Geothermal Power Plant.

Kaname Ohata

Appi Geothermal Power Plant Construction Office Renewable Energy Engineering Dept. Energy Business Div. Environment & Energy Business Company

from underground and the cooling water produced by cooling the steam after power generation to the underground. At the same time, we construct a steam facility to send the steam extracted from the production well to the power generation facility. During this period. the environment is continuously monitored from the survey phase. This project has a long construction period. lasting four and a half years. In winter, construction will be suspended due to heavy snowfall, which can pile more than five meters.

Regarding drilling work specific to geothermal power plants, it takes about two months to drill one well to 2,300 meters below ground where the geothermal reservoir exists. We are drilling seven wells that will last for many years, ensuring that the water veins encountered while drilling are plugged, calculating the expansion of the pipes due to heat, and securing the pipes so that they are not overloaded.

In addition to meeting the required specifications for equipment quality, we also make sure that every invisible detail is beautifully finished. As the saying

goes. "God is in the details." and attention to detail is the key to extending the life of equipment. Because the equipment will keep running for decades, we want to pass on something we can be proud of to the next generation. We will also focus on training the engineers who will be responsible for building the next new geothermal power plants and pass on the technology and know-how we have fostered here to the future.



Drilling with a Tricone Bit, which reaches 2,300 meters underground. This drilling technology was fostered from exploratory drilling for mine development

peration management technology for geothermal power plants

Continuing to Produce Energy Safely Hiroki Tanaka

Providing a stable supply of electricity while interacting with the earth

The Onuma Geothermal Power Station is the third geothermal power plant in Japan with a long history of operation. It is still in operation, and management operations are designed to keep the geothermal power plant operating stably for a longer period of time. Management tasks include a 24hour operation control, hot water piping maintenance, renovation work, regular inspections with the plant shut down for two weeks each year, and drilling of new replenishment wells.

We also conduct environmental monitoring on a regular basis to ensure that the plant does not affect the



The Onuma Geothermal Power Station conducts a periodic inspection every year, which is required by law only once every four years. Turbines and pumps that are in constant operation are dismantled and comprehensively inspected. Mistakes are unacceptable, as they will result in a longer period of shutdown.



Compared to photovoltaic and hydroelectric power generation, geothermal power generation is said to be a stable renewable energy source that is not affected by the weather or seasons. Strictly speaking, however, the high-temperature, high-pressure water extracted from production wells does



dioxide combines with a base) accumulates on ho water pipes at a rate of 1 cm per year. To prevent clogging and other problems, workers physically scrape it off the piping.



not always gush out in the same way. Some production wells may be dormant for several months after a month of water discharge. Since we never know what is going on underground, we monitor pressure levels and manage multiple production wells to ensure a stable supply of electricity.

My mission is to make the Onuma Geothermal Power Station last even longer. Building a geothermal power plant is not an easy task. That is why regular inspections and daily maintenance are so important. Currently, we are moving forward with a revival plan to renovate and repair high risk facilities, and we are also planning to drill new reinjection wells this fiscal year. In addition, to improve the reliability of operations, a remote monitoring system has been introduced to strengthen the overall monitoring framework. Furthermore, we are digitizing on-site information and utilizing numerical management to detect problems quickly and work efficiently. By evolving our operational management in step with the times, we hope to contribute to the continuation of long-term stable operations.

EXTERNAL PEOPLE'S COMMENTS

Expectations for Mitsubishi Materials' **Geothermal Power Generation Business**

Mitsubishi Materials is promoting its geothermal power generation business by cooperating with various stakeholders, including local governments and private companies. We received messages from Akita Prefecture (our regional partner), Mitsubishi Gas Chemical Company, Inc. (our joint development partner), and a student majoring in resource development, who will lead the next generation.

Finding value in Akita's potential

Yasuhisa Abe

Senior Director of New Energy Policies, Department of Industry and Labor, Akita Prefectural Government

To valorize Akita's dormant potential in a way that is useful to society. I believe this is the major significance of Mitsubishi Materials' geothermal power generation business. Geothermal energy will simply be sleeping there if nothing is done about it. Once developed, however, it can continually produce stable clean energy.

I have been working with the employees of Mitsubishi Materials since I joined the government. What I strongly felt during this process was the power of the company's people. Mitsubishi Materials has excellent human resources of various ages. This is the result of consistently continuing the business even when geothermal power generation was in a downturn and the entire industry was experiencing a hollowing out of human resources. When we built the Sumikawa Geothermal Power Station, members involved had a wide range of opinions. Mitsubishi Materials members put together the best possible plan after fully considering everyone's opinions, which was very encouraging. Recently, they are visiting the concerned parties and carefully explaining the construction of a new power plant. Since geothermal power generation

can ensure a stable supply and does not



emit much CO₂, it is no exaggeration to say that this energy source benefits not only Akita but also the rest of the world. Naturally, it also creates local jobs and employment and revitalizes the local economy. Surveys for the construction of the new plant are now underway, and we hope that the construction starts safely and on schedule. Conducting surveys in itself develops human resources and accumulates knowledge. We look forward to continuing to work with Mitsubishi Materials to further develop geothermal power generation.



Mitsubishi Gas Chemical and Mitsubishi Materials have worked together as partners in geothermal power generation business for more than 40 years since 1981. Mitsubishi Gas Chemical has cultivated the technology to drill largediameter wells by developing natural gas in Niigata, and Mitsubishi Materials has fostered the technology to probe for underground resources in mines. Working together, we have evolved both companies' technologies to take on the challenge of geothermal development. There used to be a time when private

Shinichi Mitsuda

Specially Appointed Executive Mitsubishi Gas Chemical Company, Inc.

companies withdrew from the field for cost-efficiency reasons and due to national policy. However, we kept up steady efforts and accumulated knowledge, which is leading to new developments. We have also been passing on our technologies by continuously training engineers involved in geothermal development. The process of developing. constructing, and operating geothermal power plants requires the ability to execute projects while involving many business operators and local residents. Mitsubishi Materials, with its

I want to witness the turning point in energy

Koki Hiromoto

Energy Resource Engineering Laboratory, Dept. of Earth Resource Engineering and Environmental Science, Faculty of International Resource Sciences, Akita University

I am researching mechanisms to increase oil recovery amounts in inland areas at university. One could say it's the same as geothermal energy in terms of underground development. I feel drawn to the field of resource development, where we interact with the earth on this large-scale stage: the underground.

We humans have relied primarily on thermal power generation using fossil fuels, but those fuels can only be used once. Geothermal energy, on the other hand, is reusable, and the process of generating electricity does not emit much CO2. It is truly an energy source

that can contribute to a sustainable society. Some people are worried about the negative impacts of underground development, but as far as I can tell from the new technologies and research I am studying at university, there is no need to worry. I want everyone to get the latest knowledge and be positive. I would like to work in the energy field after I graduate, and I look forward to witnessing the turning point where we shift from fossil energy to renewable energy. Mitsubishi Materials has advanced technological capabilities fostered through its history of underground

Leading the development of geothermal power in Japan with technological capabilities, knowledge, and ability to get things done

plentiful experience and organizational capabilities, has a top-class ability to steadily promote projects.

Geothermal power generation has great potential as a purely domestic energy source with extremely low CO₂ emissions. As more new businesses enter the market. companies can expand their possibilities by sharing information openly and collaborating. The national government, local governments, local people, and we in the private sector should all work as one to promote geothermal power generation as a renewable energy source.



development that began in mining. It is obvious from its track record of successful projects with multiple partner companies that the company has earned the trust of outside parties. I expect the company to continue to contribute to the building of a recycling-oriented society in the field of renewable energy, including geothermal power generation.



Ms. Stride, a woman traveling around the world, visits a town where a Mitsubishi Materials Group hub is located.



Navigator Ms. Stride A woman in her late twenties who enjoys factory tours and strolls around town.

Stuttgart Technical Center edition

In this edition, we will introduce the Stuttgart Technical Center, which provides a wide range of solutions for European customers who use Mitsubishi Materials' cutting tools, and the city of Stuttgart.

Germany Stuttgart

t's have a break azing out at the city s Stuttgart is located in southwest Germany. As a major manufacturing hub, it is home to many of Mitsubishi Materials' customers in the automotive, aircraft, and parts industries. Stuttgart Technical Center of MMC Hartmetall GmbH (MHG), more commonly known as MTEC Stuttgart, was established in June 2019.

Stuttgart TV Tower

I'm excited to

taste food

I've never

The world's first telecommunications tower!

The Stuttgart TV Tower is the symbol of Stuttgart. Built in 1956, it was the world's first telecommunications tower, and thus served as the prototype for many other TV towers around the world. Today, it houses a panorama café, where you can enjoy good food while gazing out at an incredible view. When the weather is fine, it is possible to see Teck Castle from the top of the tower.

Swabian Cuisine Must-try dishes in Stuttgart

Swabia is a historic region in southwest Germany. The local food is rich and hearty, and the most well-known dishes include Maultaschen (meat and spinach-filled dumplings either fried or served in broth) and Spätzle (fresh egg noodles).

Guide Kiichi Yamazaki Coordinato R&D

Joined Mitsubishi Materials Corporation in April 2011 as a tool designer. In April 2020, he transferred to MHG (Germany) as a project engineer. Currently, he is in charge of coordinating R&D and designing customized tools. He recommends visiting the Stuttgart TV Tower and the Mercedes-Benz Museum

Esslingen Christmas Market Celebrate Christmas in medieval style

Germany is well-known for its Christmas markets, where you can enjoy a cup of Glühwein (mulled wine) and bratwurst sausages. The Esslingen Christmas Market is particularly famous as it is based on a medieval theme and many of the participants dress up as knights or kings!

Welcome to MTEC Stuttgart!

MTEC Stuttgart's Workflow

Upon receiving a request, MTEC Stuttgart's project engineering team will thoroughly analyze the customer's machining cycle to determine the issues of machining. The engineers come from a variety of backgrounds and industries, allowing them to make proposals from different perspectives. Once a proposal is accepted, they will begin the trial machining and optimization process to ensure that everything works flawlessly.



Testing Equipment

MTEC Stuttgart tests machining processes under conditions that match the customer's needs on machines in MTEC and uses precise measuring tools to check the dimensions and quality afterwards. Digital solutions can also be used to calculate cutting force, stress, and other information that may be important to the cumsomer.

Original Designs In the event that Mitsubishi Material's standard catalog of tools doesn't include a suitable solution. MTEC Stuttgart's engineers can modify existing tools or design something completely new from scratch. Design proposals can be completed in as little as a few days!

Cradle of the Automobile

The first automobile is said to have been invented in Stuttgart by Gottlieb Daimler in 1885, giving the city the moniker "cradle of the automobile." Today, Stuttgart is home to all the major German car manufacturers, as well as the Mercedes-Benz and Porsche museums, where you can brush up on your automobile history!





Seeing is believing!

MTEC Stuttgart is also designed to demonstrate these solutions to customers. The conference and machining rooms can accommodate up to 50 visitors, and every machine is equipped with a process monitoring camera, the footage of which can be played on a monitor or streamed online.

Guide

Dennis Loibl Group Leader / Application Engineer MTEC Stuttgart

Joined the company in February 2019. One of the founding members of MTEC Stuttgart Currently, he is in charge of trial machining, optimization, and cost and performance reports. He recommends seeing the majestic castles in the Stuttgart area.





assurance for the future of our business"

Yui Morimoto

Quality Assurance Section, Naoshima Smelter & Refinery, Metals Company

Quality initiatives shift from "reactive" to "proactive"

The Naoshima Smelter & Refinery supplies basic materials for industrial society through copper and precious metal smelting and recycling operations. I have been a member of the Quality Assurance Section for two years and am responsible for two main types of work. One is to check each delivery lot to see if the specifications of the products to be shipped meet the customer's requirements, and issue an inspection certificate. The other is to act as the secretariat of the QMS (Quality Management System), managing and guiding each department to comply with the rules based on the requirements of ISO9001.

One of the important missions of the QMS secretariat is to maintain ISO certification. While we make various adjustments within the plant prior to the regular audits, there is no time to take a breather after passing the certification audits. From the next day, we must start the PDCA cycle again to enhance the QMS. Through monthly meetings with the quality managers of each department, the QMS secretariat discusses and shares information on QMS-related operational and business problems and solutions in the course of daily activities. As part of our duties, we also propose reviews of rules related to quality management, which sometimes develop into reviews of the entire operational structure of the plant. Because this work involves the entire organization, it is necessary to understand the roles of each



department and seek rules that are easy for everyone to follow. It can be a tough job, but I find it very rewarding. You may think of quality assurance as a "reactive" job where we continue to do exactly what has been decided. Indeed, the traditional role of quality assurance is to ensure that nonconforming products are not shipped. However, this is now changing. The Mitsubishi Materials Group as a whole is now taking a "proactive" approach to quality assurance, which is to avoid producing non-conforming products. I, too, would like to continue to implement the PDCA cycle and develop the Naoshima Smelter & Refinery's QMS into one that is worthy of being called "proactive" quality.

Self-study toward becoming an indispensable employee

Assurance Section, I have been taking the test because the ship I going well.

Since being assigned to the Quality studying the specialized knowledge required for my work from the ground up. I also tried to obtain QC Kentei (Quality Control Certification) Grade 2, which QC managers are required to obtain. The first time, I failed by a whisker. The second time, I gave up was supposed to take could not leave Naoshima Island due to dense fog. The third time, I finally passed the test. Later, I also obtained a certification to become a quality control manager for JIS (Japanese Industrial Standards) products. My knowledge and skills have improved, and I feel my work is

Currently, I am trying to obtain certification as a general certified measurer. The Naoshima Smelter & Refinery is designated as an appropriate measurement control business place, where in-house certified measurers perform periodic inspections of meters used for transactions and verifications. The use of properly controlled meters is a prerequisite for accurate quality assessment, and certified measurers are essential for maintaining quality because they keep meters in proper condition. However, the Naoshima Smelter & Refinery has only a minimum number of certified measurers, so I decided to pursue the certification. I would like to become an indispensable employee by taking charge of essential tasks for the company.

Continuing to take on challenges toward the future of the Naoshima Smelter & Refinery

I am proud of the Naoshima Smelter & Refinery. For more than 100 years since its establishment, it has made full use of raw materials, even commercializing the by-products of copper and precious metal smelting. Furthermore, it has contributed to the realization of a sustainable society by achieving zero-emission recycling, in which 100% of the recycled raw materials are reused.

That is why we want to develop the company so that the Naoshima Smelter & Refinery can exist for the next century. As an employee, I would like to evolve myself and be part of the driving force to develop the company by taking on new challenges without being afraid of changes.

To deepen my understanding of each department's role and products, I review QC process charts and standard operating procedures and visit actual work sites.



The Power of Materials Builds Society

Communication Infrastructure

Thermistors for temperature control of communication devices

Communication infrastructure is indispensable to modern society. It connects the internet and smartphones, supporting people's communication and safe living. A thermistor is one of the electronic components necessary to stabilize communication. It enables the temperature control which is important to ensure frequency stability and reliability of optical communication devices.

With society becoming increasingly information-driven due to video streaming, social media, cloud services, Al, and other factors, the volume of data traffic is on the rise. As such, electric devices are required to be more compact with better performance, higher heat resistance, and reliability.

Since 2019, Mitsubishi Materials has been leading the market with the VH Series of thermistors, which are more reliable than conventional products. In the future, we plan to release new products that satisfy strict mounting requirements and achieve an even higher level of reliability. Additionally, we have realized a wide range of products using our unique material technologies, including support for mounting technology to achieve lower costs and reduced lead time as well as the miniaturized VH02.

> PICK UP VH Series

A series of flake type (front and back electrodes) thermistors for the optical communication market that are more compact and reliable than the FH Series, which allows for high-speed, high-precision temperature control.

TOPICS Here are some of the main topics involving Mitsubishi Materials from July – September 2022.



Mitsubishi Materials participated in G20 EMPOWER. G20 EMPOWER is a global alliance in the private sector that aims to increase the



number of women playing a vital role in economic and business

Promotion of active participation of women in decision-making and management, which is the goal of G20 EMPOWER, is one of the important initiatives in the activities relating to diversity and inclusion that we are advancing. Through sharing of information and learning among participating companies, we intend to further promote women's active participation in the company

Mitsubishi Materials Sustainability Innovation

Mitsubishi Materials has established the Mitsubishi Materials Sustainability Innovation Collaborative Research Cluster with the support of the Tokyo Institute of Technology Open Innovation Platform to conduct



processes that contribute to a sustainable society. The Collaborative Research Cluster will conduct joint research on composite materials, next-generation batteries, CO₂ utilization, and so on by combining the extensive and advanced knowledge of materials possessed by the Tokyo Institute of Technology with Mitsubishi Materials' accumulated materials technology and know-how on recycling and other processes relating to non-ferrous metals, particularly copper. We will promote technological development while actively incorporating cutting-edge technologies and contribute to the building of a prosperous society.

Continuing Donations to Organizations Addressing Social Issues

Mitsubishi Materials made fiscal 2023 donations to four organizations* working to resolve social issues. This initiative was launched on the occasion of the Group's 150th anniversary last year. To realize our corporate philosophy "For People, Society and the Earth," we have selected organizations committed to solving social issues through activities in line with this philosophy, in particular those supporting children, students, and refugees, and we continue to make donations this fiscal year. We, as a Group, will continue to contribute to the resolution of social issues and a sustainable society through various initiatives.



* International Volunteer University Student Association, a specified non-profit organization; Katariba, an approved specified non-profit organization; Japan Association for Refugees, a specified non-profit organization; WELgee, a specified non-profit organization



Please take part in the WITH MATERIALS survey



fields and achieve their empowerment. It was launched in earnest in 2020 based on an agreement at the G20 Osaka Summit 2019.

and strengthen diversity and inclusion activities.

Collaborative Research Cluster in the Tokvo Institute of Technology Established

research on innovative materials and



an expert on material

Dr. Materials

A doctor who loves

materials devoted to

research at a Mitsubishi

Materials lab

How is it different from conventional plastics?

SOZAI FILE NO.3

What type of material is

"fire-resistant

You probably think of plastics as being vulnerable to fire. However,

fire-resistant plastic, a new resin product that Mitsubishi Materials

has begun developing, doesn't burn when exposed to flames and is

harder to melt than conventional plastics.

plastic"?



The secret is material compounding technology!





Usually, a fire-retardant is added to prevent plastics from burning. However, regardless of how much is added, plastics are unable to withstand high-power flames. So, Mitsubishi Materials applied the material compounding technology it has cultivated to date to develop a plastic technology for obtaining fireresistant properties that are strengthened when exposed to flames, making it harder to melt. Using this technology, we created fire-resistant plastics!

Example of applications

The Secrets of

Materials

Exploring the "secrets" of

new materials Mitsubishi

Materials has developed!



Lithium-ion batteries

Fire-resistant plastics are expected to play an active role as a material for lithium-ion battery cases used for cell phones, PCs, and other devices. If the batteries ignite, it is hoped that the plastic casing will minimize the spread of the fire. When used for the lid of the LIB of an electric vehicle (EV), the LIB can be expected to be prevented from igniting or exploding even if the vehicle is on fire.



We would love to hear your honest thoughts and opinions about this issue of "WITH MATERIALS" and what you would like to see covered in the future.

Integrated Report 2022 and ESG Report 2022 Issued

Mitsubishi Materials issued Integrated Report 2022 at the end of July. With the aim of proactively disclosing both financial and nonfinancial initiatives to stakeholders and helping them understand the medium- to long-term growth potential of the company, this fiscal year's report includes enhanced contents on corporate governance and a special feature on the four management reforms currently underway. Additionally, we issued ESG Report 2022 at the end of August. You can read them on our website.





ESG Report 2022 https://mmc.disclosure.site/en/

A Special Website Opened for the Mitsubishi Materials' Mission -Introducing Employees Taking Ownership of Our Mission-

Based on the idea that "it is the power of each and every employee that gives soul and shape to our vision." Mitsubishi Materials began developing its inner branding initiatives in fiscal 2022 to encourage each employee to take ownership of the company's Mission.



To share this endeavor with our stakeholders, we also launched a special website on our Mission. This website introduces employees who interpret our Mission on a personal level and face their daily tasks, declarations of mission by employees in various positions, and more.

Promoting Understanding of Four Management Reforms

Mitsubishi Materials is currently carrying out four management reforms—CX (Corporate Transformation), HRX (Human Resources Transformation), DX (Digital Transformation), and operational efficiency improvement-to enhance our organizational capabilities with the aim of realizing our Group's ideal organization and culture. In April, we introduced several new systems, including a complete in-house company system and the Job-based HR system. Additionally, we actively provide information in town hall meetings and on our internal

website to allow employees to better understand the management reforms, including these initiatives. From August to September, questions and opinions were actively exchanged between management and employees in online town hall meetings





Teine Forest, one of our Materials Forests (Sapporo, Hokkaido)

Forest Guardians

There are several types of forests: inhospitable thick forests, forests for producing wood, forests for conserving water, forests with paved pathways that are accessible to everyone, and more. Forest guardians are those who maintain the functionality of all these forests.

Our Materials Forests have guardians, too. Their daily duty is to interact with the forests, listen to their voice, and keep them in better condition. They work to make efficient use of the wood resources and sometimes plan environmental education or recreational events to create connections between people and forests.

Forests in the autumn show us their beauty with red and yellow leaves. When you enjoy the beautiful scenery, please imagine the guardian's feelings. You may find your visit to the forest to be even more enjoyable.