

**Top Message**

**Adhering closely to its Corporate Philosophy, the Mitsubishi Rayon Group will continue to fulfill its social responsibility and thereby contribute to a sustainable society and the realization of KAITEKI.**



Around the world today, we face multitude of issues. In addition to environmental issues, such as global warming, climate change and air pollution, concerns of natural resource and energy depletion, and biodiversity destruction, other issues include rapid population growth, food and water shortages, aging populations with declining birthrates, severely lopsided wealth distribution, human rights abuses, and religious and racial unrest. Of course, there is no way that any one corporation could singlehandedly find solutions to all these issues. Nevertheless, the Group believes that every corporation bears a responsibility to confront such issues and to work to help find needed solutions through its corporate activities. We also believe that pursuing such activities is essential to the survival of any corporation in modern society.

As a member of the Mitsubishi Chemical Holdings (MCHC) Group, Mitsubishi Rayon Group's aim as a corporate group is to realize a well-balanced and truly sustainable condition, that is to say, KAITEKI, for people, society and the earth. To this end, we practice KAITEKI management based on three management concepts—Management of Economics (MOE), Management of Technology (MOT), and Management of Sustainability (MOS), which we employ to clarify targets and results, and the understanding thus gained enables us to improve our activities further. In this way, we will continue to fulfill our social responsibility as a company, thereby developing into a corporate group that helps to realize KAITEKI.

The Group's Corporate Philosophy is "Best Quality for a Better Life." "Best Quality" is not something we insist on only when it comes to products and services. We are working to help customers to realize a "Better Life" by applying the "Best Quality" standard to the development of personnel and other management resources as well as when dealing with business partners, customers and members of global and local communities. In this sense, our Corporate Philosophy expresses our commitment to pursuing "Best Quality" and contributing to sound social development. By acting on this commitment we realize a society that is truly KAITEKI.

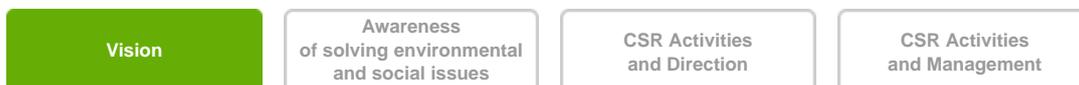
We consider safe and stable operations to be an important factor in fulfilling our responsibility to society in this way, through business activities aiming for KAITEKI. In accordance with the Mitsubishi Rayon Group's Basic Policies and Action Guidelines on safety, the environment, and quality assurance, we make safety and the environment our top priorities as essential prerequisites for corporate existence. We comply with all relevant laws and regulations. We will continue to place the highest priority on assuring safety and protecting the environment in all our corporate activities, allocate human resources and equipment appropriately and adequately, and maintain and improve safety.

\* KAITEKI is an original concept of the Mitsubishi Chemical Holdings Group, meaning a sustainable condition which is comfortable for people, society and the Earth, transcending time and generations.

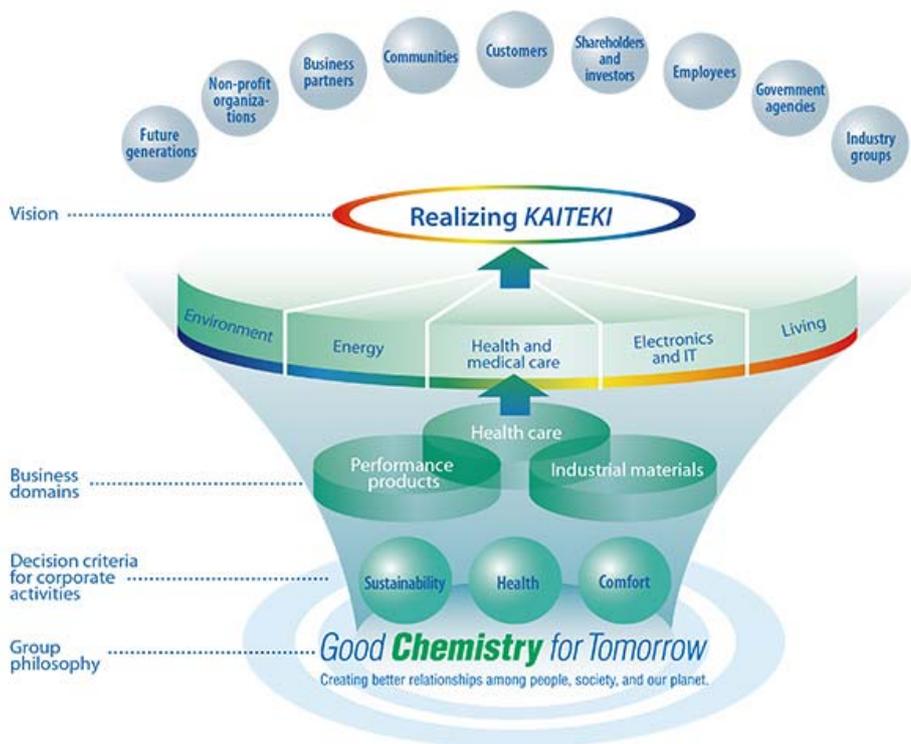
Hitoshi Ochi  
President  
Mitsubishi Rayon Co., Ltd

## The MCHC Group's Vision and CSR

The Mitsubishi Rayon Group's holding company, Mitsubishi Chemical Holdings Company ("MCHC"), seeks to achieve sustainable development for society and the planet, in addition to serving as a guide for solving environmental and social problems, under the MCHC Group's original concept of KAITEKI, while moving ahead with corporate and CSR activities in an integrated manner.



**Our vision is to realize KAITEKI, "a sustainable condition which is comfortable for people, society and the earth, transcending time and generations."**



KAITEKI as advocated by the MCHC Group means "a sustainable condition which is comfortable for people, society and the earth, transcending time and generations." It is an original concept of the MCHC Group that proposes a way forward in the sustainable development of society and the planet, in addition to serving as a guide for solving environmental and social issues.

The MCHC Group has made realizing KAITEKI its vision and based on the Group Philosophy of Good Chemistry for Tomorrow has set Sustainability, Health and Comfort as its decision criteria for Group corporate activities. Group companies with chemistry as the basis of their activities gather their collective strengths in the three business domains of Industrial Materials, Health Care, and Performance Products to provide a wide array of products, technologies and services.

Through our corporate activities, we contribute to the realization of KAITEKI through various fields including Environment, Energy, Health and medical care, Electronics and IT, and Living. This is the corporate ideal that the MCHC Group seeks to realize.

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**The MCHC Group aims to realize sustainable development based on addressing issues on a global scale and also healthcare and medicine issues.**

Moreover, the human race has advanced to where it is today as a result of diverse economic activities as well as scientific and technological progress. However, we have fallen out of balance with the global environment, and are confronted by complex problems spanning from climate change to natural resource/energy depletion and an uneven distribution of food and water. While addressing these global issues, we are being asked by society to contribute to the fields of healthcare and medicine, and to explore ways to improve convenience and advance technology in coexistence with the planet.

In light of these social needs, the MCHC Group aims to achieve sustainable development through systems that recycle materials derived from natural resources, use of natural energy sources, support of healthcare beyond the treatment of illnesses, and solutions that satisfy diverse values.

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**Sharing Issues and Targets Through Dialogue With Stakeholders**

The MCHC Group considers its stakeholders to include all the people who support our corporate activities: our customers, shareholders and investors, communities, employees and business partners, as well as society, and even the Earth, which is the foundation of our lives. To realize sustainable development among people, society and the earth, working in concert and engaging in dialogue with our stakeholders is indispensable to jointly identify issues and set targets for the short, medium and long term, and gear our corporate activities to their fulfillment.

As part of such activities, in May 2006, MCHC expressed support for the United Nations Global Compact, which stated 10 principles in the areas of human rights, labor, the environment, and anti-corruption, and the MCHC Group is promoting its corporate activities in accordance with the norms of the 10 principles.

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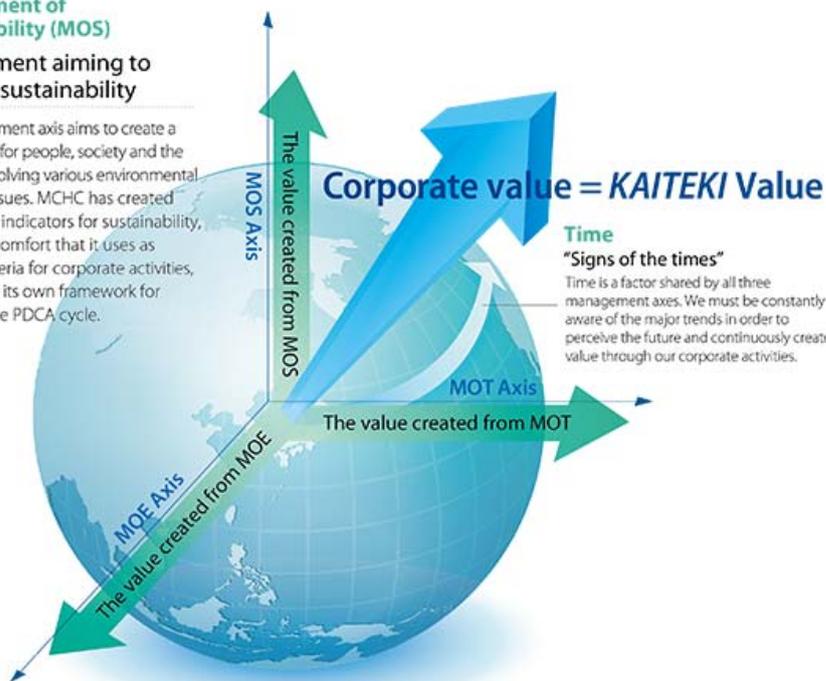


Applying KAITEKI Management, Our Own Management Method Based on Three Management Axes

Management of Sustainability (MOS)

Management aiming to improve sustainability

This management axis aims to create a better future for people, society and the planet by resolving various environmental and social issues. MCHC has created quantitative indicators for sustainability, health and comfort that it uses as decision criteria for corporate activities, and has built its own framework for engaging the PDCA cycle.



Management of Economics (MOE)

Management which focuses on capital efficiency

This management axis aims to increase profits and enhance economic value through the efficient allocation of capital, including personnel, assets and funds.

Management of Technology (MOT)

Management which strives to create innovations for society

This management axis aims to create innovations that lead to improvements in economic and social value through the development of new technologies and differentiate existing technologies. In addition to in-house development, this style of management emphasizes time-sensitive outcomes by building open and shared business models through alliances with other companies around the world.

The MCHC Group decided that a different set of values and management methods were needed for it to advance corporate activities with a view to solving environmental and social issues, while comparing the Group philosophy and decision criteria for corporate activities.

As a result, we created our own management method based on three management axes: (1) Management of Economics, which aims to increase economic value by focusing on capital efficiency; (2) Management of Technology, which aims to foster innovation that leads to higher economic and social value; and (3) Management of Sustainability, which aims to enhance social value through improvements in sustainability. Management along these three axes is implemented systematically with an awareness of major trends and opportunities throughout time. KAITEKI Management is the

name we have given to this unique management method for lifting corporate value from a broad-based perspective.

The MCHC Group discloses results of (1), (2) and (3) and progress reports of activities in the KAITEKI Report issued yearly.

## The Mitsubishi Rayon Group's CSR

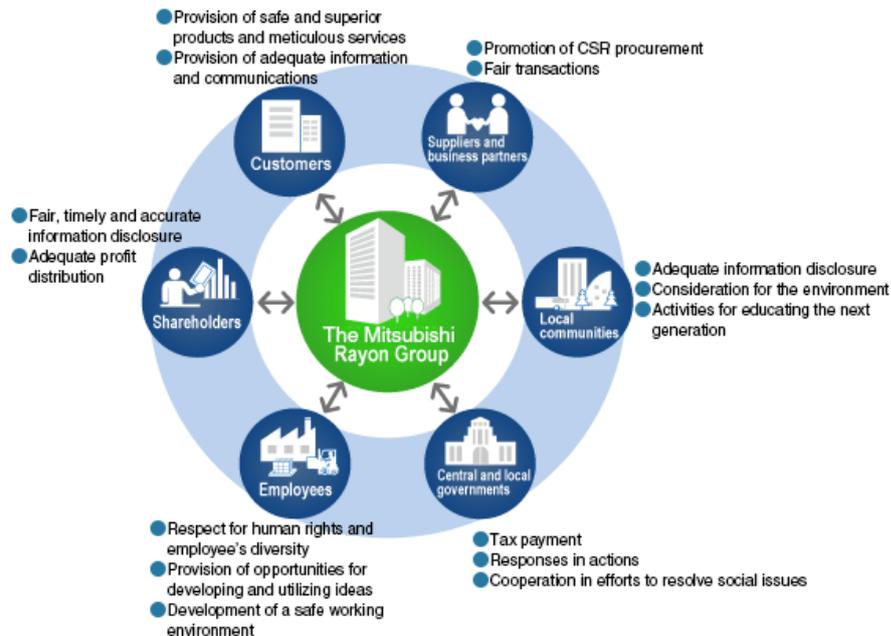
- ↳ [Basic Concept](#)
- ↳ [The Mitsubishi Rayon Group and Its Main Stakeholders](#)
- ↳ [CSR Implementation Structure](#)

### Basic Concept

As a member of the Mitsubishi Chemical Holdings (MCHC) Group, Mitsubishi Rayon Group's aim as a corporate group is to realize a comfortable and truly sustainable condition, that is to say, KAITEKI, for people, society and the earth. To this end, the Mitsubishi Rayon Group strives to encourage each and every employee to practice its corporate philosophy of "Best Quality for a Better Life" as embodied in the Group's "[Corporate Behavior Charter](#)," and actively works toward global business development. In doing so, the Group strives to create expected value by obtaining a higher level of trust from various stakeholders and global society.

### The Mitsubishi Rayon Group and Its Main Stakeholders

Building relationships of trust with stakeholders is the most important aspect in carrying out CSR activities. Building on a cumulative process of interactive dialogue, the Mitsubishi Rayon Group will accurately reflect the opinions, expectations and needs of stakeholders in our business activities and cooperate with stakeholders in an effort to ensure the sustainable development of society.



### CSR Implementation Structure

The Mitsubishi Rayon Group's CSR structure has instituted a CSR Management Meeting as a decision-making meeting mechanism that encompasses CSR activities as a whole. CSR Management Meetings are chaired by the president and comprised of Management Meeting

members, which includes corporate auditors. In addition to sharing and evaluating the CSR activity details and progress, CSR Management Meetings serve as a forum to deliberate on and determine Group CSR activity plans.

The CSR Management Meeting oversees a CSR activity proposal and promotion structure that comprises the Risk Management Committee, Safety, Environment & Quality Assurance Committee, Compliance Committee, and Information Security Committee. Each of these committees formulate activity plans on an individual presiding theme basis. Once a matter is determined at the CSR Management Meeting level, each committee then works diligently to promote specific activities.



As of April 1, 2015

For details on the activities below, please click on the following links:

- [Corporate Governance](#)
- [Compliance](#)
- [Risk Management](#)

## Corporate Governance

### Basic Perspective

The Mitsubishi Rayon Group is working to enhance its corporate governance by undertaking fair business activities in compliance with laws and with a high standard of corporate ethics.

### Fundamental Policy on Internal Control System

The Company hereby establishes its "internal control system" as below, which shall be reviewed and improved going forward as necessary. The purpose of this fundamental internal control system is to contribute to the achievement of MRC's corporate philosophy and to maximize the Company's corporate value by securing proper execution of business activities, ensuring efficiency of business activities and managing business risks.

#### 1. System to ensure business operation by Board Directors ("Directors") to comply with laws and the Articles of Association

- Directors shall act as a role model for others and execute their duties in accordance with the "Corporate Behavior Charter" whose purpose is to achieve the Company's corporate philosophy.
- Directors shall not only make business decisions but also make business reports and share information necessary for execution of Company's business at regular Board Meetings and at special Board Meetings.
- Directors shall mutually monitor and oversee other Directors' execution of duties to ensure entire legal compliance thereof. Should Director(s) be in violation of laws or Articles of Association committed by other Director(s), such instances must be immediately reported to the Corporate Auditors and to the Board and corrective measures shall be taken.

#### 2. System to store and manage information related to business execution by the Directors.

- The Company shall establish the "Important Documents Retention Regulations" and place appropriate controls on important documents related to business execution by the Directors (e.g. Shareholders' Meeting minutes, Board Meeting minutes, etc.).
- The Company shall establish the "MRC Information Security Committee," which shall supervise MRC Group's information security and management activities.
- The Company shall appropriately manage all of the MRC Group's information assets by establishing a basic information management policy and the "Mitsubishi Rayon Group Information Security Policy" and "Information Asset Management Regulations."
- Online Document Management System consisting of online "Bulletin Board", online "Koshin", etc. shall be utilized to transmit promptly and accurately the minutes of the Board Meetings and resolutions of the Management Meeting and other matters to be announced to other MRC Group companies.

#### 3. Regulations and other system to manage risk of loss

- The Company shall capture and categorize external risk factors; political and economic conditions, natural disasters and other significant risks concerning overall business operations i.e. production, sales, products, finances, R&D, systems, etc. The Company shall implement a system to prevent risks appropriately and mitigate risks.
- The Company shall establish the "Risk Management Committee," which shall supervise MRC

Group's risk management activities.

- The Company shall specify managerial responsibilities and management methods concerning the important risks related to the Company's business operations in the "Risk Management Regulations", and Directors and the head of each department shall take managerial responsibility for prevention and treatment of material risks in the business operations assigned to them. As to individual operational risks, the Company shall standardize business activities in the "Business Operations Regulations" and put the risk prevention system in operation on a daily basis.
- As to disaster, accident, incident and other crisis management, the Company shall, pursuant to the "Risk Management Regulations," set up a Crisis Task Force as needed for organisational response. The Company shall prepare a risk management system for all conceivable risks, and develop and update the Crisis Management Procedures.

#### **4. System to ensure efficiency of business operation by the Directors**

- In addition to the regular and special Board Meetings, the Management Meeting, chaired by the President, shall be held to deliberate important matters concerning business operations of all the Group Companies and Departments for the purpose to improve the efficiency of performance of respective duties of each of the Directors.
- The President shall promptly transmit the resolutions by the Board and the decisions by the Management Meeting to all Executive Officers and concerned departments using the online bulletin board. Operations based on those resolutions and decisions shall be executed quickly by the employees in accordance with the authorities and responsibilities defined by the "Office Organisation Rules" and "Segregation of Duties Rules".
- The Company shall establish the "CSR Management Meeting," which oversees the activities of the Risk Management Committee, Safety, Environment & Quality Assurance Committee, Compliance Committee, and Information Security Committee. Each such committee shall enhance efficient business operations and compliance systems.

#### **5. System to ensure business operation by employees to comply with laws and the Articles of Association**

- The Company shall endeavor to spread the "Corporate Behavior Charter" and the "Compliance Code of Conduct," and shall disseminate employees the significance and purposes of all types of internal regulations concerning the execution of other business operations and improve the employees' understanding thereof.
- To further ensure strict adherence to the "Corporate Behavior Charter" and compliance requirements, the Company shall establish the "Compliance Committee". The "Compliance Committee" shall be the cornerstone of the compliance framework. Each of the Executive Officers, General Managers, and Directors shall promote compliance activities within their organisations on a daily basis in accordance with the policies implemented by the "Compliance Committee".
- The Company shall establish the "Safety, Environment & Quality Assurance Committee," which shall oversee the risk management related to safety, environment and quality assurance and compliance activities in accordance with "Safety, Environment & Quality Assurance Regulations".
- Audit Office shall submit internal audit reports to the President and to the concerned departments in accordance with the "Internal Audit Regulations" and exchange information with the Corporate Auditors.
- Should Director(s) discover serious violations of laws and material facts concerning compliance, such instances must be immediately reported to the Corporate Auditors, the Board, and the Management Meeting.
- The Company shall establish the Compliance Hotline System pursuant to the "Compliance Hotline System Regulations" for early discovery of violation of compliance issues and proper treatment thereof.

#### **6. System to ensure proper operation by the Corporate Group**

- The Company and its Group companies shall adhere to the "Charter of Corporate Behavior" and

related policies etc. set forth by its parent company Mitsubishi Chemical Holdings Corporation and seek its approvals on, and report to it, any important management matters.

- The Company shall ensure that all the Directors and employees of both the domestic and overseas Group Companies comply with the "Corporate Behavior Charter" and the "Compliance Code of Conduct" as their common norm.
- Group Company President (CEO) shall oversee and be responsible for the compliance activities of such group company in accordance with the "Corporate Behavior Charter" and the "Compliance Code of Conduct".
- In order to properly manage the operations of Group Companies, the Company shall establish the "Group Companies Management Regulations", which shall apply to all Group Companies. While honouring the independent activities of Group Companies, the Company shall ensure it receives reports and notifications from Group Companies, and provide guidance, etc., to Group Companies.
- Risk management at each Group Company shall be incorporated into the risk management system of its parent company.
- The Company shall regularly hold meetings that are attended by its Group companies' presidents and share the Online Document Management System consisting of online "Bulletin Board", online "Koshin", etc.
- In addition to as provided for in Paragraph 5. (6), MRC shall position the Compliance Hotline System as an internal reporting system for all Group Companies and as a reporting channel for cases of compliance issues with the business management or management guidance of the parent company.
- Internal audit of Group Companies shall be conducted in accordance with the "Internal Audit Regulations". The Audit Office shall share information with Corporate Auditors of Group Companies through communication and consultation concerning auditor's duties.

#### **7. System to ensure credibility of Financial Reporting**

- To ensure reliable financial reporting, MRC shall develop and operate an internal control system and report the results of assessments of its effectiveness based upon the "Operation Rules for Internal Control over Financial Reporting".

#### **8. Matters for Employees that assist duties of Corporate Auditors**

- MRC shall appoint audit assistants who will assume the position in charge of support auditing duties and responsibilities of Corporate Auditors.
- When deciding personnel issues such as appointment, evaluation, transfer, etc. of audit assistants, prior consent of the Corporate Auditors shall be required and such decisions shall remain independent from the Directors.
- The audit assistants shall follow corporate auditors' instructions and orders and assist in execution of corporate auditors' duties.

#### **9. Reporting systems to Corporate Auditors.**

- With regard to important issues concerning operation of business such as matters reported to or resolved at the Management Meeting, the personnel in charge for such issue shall be caused to provide explanation to the Corporate Auditors upon request by the Corporate Auditors to enhance effectiveness of the report to the Corporate Auditors.
- The Company shall secure a system whereby Corporate Auditors is entitled, in addition to receiving reports from the Directors, to attend important meetings and express their opinions, and conduct separate meetings with Management Meeting members, etc. including the President and the Corporate Auditors on a regular basis to collect information.
- The Company shall mandate the Internal Control Department to report to the Corporate Auditors concerning each instance raised through the Compliance Hotline System.
- The Company shall have the responsible department(s) report to Corporate Auditors concerning

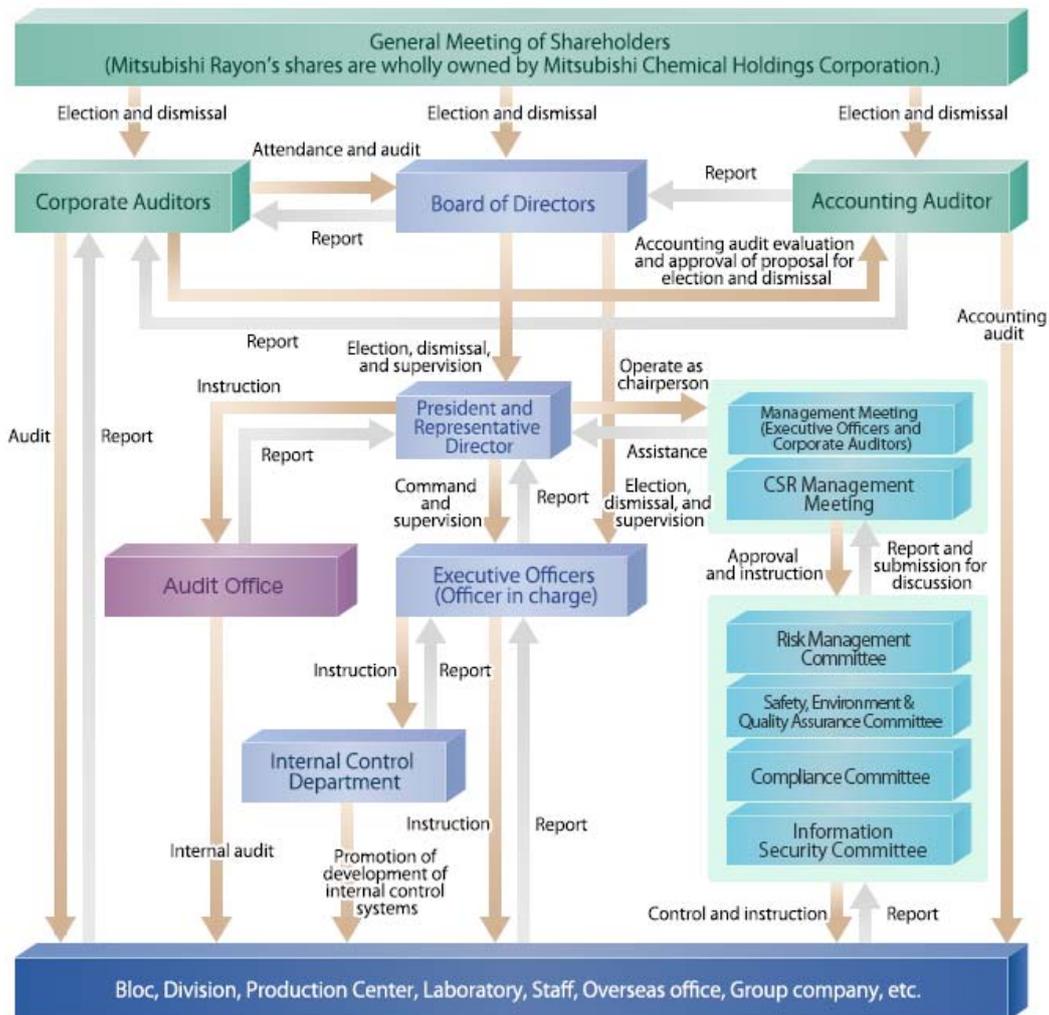
status of implementation of the internal control system approved at the Board Meeting, and whether such system is functioning effectively. The status of risk management shall also be reported regularly to the Corporate Auditors.

- The Company shall ensure directors or employees not to be given any disadvantageous treatment because of the reports that they make to the corporate auditors by setting forth a relevant provision in "Rules on Compliance Consultation Desks."

### 10. Other systems to ensure effective Audit by Corporate Auditors

- Corporate Auditors, Accounting Auditors and Audit Office shall regularly exchange information. The Company shall ensure a system whereby Corporate Auditors, Accounting Auditors and Audit Office can maintain close liaison, conduct effective audit, and exchange theme specific information when carrying out audit work. In conducting internal audit, the Audit Office shall maintain close contact and coordination with the Corporate Auditors and cooperate with Corporate Auditors' audit. In addition, the Corporate Auditors shall focus on strengthening the effectiveness of the audit system for auditing Group Companies including overseas subsidiaries and affiliates.
- The Company shall be responsible for the payment of costs, among the costs paid by corporate auditors, which are deemed adequate to regard as costs necessary for conducting audit.

2015/06/23



**Compliance**

The Mitsubishi Rayon Group is expanding its autonomous activities to steadily raise the compliance awareness of every employee by positioning compliance in its corporate endeavors as one of its top priorities and through the formulation of the Business Code of Conduct and Compliance Code of Conduct.

**Compliance promotion system**

The Mitsubishi Rayon Group has established the Compliance Committee to determine the group's policies and plans regarding compliance promotion activities under the direction of the Chief Compliance Officer. At the same time, for the purpose of upgrading the group's compliance promotion activities, the group has assigned employees in charge of compliance promotion who manage the progress of compliance promotion activities, confirm the effectiveness of such activities, and develop improvement measures, etc. Furthermore, the group aims to enhance its compliance promotion activities by developing and improving compliance-related rules and monitoring circumstances relating to disciplinary actions, reports provided to compliance consultation desks, etc.

**Compliance Promotion System**



## **Thorough Compliance Education, Training and PR**

We make every effort to regularly conduct education, training and PR at each workplace to fully instill an awareness of shared values and our Business Code of Conduct in each employee.

Every year, basic compliance training via e-learning is conducted specifically for assistant sales managers and new managers in order to test their knowledge and understanding of compliance in such areas as customers, partners, competitors and society. In addition, we hold workshops for approximately 400 managers and group leaders given their key role in promoting compliance. The workshops focus on increasing one's own sensitivity towards compliance and becoming more attuned to the latest information on this topic. We also conduct group discussions mainly on workplace issues with the purpose of raising awareness of compliance among employees and deepening communication during daily operations at every workplace.

Using internal databases, we publish the Compliance Report every month to showcase good compliance actions as well as publicize such issues as relevant laws and behaviors subject to disciplinary action. The Compliance Report serves as part of our employee education and awareness raising activities.

## **Compliance Awareness Survey**

In order to confirm the status of compliance promotion, the compliance awareness survey was conducted for the first time targeting Mitsubishi Rayon employees in conjunction with each Mitsubishi Chemical Holdings Group company. Survey results are conveyed to employees, used to confirm current compliance status and promote future compliance promotion activities.

## **Compliance Consultation Desk**

In order to rapidly identify and appropriately address compliance infringements, the Mitsubishi Rayon Group has set up two external compliance consultation desks staffed by attorneys and operated by a specialist management company and two in-house desks staffed by corporate auditors and operated by the Internal Control office. All of these desks form a consultation and reporting system that the Company utilizes in its efforts to appropriately manage and promote compliance. The privacy and human rights of everyone using this service is protected, the information gathered is not handled in a disadvantageous manner, and steps are taken under the direction of the Chief Compliance Officer (CCO) to remedy problems as soon as possible.

## **Compliance Activities in Overseas Group Companies**

The legal framework, culture, and social system are different in each country or area, and therefore, it is necessary to carry out compliance promotion activities that meet the circumstances of each country or area. Mitsubishi Chemical Holdings America Inc. in North America, Mitsubishi Chemical Holdings Europe GmbH. in Europe, Mitsubishi Chemical Holdings (Beijing) Co. and other regional supervisory companies of the Mitsubishi Chemical Holdings Corporation group in China, and key companies in other Asian countries are playing a central role in providing training and e-learning services to managers and employees at group companies. In addition, Mitsubishi Rayon (Shanghai) Co. is developing and promoting compliance plans in China.

## Risk Management

The Mitsubishi Rayon Group is aware that in order for the Group to meet public demands and sustain its development, it is essential for it to establish a mechanism for thoroughly understanding and managing various key risks both within and outside its business, in other words a "risk management system." With this awareness, the Mitsubishi Rayon Group has undertaken the following activities for managing risks.

### Risk Management System

The Mitsubishi Rayon Group's risk management initiatives respond to both important operational risks from a companywide perspective and risks inherent in each business activity undertaken by the Group.

#### (1) Risks That Significantly Impact Operations

Taking into account the social environment and other factors, the Risk Management Committee sets important companywide risks yearly and appoints the competent department to implement key measures in response to each risk.

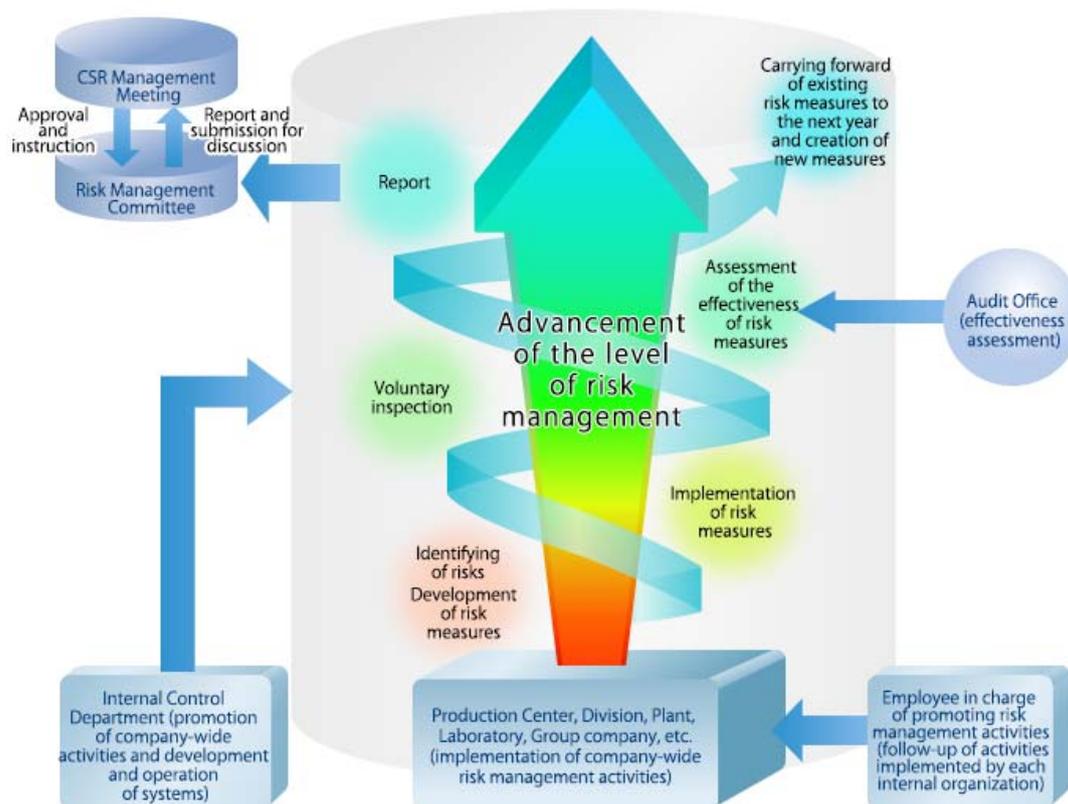
#### (2) Risks specific to each department

Each department, division, production center, plant, or laboratory develops its own risk measures in accordance with the company-wide risk management standards and manages risks with a bottom-up approach.

Specifically, each department, division, production center, plant, or laboratory is endeavoring to reduce risks by implementing the PDCA (plan-do-check-act) cycle consisting of (1) identifying risks, (2) developing risk measures, (3) implementing risk measures, (4) assessing the effectiveness of risk measures, and (5) carrying forward existing risk measures to the next year and creating new measures.

For each risk, the Audit Office checks the effectiveness of activities to develop and implement risk measures, aiming to improve the level of risk management activities. The progress of risk management activities is managed using a database system, with the aim of effectively and efficiently carrying out risk management operations by sharing risk information within the group, including overseas group companies. In addition, the level of risks identified is evaluated based on a matrix consisting of the degree of influence and the frequency of occurrence, and the results of this evaluation are reported to the Risk Management Committee.

## Risk Management Chart



### Risk management activities at overseas group companies

We are facing a need to carry out global business operations, covering global markets, by promoting cooperation among production and marketing centers in Japan, Asia, the U.S., Europe, and other countries and regions in the world. Consequently, from the perspective of securing the soundness of business management, it is becoming more and more important to develop and strengthen risk management and corporate governance functions.

The Mitsubishi Rayon Group manages risks on a unified, group-wide basis, covering both domestic and overseas group companies. For overseas areas where there are many group companies, and a high level of risk management is required, the group is carrying out risk management activities together with Mitsubishi Chemical Holdings America Inc. (in North America), Mitsubishi Chemical Holdings Europe GmbH. (in Europe), and Mitsubishi Chemical Holdings (Beijing) Co. (in China) and other regional supervisory companies of the Mitsubishi Chemical Holdings Corporation group. Furthermore, one of the most important challenges regarding the Mitsubishi Rayon Group's business operations is to develop and strengthen risk management and corporate governance functions in China. The group is dealing with these challenges by providing Mitsubishi Rayon (Shanghai) Co. with functions to develop and promote risk management plans.

### Business Continuity Plan (BCP)

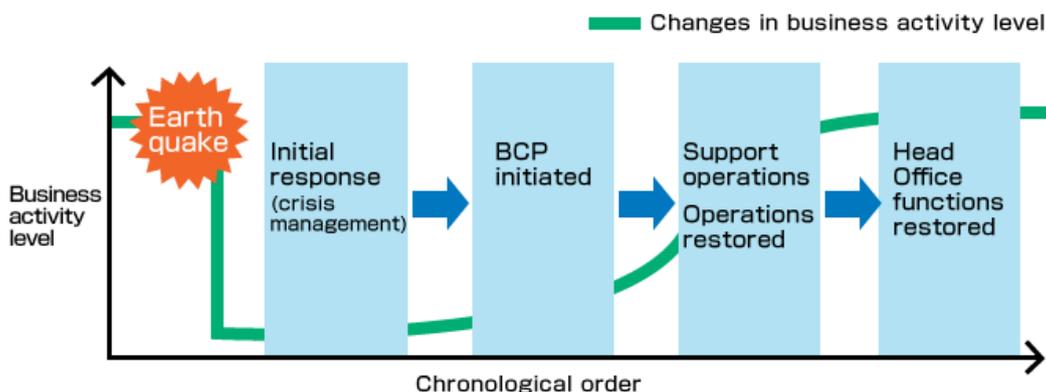
#### ■ Activities relating to an initial response (crisis management) plan and a business continuity plan (BCP) to prepare for a huge earthquake directly hitting the Tokyo metropolitan area and a major Nankai Trough earthquake

In order to prepare for a situation where the functions of the Head Office are lost because a huge earthquake hits the Tokyo metropolitan area or a situation where the functions of production centers and other offices located in the part of Japan that is west of Shizuoka Prefecture are lost because a major Nankai Trough earthquake occurs, we have developed a crisis management plan to secure the

safety of employees and a BCP-related basic action program covering all departments, etc., of the Mitsubishi Rayon Group.

Under the BCP-related basic action program, each department of Mitsubishi Rayon has separately assigned a supporting department that will take over its operations in case it is hit by an earthquake. After a BCP is implemented, supporting departments in each area will voluntarily launch support operations and will provide business continuity support until the earthquake-stricken departments restore their operations. Through these activities, we aim to restore the lost functions as fast as possible.

### Chronological Order and Business Activity Level



\*The green line indicates the fastest possible restoration of pre-earthquake operations.

#### ■ Crisis management training

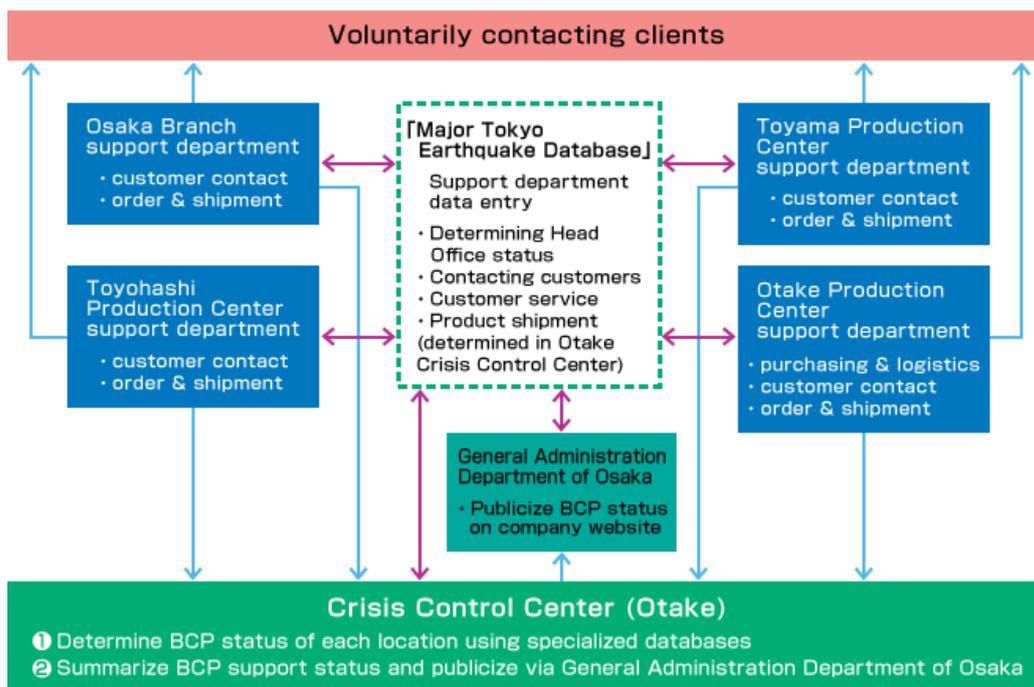
We periodically provide crisis management training simulating a situation where a huge earthquake directly hits the Tokyo metropolitan area or a major Nankai Trough earthquake occurs during work hours. If challenges are discovered and clarified through training, they are incorporated in the next crisis management plan (the revised edition), aiming to improve its effectiveness.

#### ■ BCP training

We periodically provide BCP training simulating a situation where a huge earthquake directly hits the Tokyo metropolitan area, based on cooperation among supporting departments for the Osaka Branch, the Toyohashi Production Center, the Toyama Production Center, the Otake Production Center, and the Sakaide Production Center, departments at the Head Office (which is assumed to be damaged by the earthquake), and the Otake Crisis Control Center.

In the training, a responsible person at a supporting department confirms failure of the functions of the Head Office in Tokyo due to an earthquake, implements a BCP, and instructs a person in charge to begin support operations. Subsequently, the person in charge at the supporting department notifies a client (in the training, a department in charge at the Head Office acts as a client) of the taking over of operations by the supporting department, carries out shipment and other operations on behalf of the Head Office, and enters the results of these operations into an in-house "database for a huge earthquake hitting the Tokyo metropolitan area." Then, the responsible person at the supporting department reports the results of these operations, which are carried out on behalf of the Head Office under the BCP, to the Otake Crisis Control Center, and a person in charge of public relations at the Osaka Branch provides information to outside parties through the website.

Meanwhile, to prepare for a major Nankai Trough earthquake, the Otake Production Center, the Toyohashi Production Center, and the Yokohama Production Center are eagerly examining BCP-related training programs by carrying out activities such as determining the level of anticipated damage in each area and creating BCP-related manuals.



### ■ Distribution of handbooks

We have created a handbook describing basic actions to be taken if a huge earthquake occurs and distributed it to all employees of the Mitsubishi Rayon Group. (The first edition was published in October 2014.)

### ■ Challenges under review

Improvement of the effectiveness of the crisis management plan and the BCP in order to prepare for a huge earthquake directly hitting the Tokyo metropolitan area

Establishment of a crisis management plan and a BCP at each production center in order to prepare for a major Nankai Trough earthquake

## Information Security

The Mitsubishi Rayon Group established its Information Security Policy in fiscal 2004 and is undertaking activities centered on the Information Security Committee to increase information security. From the perspective of internal control (J-SOX), the Group inspected mobile devices and tightened control of information access rights in fiscal 2009. The Group has expanded the application of improved physical security measures in areas such as facilities, equipment and devices, with the use of IC cards<sup>※1</sup> called PIAS<sup>※2</sup>. We will continue to promote PDCA cycles to reinforce information security activities.

※1 IC card: A card mounted with integrated circuits (ICs) for data storage and computation

※2 PIAS: Physical Security Integrated Admission System, the Mitsubishi Rayon Group's unified access control system

# CSR 2015

## Activity Highlights 2015

Activity 12 | Our Global Carbon Fiber Business



Globally strengthening our carbon fiber business to promote energy conservation

Activity 11 | Strengthen the MMA Monomer Production System



Further strengthening the stable supply of MMA as the world's No. 1 supplier

Activity 10 | Establish Mitsubishi Rayon Aqua Solutions

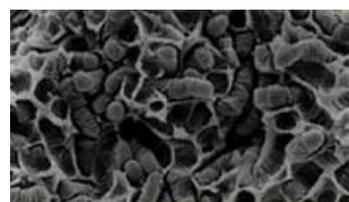


Developing a comprehensive aqua solutions business to realize a sustainable society

### Back number



Activity 9 | Promotion of Fuel Conversion



Activity 8 | Global Development of Acrylamide Manufacturing Technology



Activity 7 | Promotion of Skylights Made From Acrylic Resin



Activity 6 | Groundwater Membrane Filtration System



Activity 5 | Expansion of the Market for Artificial Carbon Dioxide Baths



Activity 4 | Next Stage of Development in DNA Chips (Genopal)



Activity 3 | Development of Core-sheath Acetate Fiber (KIST)



Activity 2 | Promoted Cleansui Long-Term Storable Water



Activity 1 | Further Evolved Golf Shafts



## Globally strengthening our carbon fiber business to promote energy conservation

The world today is acting with strong resolve to make energy use cleaner and more efficient. A key material for the success of these efforts is carbon fiber, combining strength with light weight. Mitsubishi Rayon Group, as the world's only manufacturer of both PAN-based and coal pitch-based carbon fibers, provides solutions to many different kinds of industries, even as we work to further strengthen our global value chain.

### Environmental and Societal Issues

#### Expanding demand for strong and lightweight carbon fiber products for reduced environmental burden

For human society to avoid the crisis of global warming and climate change, it will be essential to use energy effectively and to achieve major reductions in emissions of CO<sub>2</sub> and other greenhouse gases. Today worldwide efforts are under way to reduce energy use and to introduce new cleaner energy. A key material in these initiatives is carbon fiber, combining strength with light weight. In the automotive field, for example, an important theme is to reduce vehicle body weight for better fuel efficiency. CFRP (Carbon Fiber-Reinforced Plastic), boasting around ten times the strength and a fourth of the weight of steel, is increasingly being used by automakers as a structural material in vehicles to reduce weight. Lowering body weight is also an effective way to extend the range of electric vehicles and those powered by fuel cells. CFRP is thus expected to see expanded use in these next-generation eco-cars. Naturally the expectations for lower weight and greater fuel efficiency from wider CFRP use are not limited to automobiles, but extend to railways and other transportation means and to the aerospace field.

CFRP and other carbon fiber composite materials are further seen as having worldwide growth potential in the energy field. They are essential advanced functional materials for tanks that transport natural gas and shale gas in the alternative energy field, and for products such as hydrogen gas tanks for fuel cells and wind turbine blades in the next-generation clean energy field.

### The Mitsubishi Rayon Approach

#### Realizing diverse solutions with a top-performing carbon fiber lineup and original processing technology

Exceptionally strong PAN-based carbon fibers are made from acrylic fibers carbonized at high temperatures. Pitch-based carbon fibers, made from coal tar as raw material, are known for their high

rigidity (modulus of elasticity). Drawing on their respective advantages, these two main types of carbon fiber are put to diverse uses in aerospace, sporting goods and leisure products, and in the manufacturing and automotive fields.

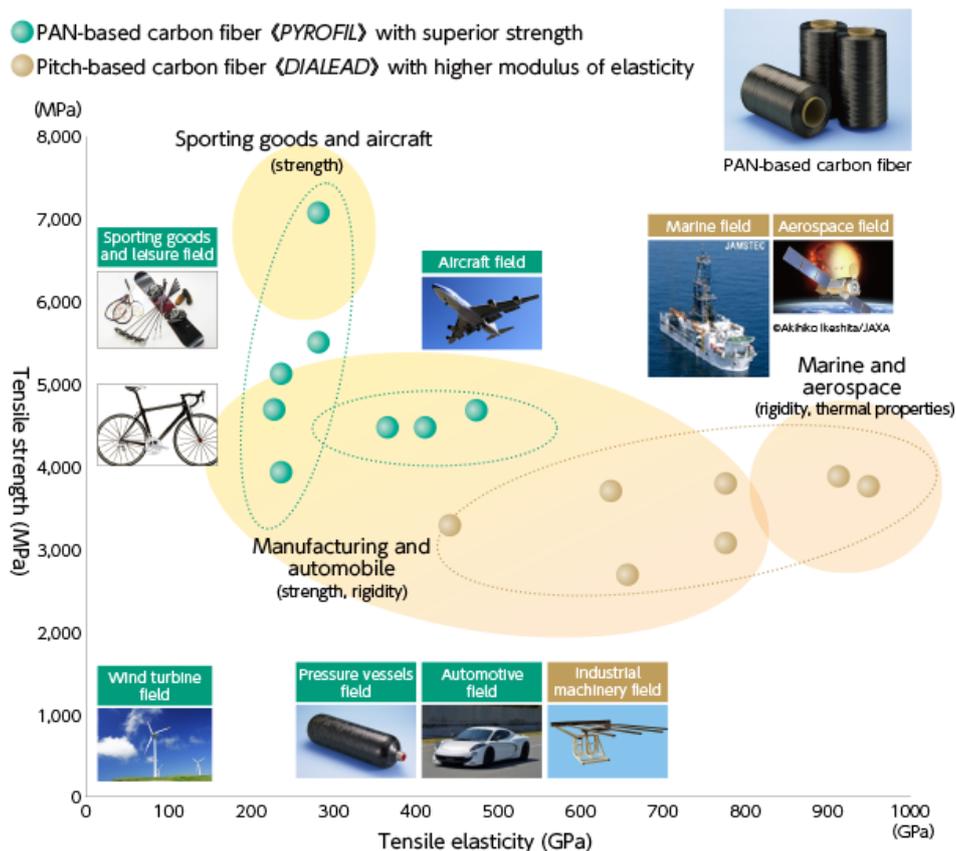
Mitsubishi Rayon is the world's only manufacturer of both PAN-based and pitch-based carbon fibers. In the wide-ranging lineup, the PAN-based «PYROFIL» series includes products with the highest strength grade in the world, while the pitched-based «DIALEAD» series boast the highest rigidity (modulus of elasticity). The «PYROFIL» series, moreover, features high-performance large tow\* fibers having performance similar to that of regular tow\* fibers but with major cost advantages. These are attracting notice in a wide range of industries.

As processing technologies, in addition to the conventional AC (autoclave) and RTM (resin transfer molding) techniques, we developed the PCM (prepreg compression molding) technique with greatly reduced molding time while maintaining the same properties as AC. We have also succeeded for the first time in developing mass production SMC (sheet molding compound) technology for carbon fibers, aimed at improving molding processability while reducing costs.

Applying these carbon fibers and processing technologies, Mitsubishi Rayon is creating diverse solutions while strengthening our global value chain, for quickly meeting the varied needs of customers.

\* regular tow/large tow

Carbon fiber is a bundle of fibers up to 10 microns in diameter. Carbon fiber of 24,000 or fewer filaments is called regular tow, and that of 40,000 or more filaments is called large tow. Generally, the former offers superior performance while the latter offers superior processing capability and cost.



## Fiscal 2014 Results

### Strengthening the value chain and achieving highly competitive business

#### ● Toward a Stronger Business Structure

**Integrating with the pitch-based carbon fiber business of Mitsubishi Plastics to become a comprehensive manufacturer of carbon fibers**

Mitsubishi Rayon and Mitsubishi Plastics agreed in April 2015 to integrate their respective PAN-based and

pitch-based carbon fiber businesses, with the aim of boosting business in the area of carbon fiber and composite materials. Mitsubishi Rayon took over the pitch-based carbon fiber business of Mitsubishi Plastics through a corporate demerger, embarking on a fresh start under a new organization integrating this with the PAN-based carbon fiber business.

As a result of this integration of business divisions, Mitsubishi Rayon became the sole carbon fiber manufacturer in the world with the technologies for producing both PAN-based and pitch-based products. Mitsubishi Rayon, by applying the know-how built up in the world's top pitched-based carbon fiber business to the PAN-based carbon fiber area, is further strengthening our ability to offer solutions in key strategic industry fields including automobiles, pressure vessels, and wind turbine blades. Taking advantage of the existing worldwide business infrastructure for PAN-based carbon fiber and composite materials, we are now moving to maximize the business value of pitch-based carbon fiber.

### ● In European Automobile Markets

#### Acquired German firm Wethje, maker of CFRP parts for automobiles

To strengthen our European business in carbon fiber and composite materials for automobiles, Mitsubishi Rayon acquired a 51 percent stake in Wethje Holding GmbH, a German firm manufacturing automotive CFRP parts, making that company a consolidated subsidiary on October 1, 2014.

In operation since 1979, Wethje has supplied numerous parts to high-end automobiles, winning high acclaim in European markets for its outstanding technology as a CFRP parts manufacturer. The company is also known as one of the few manufacturers capable of wielding not only the AC process for small-lot production but also the RTM process for medium-scale production.

Mitsubishi Rayon had already acquired Challenge Co. Ltd. in 2012, but the addition of Wethje to the fold further upped the presence in Europe as a development, manufacturing, and market base for CFRP automotive parts, and is further strengthening our supply chain in European markets for automotive carbon fiber and composite materials business.

### ● In US Production Plants

#### Doubling of production capacity to meet demand growth in North America market

As an important step toward strengthening the carbon fiber and composite materials value chain, Mitsubishi Rayon in June 2014 set about expanding the carbon fiber production facilities at our North American wholly owned subsidiary Mitsubishi Rayon Carbon Fiber and Composites, Inc. (MRCFAC). Production equipment at the existing Sacramento, California plant, with annual capacity of 2,000 tons, is being expanded to achieve double the capacity at 4,000 tons per year. It is scheduled to go into operation in mid-2016.

Positioning MRCFAC as a supply base for high-performance carbon fiber, Mitsubishi Rayon will have enhanced capability for meeting demand growth especially in North America.

### ● For the Aircraft Market

#### Our PAN-based carbon fiber adopted in Airbus A320neo engine components

Mitsubishi Rayon PAN-based intermediate-modulus carbon fiber in February 2015 won adoption as a CFRP component material in the structural guide vanes (SGVs) of the PW1100G-JM engine, newly developed to power the new Airbus A320neo airplane. The PW1100G-JM engine is a civilian aircraft engine developed jointly by the US firm Pratt & Whitney, the German MTU Aero Engines AG, and Japanese Aero Engines Corporation (JAEC), to deliver improved fuel consumption, low emissions, and low noise. Core JAEC member IHI Corporation, which chose Mitsubishi Rayon's carbon fiber, successfully developed the world's first composite material-based SGVs. These will be installed inside the fan that draws in air from the front of the engine. The replacement of conventional titanium and aluminum with

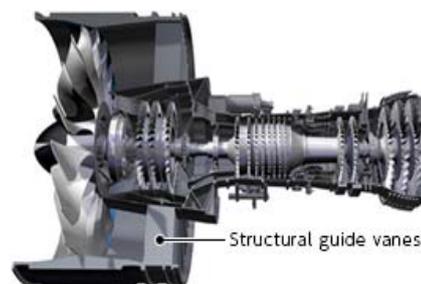


Image provided by Japanese Aero Engines Corporation (JAEC)

more lightweight but stronger CFRP composite materials significantly aided the development of a lighter, more energy-efficient engine. It achieves a large engine diameter while maintaining a high level of strength that can withstand bird collisions. Mitsubishi Rayon is looking to win wider adoption of carbon fiber in aircraft engine components.

### Key Person's Voice



**Masayuki Fukumoto**

Composite Products Division,  
Mitsubishi Rayon Co., Ltd.

For a material to be adopted in the structure or component of an aircraft, it has to be certified as meeting the required performance. The certification process involves a long development period and considerable expense. This project was no exception, as it took a total of around eight years from the time of carbon fiber development to adoption and the start of mass production. During this time there were many ups and downs, but when at first the required performance failed to be realized, we continued persistently to make improvements in the carbon fiber while coordinating with the customer, eventually winning adoption as the world's first carbon fiber for use in the structural guide vanes of a composite engine. I should note that our carbon fiber composite material was also adopted for the rotor blades of the MRJ (Mitsubishi Regional Jet) developed by the Mitsubishi Heavy Industries Group, which will start flying the world's skies at roughly the same time as the PW1100G-JM goes into service. Winning adoption in these civilian aircraft should further raise the presence of our company in the aviation field.

### ● Making a Business of Recycling

#### Promoting recycling services helping to realize a sustainable resource-recycling society

Growing demand for carbon fiber products makes it desirable to establish a recycling system to achieve more effective use of resources. Mitsubishi Rayon and other carbon fiber manufacturers in April 2012 established the jointly funded Consortium for Carbon Fiber Recycling Technology Development, undertaking research and trials of basic technology for recycling of carbon fiber. After achieving the goal of establishing the desired manufacturing technology, the consortium was dissolved at the end of March 2015.

Carrying on the research achievements, Mitsubishi Rayon starting in April 2015 began joint promotion of carbon fiber recycling business with Shinryo Corporation, a wholly owned subsidiary of Mitsubishi Chemical Corporation engaged in the environmental recycling business.

Shinryo built a new test facility for carbon fiber recycling at its site inside the Mitsubishi Chemical Corporation Kurosaki Plant in June 2015, and is working with Mitsubishi Rayon to further raise the level of the recycling technology toward commercial introduction. The two companies, drawing on their respective know-how built up in carbon fiber business and recycling business, are aiming to contribute toward realization of a sustainable resource-recycling society.



## Further strengthening the stable supply of MMA as the world's No. 1 supplier

### Environmental and Societal Issues

#### Establishing a supply chain for the growing global demand for MMA monomers

Acrylic resins, the primary derivative product of MMA (methyl methacrylate), offer high transparency, excellent weatherability and excellent processability. This material can be recycled through a technology known as depolymerization. Therefore, it is widely used in a broad range of applications including signage for convenience stores, automobile lamp covers, LCD covers for mobile phones, light guide plates for LCDs, aquarium tanks, coating, and building materials. As the No.1 supplier of MMA in the world with an approximately 40% share of global production capacity, Mitsubishi Rayon has developed a value chain that is global in scope. Beginning with MMA monomers, we supply a wide array of products worldwide, from commodities to high-performance products, including polymer processing products such as molding materials, resin sheets, resin improvers, plastic films, coating materials, optical fiber, and rod lenses that we carefully customize based on customer needs. We are No.1 in the world for the capability of these products.

Current global demand for MMA monomers, the raw material of acrylic resin, now exceeds 3 million tons annually and stable demand growth in line with each country's GDP is expected. To continue fulfilling its responsibility of reliable supply as the No.1 supplier, Mitsubishi Rayon is expanding its global production structure.

### The Mitsubishi Rayon Approach

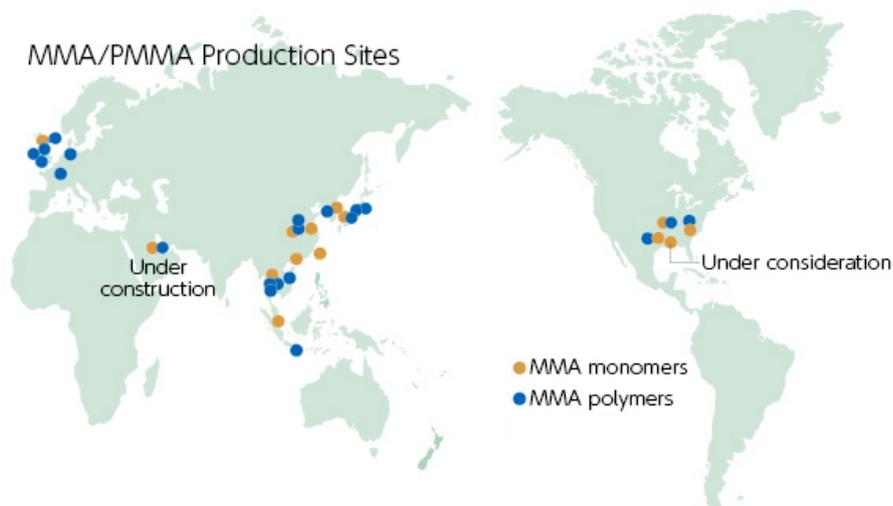
#### Leveraging production bases in the U.S., Europe and Asia

To fulfill its responsibility of reliably supplying MMA monomers globally, Mitsubishi Rayon is currently focusing on the creation of a globally optimized production system underpinned by various manufacturing technologies that are the source of its competitive edge.

Mitsubishi Rayon is the only company that possesses all three of the main production methods that use different production raw materials. In addition to the traditional ACH method, it has the C4-direct oxidation process first industrialized in 1983, and the innovative ethylene-based MMA production process, "Alpha Technology" successfully industrialized in 2008. Leveraging its strengths in these various manufacturing technologies and supply chain development from monomers to polymers, Mitsubishi Rayon is building an optimized production system at more than 30 of its manufacturing bases throughout the U.S., Europe and Asia. The system will monitor in an integrated manner the accessibility of raw material procurement, costs,

market needs, trends and other factors.

To make this unique business model more robust and raise our supply and competitive capabilities, we are making timely and appropriate capital investments. In fiscal 2014, we finished expanding production capacity at our base in Shanghai, China, and started new projects in Saudi Arabia and the U.S.



## Fiscal 2014 Results

### Strengthening the production structure in Saudi Arabia and the U.S.

#### ● Saudi Arabia

#### Started construction of the world's largest plant for MMA monomers and acrylic resin molding materials

In June 2014, Mitsubishi Rayon announced the establishment of The Saudi Methacrylates Company, a joint venture in Saudi Arabia with Saudi Basic Industries Corporation (SABIC). Annual production capacity for MMA monomers will be the world's largest at 250,000 tons, while acrylic resin molding materials will be at 40,000 tons.

Taking full advantage of utilizing highly competitive and secured gas feedstock, utilities and other infrastructure in Saudi Arabia, and applying the innovative ethylene-based MMA production process, "Alpha Technology", the new manufacturing facility will launch MMA monomer and PMMA businesses of overwhelming competitive strength. Scheduled to begin commercial operations in fiscal 2017, the new plant is expected to be a strategic supply base for emerging markets with growth potential, including Eastern Europe, India, the Middle East and Africa.

#### Key Person's Voice



**Itsumi Muraoka**

Project Manager,  
Mitsubishi Rayon Co., Ltd.

Plant construction in Saudi Arabia has finally moved into full swing. Collaborative work by a multinational team that includes Mitsubishi Rayon, Group company Lucite International Group based in the UK, SABIC, a partner in this project, and CTCI Corporation, a Taiwanese contractor. Safety is the first priority and all relevant parties are now focused on completing the high-quality plant on schedule.

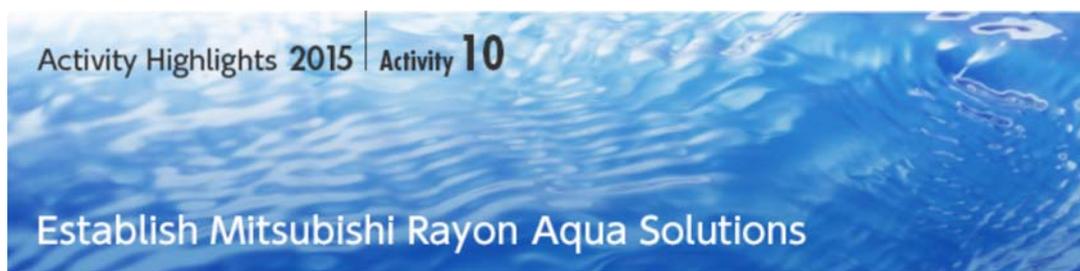
● **United States**

**MMA monomer production facility project started amid the shale gas and oil revolution**

In June 2014, Mitsubishi Rayon and Mitsui & Co., Ltd. signed a memorandum of understanding to commence detailed feasibility studies for the establishment of a joint venture in the United States to produce and sell MMA monomers.

The project brings together the integrated strengths of both companies. Mitsubishi Rayon brings its innovative ethylene-based MMA production process, "Alpha Technology" while Mitsui brings its network with overseas companies. The goal is to achieve a highly competitive MMA monomer business in the United States amid the shale gas and oil revolution.

The joint venture intends to secure access to the raw material ethylene from the shale gas and oil-derived ethylene production and supply network developed by Dow Chemical along the U.S. Gulf Coast and build an MMA monomer production facility with an annual capacity of 250,000 tons.



## Developing a comprehensive aqua solutions business to realize a sustainable society

Mitsubishi Rayon Aqua Solutions Co., Ltd. was launched in April 2015 following the restructuring of the Mitsubishi Rayon Group's aqua business.

As a comprehensive engineering company for water treatment, separation and purification capable of responding to the needs of a wide range of industries with an all-in-one package system, we will contribute to the sustainable development of a global society.

### Environmental and Societal Issues

#### **Demand for "water treatment" and "separation and purification" is expanding globally**

Global water demand is increasing at an accelerated pace along with population growth and economic development. In emerging countries with continuing rapid economic growth, in addition to water for domestic and agricultural use, demand for high quality, high-purity water for use in power stations and various types of factories is growing significantly. Further, in some emerging countries, pollution of rivers, seas, lakes and reservoirs and pollution of groundwater have become serious social issues. In these regions, it is necessary to maintain purification equipment for industrial wastewater that contains numerous impurities, and recycling equipment. Comprehensive water treatment solutions that handle everything from various types of water purification to water filtration and wastewater treatment.

In addition, reflecting growing health consciousness in developed markets and the rising living standards of emerging countries and in developed markets, there is a steadily growing need for equipment to perform separation and purification required in the manufacturing processes of pharmaceuticals and intermediates and in food production including sugar and functional foods.

### The Mitsubishi Rayon Approach

#### **Providing all-in-one package solutions in response to wide-ranging industry needs**

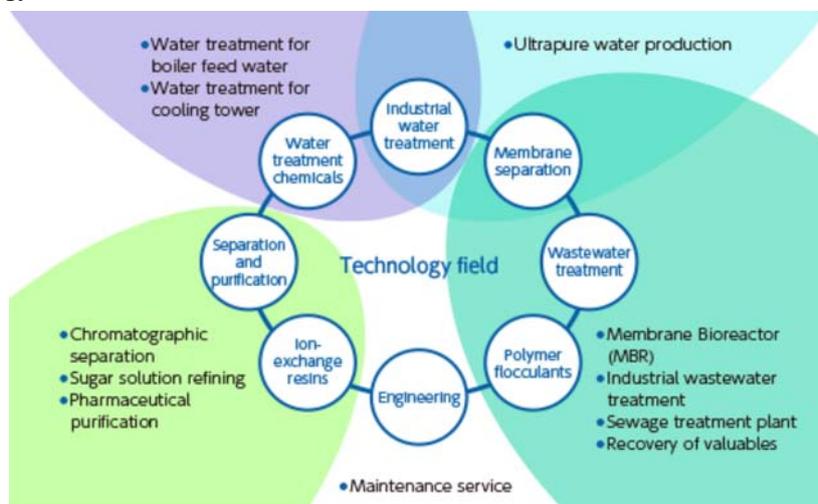
On April 1, 2015, the Mitsubishi Rayon Group restructured the former "Aqua Business Block" and changed it to the "Aqua Solution Block" with the goal of strengthening the water-related business, which has global growth potential, and the high-performance separation business. Mitsubishi Rayon Aqua Solutions Co., Ltd. was launched following this business restructuring.

This company is the parent organization of Nippon Rensui Co., which developed its business around the core water treatment and separation and purification technologies that utilize Mitsubishi Chemical's ion-exchange resins. The company is making a new start through transfer of control of nearly all of

Mitsubishi Rayon's water treatment business. Since its establishment in 1952, Nippon Rensui has developed a comprehensive engineering business that covers everything from equipment development to design, construction and maintenance primarily in the two fields of water, comprising pure and ultra pure water, and separation and purification equipment, which is used in pharmaceutical and food manufacturing processes. On the other hand, making full use of its propriety materials technology, Mitsubishi Rayon has pursued the development and sales of hollow fiber membranes mainly used in water purification and wastewater treatment, as well as of treatment equipment.

Through the fusion of these products, expertise and engineering technology, Nippon Rensui and Mitsubishi Rayon's water treatment business division were transformed into a comprehensive water treatment engineering company that not only sells parts and equipment, but is also capable of providing integrated solutions extending to design, construction and maintenance in a wide range of water treatment fields, from service water to wastewater, and the separation and purification fields, Mitsubishi Rayon Aqua Solutions intends to proactively develop diverse water treatment and separation and purification solution businesses in Japan, as well as in regions undergoing rapid economic development and industrialization, such as China and Southeast Asia. It will continue to contribute to the sustainable development of an industrial society through high-value-added businesses that make full use of its technologies and products.

● **Technology Platforms**



**Fiscal 2014 Results**

**Order received for separation and purification equipment from large Southeast Asian plant**

● **Thailand**

**Order received from world's largest liquid sugar refining plant**

In Southeast Asia, the consumption of soft drinks is increasing with recent population growth and rising living standards. Demand for liquid sugar, which enables the sugar dissolving process to be omitted in the soft drink production process, is growing. Mitsubishi Rayon Aqua Solutions (Nippon Rensui at the time) has a delivery record of supplying refining equipment in the sugar solution field to many refining plants in Japan. In recent years, leveraging this technology and knowhow, we have focused on sales activities in Thailand, Asia's largest sugar exporting country.

As a result, in September 2014, we received an order from Kaset Thai International Sugar Corporation Public Company Limited (KTIS) of Thailand for liquid sugar refining equipment that employs ion-exchange resins. KTIS is a major sugar production and sales company of Thailand. In 2013, Sumitomo Corporation and Nissin Sugar Co., Ltd. made a capital participation in the company, which is increasing the scale of its business in Southeast Asia. This sugar solution refining equipment will be installed in KTIS's refining plant in Nakhon Sawan Province in northern Thailand, which has one of the world's largest production capacities for a standalone plant.

Mitsubishi Rayon Aqua Solutions views the sugar processing field in Southeast Asia, China and other regions as an important growth business and will continue to proactively expand business while taking advantage of the MCHC Group's overseas bases and network of business partners.

### Key Person's Voice



#### Shinya Katayanagi

Senior Manager, Overseas Business Group  
Corporate Planning Division  
Mitsubishi Rayon Aqua Solutions Co., Ltd.

The design, procurement and delivery of equipment have been completed and the project is now in the construction stage. We routinely dispatch engineers to inspect constructions and we expect to complete commissioning and delivery within 2015. As an extension to this project, we can contribute to the expanding production of sweeteners and functional food materials using our technology. This is also expected to lead to better health for the local population through our customers' products. We plan to actively expand sales in Indonesia, Vietnam, China, and particularly in Thailand.

### ● Indonesia

#### Order for Southeast Asia's largest secondary brine purification system received from Indonesia's No. 1 caustic soda manufacturer

In the Southeast Asian market, where rapid economic development continues, demand is increasing for caustic soda, the raw material for a wide range of industrial products. In response to this increasing demand, PT. ASAHIMAS CHEMICAL (ASC), a caustic soda and vinyl chloride manufacturing and sales subsidiary of Asahi Glass in Indonesia, has been actively expanding its production capacity in recent years.

As a result, Mitsubishi Rayon Aqua Solutions (Nippon Rensui at the time) received an order in December 2014 for a secondary brine purification system from ASAHIMAS CHEMICAL, which boasts the leading market share for caustic soda and vinyl chloride in Indonesia. The system pre-treats ion-exchange membrane electrolysis equipment in the caustic soda manufacturing process (removing Ca, Mg and Sr) and has the largest purification capacity in Southeast Asia.

Mitsubishi Rayon Aqua Solutions has already delivered two secondary brine purification systems to ASAHIMAS CHEMICAL. The high-performance and space-saving benefits of the equipment are highly regarded and a third system was delivered. This time we also received an order for a pure water system for boiler feed water. Both systems are scheduled for operation by the end of 2015.

Mitsubishi Rayon Aqua Solutions will continue to contribute to industrial development in Japan and abroad by providing high-value-added separation and purification equipment.



Secondary brine purification system  
Two-tower type

Activity Highlights | Activity 9  
Promotion of Fuel Conversion

## Using fuel with little environmental impact to realize a sustainable society

### Environmental and Societal Issues

#### CO<sub>2</sub> emission reduction through active fuel conversion

Reduction of the CO<sub>2</sub> emissions that can lead to global warming is an important theme when it comes to increasing the sustainability of society. In recent years, fuel conversion, or switching to fuels that place a lighter burden on the environment than conventional fuels and has attracted attention as a measure for reducing CO<sub>2</sub> emissions in corporate activities.

For example, a comparison of the amounts of CO<sub>2</sub> emitted by fuels shows that while coal will emit 1 unit, oil emits 0.8 and natural gas emits 0.6. What that means is that converting to fuels using natural gas instead of coal or oil will significantly reduce CO<sub>2</sub> emissions arising from business activities. Fuel conversion has a variety of other benefits, such as atmospheric pollution countermeasures involving conversion to fuels containing less sulfur, or resource-saving measures involving conversion to renewable fuels instead of disposable plastics or oil.

### The Mitsubishi Rayon Approach

#### Toyama Production Center and Toyama City Eco Town initiatives

Mitsubishi Rayon's Toyama Production Center is implementing various initiatives in collaboration with the adjacent Toyama City Eco Town\*<sup>1</sup> Industrial Zone.

For example, one company operating in this zone is Toyama BDF Co., Ltd., which manufactures biodiesel fuel (BDF) from used edible oils discharged from food factories and meal supply centers. BDF is an environment-friendly fuel that is carbon neutral\*<sup>2</sup> and emits a very minimal amount of sulfur oxide (SOX) compared with diesel oil. The Toyama Production Center started collaborating with Toyama BDF in 2007. The center supplies Toyama BDF with used edible oil from its company cafeteria, which had previously been thrown away, and is then processed into BDF (around 5,500 liters per year based on fiscal 2014 results) for use in some of Toyama Production Center's on-site vehicles.

At Toyama Green Food Recycle Inc., biogas (methane) produced from food waste and other material is used to fuel on-site generators. Biogas is attracting attention as a renewable energy but there are issues in expanding its



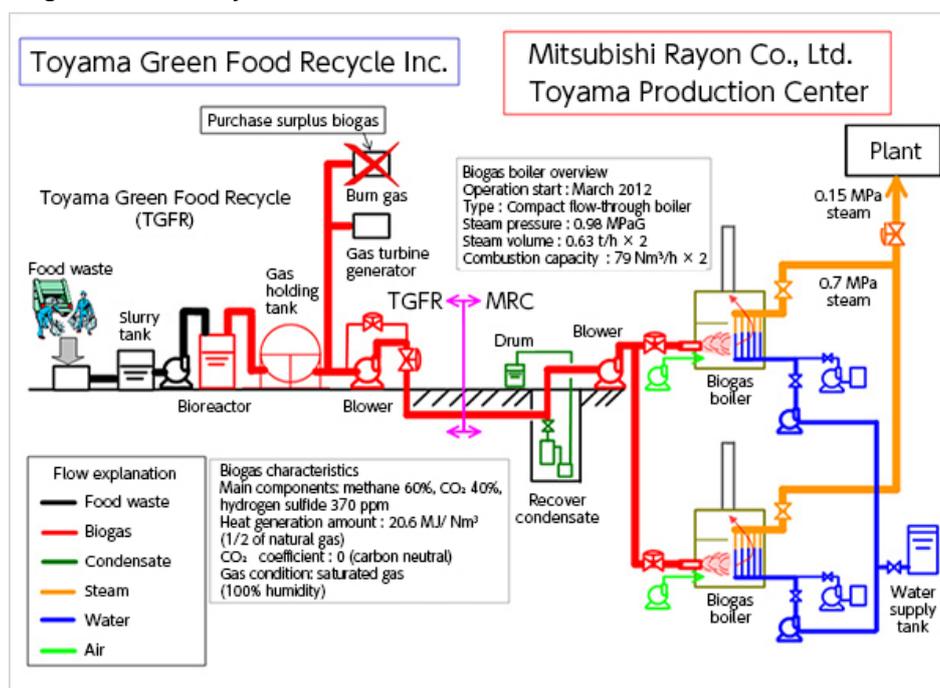
BDF is used as a fuel for vehicles used within the center

application. The Toyama Production Center has been working on this problem in cooperation with Toyama Green Food Recycle Inc. and Toyama City in a collaborative project between industry and government to examine the effective uses of surplus biogas. Since 2012, the surplus biogas has been used effectively as a portion of the fuel for a steam boiler to prevent degradation of the hydrogen sulfide that includes biogas. The result was a reduction of 995 tons of CO<sub>2</sub> emissions in fiscal 2014.

\*1 Toyama City Eco Town: Based on the Eco Town System established in 1997, projects operated by local authorities to support advanced environment-conscious town building through cooperation with local residents and industries.

\*2 Carbon neutral: When CO<sub>2</sub> emissions from plant-based fuels or combustion of raw materials are equal to the CO<sub>2</sub> emissions absorbed by plants during the photosynthesis stage and not resulting in an increase of CO<sub>2</sub> in the atmosphere.

Fig.1: Biogas Use in the Toyama Production Center



## Fiscal 2014 Results

### Reducing various environmental burdens by installing city gas boilers

At the Toyama Production Center, degraded heavy oil boilers (used together with petroleum coke boilers) were replaced in June 2014 by six compact flow-through boilers fueled by city gas. The fuel conversion from heavy oil to city gas using natural gas can reduce annual CO<sub>2</sub> emissions by 700 tons. In addition, it also led to significant decreases in substances such as nitrogen oxide (NOX) found in exhaust gases.

Installing the compact flow-through boilers also have a variety of other benefits that reduce the impact on the environment. Conventional heavy oil-fired boilers are not readily responsive to load fluctuations, so when there is a rapid reduction in factory volume use, there is no option other than to release surplus steam generated into the atmosphere. The newly installed compact flow-through boilers have outstanding load following characteristics, and detailed control of boiler numbers creates a reduction in the amount of surplus steam generated, so the amount of water used can be held down to about 1/100th of the past. Furthermore, cost and energy reductions are possible as launch times are reduced from two hours to about three minutes and detailed controlling of each boiler enables flexible operation of each device.

When installing the compact flow-through boilers, the city gas pipeline was also installed at the Toyama Production Center. This has further opened up possibilities for reducing CO<sub>2</sub> emissions through fuel conversion to city gas. We will continue to examine further fuel conversions.

Activity Highlights | Activity 8  
 Global Development of Acrylamide Manufacturing Technology

## Deployment of world's first production method to reduce environmental impact

### Environmental and Societal Issues

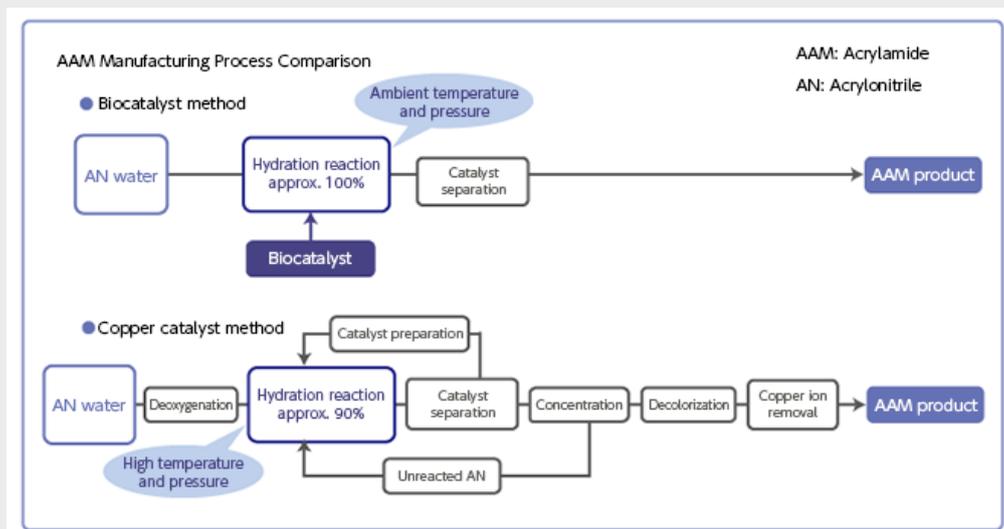
#### Significant reductions of energy consumption in acrylamide production

Acrylamide (AAM), a derivative of acrylonitrile, is used in a wide range of areas including as a raw material in flocculants for water treatment, in oil-recovery agents, in paper strengthening agents and as a raw material synthetic for various chemical compounds.

The typical production method of AAM used to be the copper catalyst method. However, the manufacturing process using the copper catalyst method to react at high-temperature and high-pressure required considerable energy. On the other hand, the biocatalyst method using microorganisms that have enzymes allows production at ambient temperature and pressure. The process is simpler and superior in terms of energy savings. (Fig. 1)

In 1985, Mitsubishi Rayon launched the world's first biocatalyst industrial production of acrylamide (AAM). This was the world's first instance of the biocatalyst method industrial production of a commodity chemical.

**Fig. 1 Comparison of Biocatalyst Method and Copper Catalyst Method Manufacturing Process**



### The Mitsubishi Rayon Approach

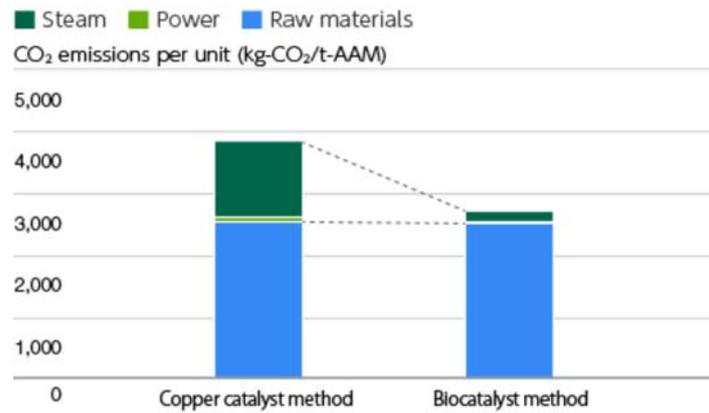
#### Significant reductions in CO<sub>2</sub> emissions

Mitsubishi Rayon started R&D into the biocatalyst method in 1976. At the time, the study to decompose harmful substances in the soil using microorganisms made progress, but was unable to confirm the existence of microorganisms appropriate for the AAM production process. While solving the various

technical problems to discover effective microorganisms, to establish the cultivation conditions and develop a more compact process we completed the world's first production technology over about nine years.

Subsequently, Mitsubishi Rayon took on the challenge of developing production methods linked to resource and energy saving. As a result, it has succeeded the development of the high-performance catalyst that is more stable and more active, in addition to making the process more compact. These developments have enabled a reduction in CO<sub>2</sub> emissions during the AAM production process to less than a fifth of the emissions from the copper catalyst method. (Fig. 2)

**Fig. 2 Comparison of CO<sub>2</sub> Emissions**



Source: Environmental Information Science: 25(3)61, 1996

## Fiscal 2014 Results

### Delivering production processes reducing environmental impact to the world

Mitsubishi Rayon not only manufactures and sells AAM using the biocatalyst method, but also supplies the biocatalyst and technology licensing the manufacturing process. The needs for resource and energy-saving chemical production processes are growing across the globe and about 40% of the world's current AAM is produced using Mitsubishi Rayon's biocatalyst method. In recent years, other companies have also started using the biocatalyst method, and new AAM production plants built around the world have all switched to using the biocatalyst method. By taking on the challenge of creating the most advanced processes and innovations, Mitsubishi Rayon has contributed to resolving a societal issue.

Activity Highlights | Activity 7

Promotion of Skylights Made From Acrylic Resin

## Utilizing natural light gentle to people and the Earth

### Environmental and Societal Issues

#### Reducing energy consumption with skylights

To control global warming, society as a whole needs to reduce greenhouse gases including CO<sub>2</sub>. Therefore, it is important to create environments that minimize the amount of power used for lighting in homes or offices. From that standpoint, there has been renewed attention focused on natural lighting through skylights in recent years.

Mitsubishi Rayon, through Group company Ryoko Co., Ltd., provides offices, factories, stores and public facilities such as schools and hospitals with skylights (TOPLIGHT «Acrydome») made of Acrylic sheet.

Effectively utilizing natural light contributes to controlling power consumption volumes. The skylight's retractable roof allows cool air in during the summer and keeps cold air out in the winter through high insulation ability, creating a more KAITEKI environment. To be sure, skylight has been designed with safety in mind and can be installed with netting able to catch people from falling.

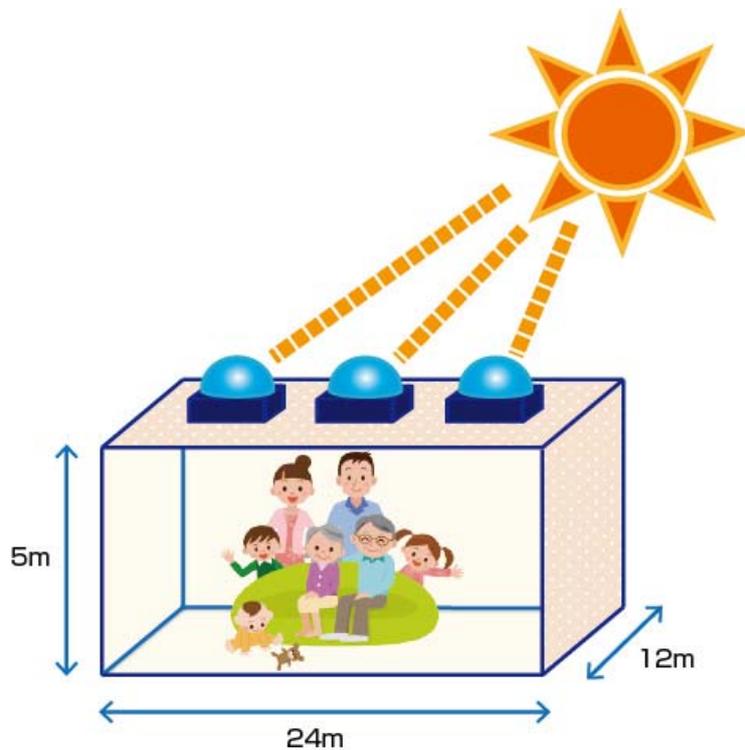


### The Mitsubishi Rayon Approach

#### Molding technology maximizing the characteristics of acrylic resin

Acrylic resin allows light to pass through better than glass, and possesses better weatherability than other transparent plastics, thus minimizing sunlight deterioration even when installed outdoors. The skylight (TOPLIGHT «Acrydome») is made by molding acrylic sheet into a dome shape that takes in the natural light.

Using an original shape appropriate for taking in natural light makes it possible to do without artificial lights on sunny days. For example, when three 2 m<sup>2</sup> skylights are installed equally on the roof of a room a roughly t 25 m swimming pool, this equals the brightness of lighting used in a typical office.



Installing the TOPLIGHT «Acrydome» can reduce CO<sub>2</sub> emissions by 388 kg\*1 per year, which translates into the annual volume of CO<sub>2</sub> absorbed by nearly 28 cedar trees. Communicating these environmental effects to customers could lead to reducing the impact on society as a whole has on the environment. From 2012, reviews of the TOPLIGHT «Acrydome» manufacturing process have resulted in shortening the formation cycle to about one-third of the previous cycle. By this and other measures, energy is being saved in the production process itself.

\*1 Calculation Conditions

1. A room of 24 m wide x 12 m long x 5 m high, dome with a shaft of 0.6 m and window area of 1 m x 5 m in six places, covering a total of 30 m<sup>2</sup>
2. TOPLIGHT «Acrydome» 3 units (cream-colored domes with netting and polished glass 6.8) 2 m wide 2m long
3. Concrete flooring, white-painted ceiling and white plasterboard walls

\*2 One cedar tree (50-years-old and 20-30-meters-high) absorbs 14 kg of CO<sub>2</sub> yearly (Forestry Agency website)

## Fiscal 2014 Results

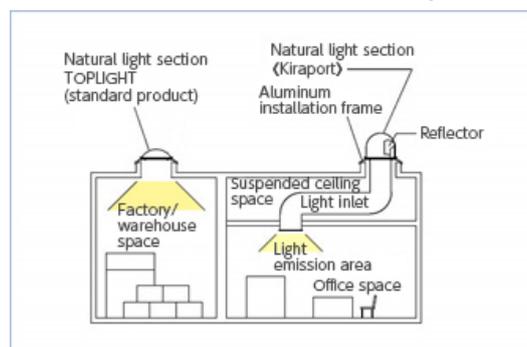
### Strengthening the lineup to further expand usage

If natural lighting through skylights spreads more throughout society, it could drastically reduce the power consumption for lighting. The Mitsubishi Rayon Group is strengthening its skylight product lineup, including the TOPLIGHT «Acrydome», so that the products can be installed under a greater variety of conditions.

In fiscal 2014, we added the «Kiraport» solar in-room system to the product lineup. This system uses light inlets built into ceilings to shine natural light into places like offices and corridors getting the natural light until now had been through windows, and into offices etc. with suspended ceilings that could not use skylight. (Fig. 1)

Going forward, we will use sales of skylight utilizing natural energy from sunlight to provide even greater KAITEKI spaces for people, the Earth and society.

**Fig. 1: Example of Using a Combination of TOPLIGHT and «Kiraport»**



Activity Highlights | Activity 6  
 Deployment of the Groundwater Membrane Filtration System in Japan and Overseas

## Responding to global requirements for infrastructure to provide a safe and secure water supply

### Environmental and Societal Issues

#### Unique water treatment and supply system to ensure a safe, secure water supply

The Earth is often referred to as the "water planet," and is thought to be blessed with rich water resources. However, the vast majority of water on the Earth is actually seawater and the total amount of water that can be used for drinking and other domestic purposes is less than 1%. In addition, in recent years, the rapid increase in the global population together with industrial development have increased demand for water. Moreover, water pollution due to lack of industrial water treatment facilities has become more serious, making it difficult to keep securing safe and secure water resources more than ever.

In Japan, there is an increasing risk of natural disasters such as massive earthquakes or volcanic activity, and in recent years there have been questions about how to respond to the water shortages that such disasters will cause. As one of the technical solutions to respond to such societal needs, WELLTHY CORPORATION, a Mitsubishi Rayon Group company, developed the Groundwater Membrane Filtration System.

The system provides safe and reliable drinking water by drawing water from a well that is usually around 100 meters deep, and by treating the water with an advanced filtration unit. Used in combination with the public water supply, the system enables a duplicate water supply. For this reason, it has been drawing attention from the perspectives of four benefits, including business continuity planning (BCP) and CSR. Hospitals, nursing homes, supermarkets, factories, hotels and railway stations are among many clients that have installed the system.

#### Four Benefits of the Groundwater Membrane Filtration System



## Seeking safe, reliable water as a pioneering company

Wellthy started working on the Groundwater Membrane Filtration System in the mid-1990s. Against a backdrop of the Great Hanshin Earthquake and an outbreak of food poisoning caused by the O157 pathogen, the importance of securing a safe and reliable water supply had become a societal issue at the time.

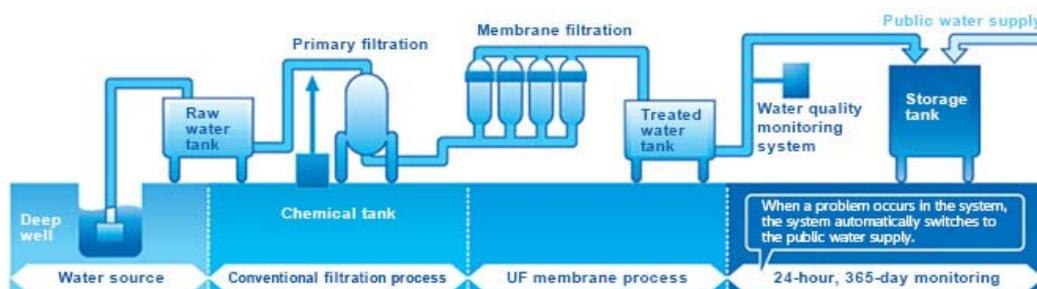
From the beginning, Wellthy had the idea of utilizing groundwater, but achieving the required quality for drinking water was not an easy task at the time. Therefore, Wellthy started joint research with Mitsubishi Rayon, which had developed a filtration technology using a hollow fiber membrane. Through trial and error, the partners built a system to supply safe and reliable water in 1997: sand filtration enabled the water to be cleaned to the level of normal drinking water, and further filtration treatment eliminated bacteria and microbes. In this way, the company finally built a system that can deliver water safely and reliably.

Once the first filtration system was completed, Wellthy went about improving it through such ways as raising the level of filtration technology, substantiating the maintenance system and establishing a water analysis center. Wellthy has also endeavored to secure the trust of third parties through such means as obtaining the Membrane Module for Drinking Water Systems qualification from the Association of Membrane Separation Technology, Japan and the Clean Water Equipment Certification from the Japan Water Research Center. Furthermore, due to the heightened interest in social BCPs, in May 2014 Wellthy became the first groundwater treatment business entity to acquire the international standard ISO 22301 for business continuity, and it is continuing every possible effort to pursue a safer and more reliable water supply.

### Groundwater Membrane Filtration System



### Basic treatment process of Groundwater Membrane Filtration System



## Delivering safe, reliable water to more people

In the aftermath of the 2011 Great East Japan Earthquake, the effectiveness of the Groundwater Membrane Filtration System was actually proven in many areas. As a result, as of the end of March 2015, the system had been adopted in more than 1,100 facilities across Japan. Based on this track record in Japan, Wellthy recently has plans to provide safe and reliable water supply infrastructure to places overseas facing severe water shortages.

The first step was taken in 2013 when Wellthy worked with the United Nations Development Programme (UNDP) to provide a slow sand filtration system to a small agricultural community comprising around 40 households in Machakos County, Eastern Kenya. The system filters water from a canal using the elevation difference to eliminate the need for electric power.

Furthermore, in April 2015, Wellthy started a pilot project in a private hospital in Vietnam on a membrane filtration system for supplying drinking water sourced from the public water supply. The system is equipped with a newly developed remote monitoring system that enables real-time monitoring of operating status and water quality. Through the 1-year pilot operation period, Wellthy hopes to accumulate the expertise for full-scale development overseas.



The water purification system set up in Kenya



System-purified water sold at a market

Activity Highlights | Activity 5

Expansion of the Market for Artificial Carbon Dioxide Baths

## Expanding into further markets as an artificial carbon dioxide bath pioneer

### Environmental and Societal Issues

#### Making artificial carbon dioxide baths more familiar and enjoyable for people

Japan is one of the world's countries where hot springs occupy a prominent position and their physiological and psychological effects and benefits have been known since long ago. Used by the samurai to heal battle wounds in past centuries, hot springs remain popular throughout Japan. Going back even further, tradition has it that hot springs were used in the ancient times of the Kojiki chronicles and Fudoki reports.

In conjunction with increased health awareness, people in recent years have started to think again about the various therapeutic, cosmetic and other benefits of hot springs. In particular, carbon dioxide springs are attracting attention. The carbon dioxide spring is a standard type of Japanese hot spring, in which CO<sub>2</sub> diffuses into bath water. In general, natural carbon dioxide baths are physiologically beneficial, especially for stimulating one's metabolism, detoxification and relaxation. Many natural carbon dioxide hot springs can be found in places such as Germany and Italy, and many people travel from around the world to seek such natural-spring cures.

Because of their high temperatures, however, Japan has very few natural, highly concentrated carbon dioxide baths since CO<sub>2</sub> does not easily diffuse into high-temperature water. In addition, producing artificial versions has proven to be quite difficult. We at the Mitsubishi Rayon Group have resolved these issues using proprietary technology so that everyone can now enjoy artificial carbon dioxide baths.

### The Mitsubishi Rayon Approach

#### Utilizing hollow fiber membrane technology to create a device producing highly concentrated carbonate bath water

Carbon dioxide effects become apparent with a greater concentration, in particular, these benefits increase in highly concentrated carbon dioxide baths containing over 1,000 ppm of CO<sub>2</sub> per liter of bath water. Dissolving large volumes of gas into high temperature spring waters, into which gas does not dissolve easily, had been the biggest issue to resolve in producing artificial carbon dioxide water.

When the Mitsubishi Rayon Group was looking into the development of practical applications for hollow filter membrane modules used in things like degassing, we focused our attention on artificially carbonated water. We started R&D under a new business theme of a CO<sub>2</sub> dissolution module. Later, as the result of many years of research, in 1997 we successfully developed a device that



A hot-spring facility featuring the Ryusenji no Yu carbon dioxide bath (Chigasaki City, Kanagawa Prefecture)

artificially generated highly concentrated carbonate dioxide bath.

Now, Mitsubishi Rayon Cleansui Co., Ltd. is in charge of sales and presents a KAITEKI environment depending on a facility's needs, whether that be the installation of a personal-use bath type for inns or nursing facilities, or the type large-scale tub baths for sports facilities.



CO<sub>2</sub> dissolution module

## Fiscal 2014 Results

### Expanding markets with the development of a new brand for the beauty industry

Mitsubishi Rayon Cleansui is examining conducting various business developments including cooperating with the Mitsubishi Chemical Holdings Group to deliver the KAITEKI effects of carbon dioxide baths to as many people as possible.

In February 2015, we launched the new brand WATERCOUTURE targeting the beauty industry, and its first product was the SODA SHOWER WS101, a carbonated spa for beauty salons. In the beauty industry in recent years, carbon dioxide baths and services using carbonated showers and the like have been attracting attention. WS101 responds to this increasing demand as a product that is compact and easily operable while still capable of producing concentrations as high as existing products. It is mainly targeted for installation in beauty parlors and esthetic salons. Looking ahead, to enable carbon dioxide baths to become a more familiar part of people's lives we are moving ahead in developing business in various field and expanding sales channels overseas.



SODA SHOWER WS101

### Key Person's Voice



#### Masanori Itakura

Manager, Technology Division  
Mitsubishi Rayon Cleansui Co., Ltd.

During the development of the triple-layer membrane design used in Mitsubishi Rayon Cleansui's artificial carbon dioxide baths, we combined the Mitsubishi Rayon Group's polymer, dilution, production, evaluation and other nurtured proprietary technologies to create membrane production technology based on a new melt spinning method.

Since the Group did not initially possess the physiological expertise or relevant evaluation system at that time, we sought outside experts to summarize data on the effect of artificial carbon dioxide baths on the body, application methods and equipment requirements. As a result, we accumulated advanced expertise not found at any other company.

Looking ahead, by introducing as many people as possible to the artificial carbon dioxide baths, we are providing various KAITEKI values through health and beauty. In addition, the artificial carbon dioxide baths help promote bathing at a lower water temperature since artificial carbonation baths feel to be around 2 to 3°C warmer than regular bath water. This helps reduce thermal energy consumption while allowing us to make a modest contribution to a KAITEKI global environment.

Activity Highlights | Activity 4

Next Stage of Development in DNA Chips 《Genopal》

## Entering the diagnostics field by leveraging the characteristics of DNA chips 《Genopal》

### Environmental and Societal Issues

#### Genetic analysis technology raising expectations about personal medical treatment

In recent years in Japan, the onset of the superaged society has been accompanied by a rapid spread of the concept of healthy longevity, that is, maintaining a high quality of life for as long as possible. Medical care including preventive medicine is indispensable to continue a KAITEKI lifestyle without any health worries in old age. Much attention has been directed toward personal medical treatment depending on personal medical conditions and physical constitutions. The key is the evolution of a genetic analysis technology. Every person has a different sequence. Analyzing an individual's genes can clarify the constitution of the person, such as their susceptibility to certain diseases or the effects of medicines.

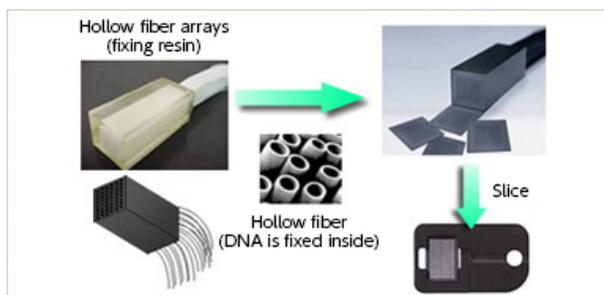
Applying fiber technologies developed over many years, Mitsubishi Rayon has started developing the highly sensitive and reproducible DNA chip 《Genopal》. We have successfully developed the fiber DNA chip 《Genopal》 which possesses a creative structure that differs from conventional chips. We provide various types of DNA chips 《Genopal》.

### The Mitsubishi Rayon Approach

#### Proposing an original chip structure by utilizing fiber technologies

DNA chips are analytic tools used to analyze the state of genes. DNA chips have numerous DNA fragments arrayed in high density on a plastic or glass board. Conventional DNA chips are mainly arrayed in two dimensions on a flat testing surface, but Mitsubishi Rayon used expertise accumulated through fiber technologies to create a three-dimensional structure using (3D) hollow fibers. The DNA probes are crosslinked gel in the fibers. It will be useful to improve the reliability and effectiveness of the genetic analysis. When the DNA chip 《Genopal》 is used, DNA probes have molecular mobility in the fibers. (See Fig. 1) This development was highly evaluated for its originality and assured performance. Mitsubishi Rayon was awarded the Special Technology Prize at the 45th Annual JCIA Technology Award in 2013.

Fig. 1 《Genopal》 production method



## Entering the oral care market as the first step into the diagnostics field

Now, Mitsubishi Rayon is not only active in its traditional role in market research support, but is also seeking to leverage the characteristics of «Genopal» to enter the diagnostics field. In fiscal 2014, as the first step in that direction, we developed the oral care chip, a DNA chip used to inspect oral bacteria. This can help prevent gum disease, of which at least 80% of adult Japanese are affected.

There are unlimited numbers of bacteria present in the mouth, but only about 0.1% of these cause gum disease. As the oral care chip is capable of simultaneously analyzing the total number of bacteria and the gum disease-causing bacteria, it is easy to discern whether there is a risk of easily contracting gum disease. Looking ahead, we will be able to compare clinical data and bacteria detection data as well as move ahead on examining market development under the concept of preventative dentistry.

### Key Person's Voice



**Ai Nozawa**

Assistant Manager  
Bio Device Research Group  
Yokohama Research Laboratories

Mitsubishi Rayon began exploratory research into DNA chips in about 2000. Initially, the main motherboard design development and application development was divided between the Corporate Research Laboratories (Otake) and the Chemicals Development Laboratories (Yokohama), but in 2003, the development work was integrated in the Yokohama Research Laboratories and full-scale development started. We successfully commercialized the product in 2008 and started to support basic research on functional foods and cosmetics and provided it for evaluating the components of food. Since joining the MCHC Group in 2010, the path has been cleared for Mitsubishi Rayon to enter the fields of diagnostic testing and drug discovery-support applications. Entering fields where we can see for ourselves the useful role DNA chips play in helping people has served to make us even more motivated. Going forward, we will strive to develop healthcare products that contribute to improving the quality of life of people.

Activity Highlights | Activity 3

Development of Core-sheath Acetate Fiber «KIST»

## Development of a highly functional fiber that controls human perspiration

### Environmental and Societal Issues

#### Realizing KAITEKI even after perspiring

In recent years, there has been increasing needs for highly functional clothing to realize a KAITEKI lifestyle. Against this backdrop, an important trend has been the need to eliminate the discomfort caused by perspiration. Among consumers, there has been a call for clothing with superior functionality that can quickly absorb and dry perspiration, and maintain freshness, even while the wearer engages in sports or experiences the heat of the summer.

To respond to these requirements, Mitsubishi Rayon Textile developed «KIST», a highly functional core-sheath acetate fiber with quick-dry and cool-touch functionality as well as high moisture absorbency and release performance.

### The Mitsubishi Rayon Approach

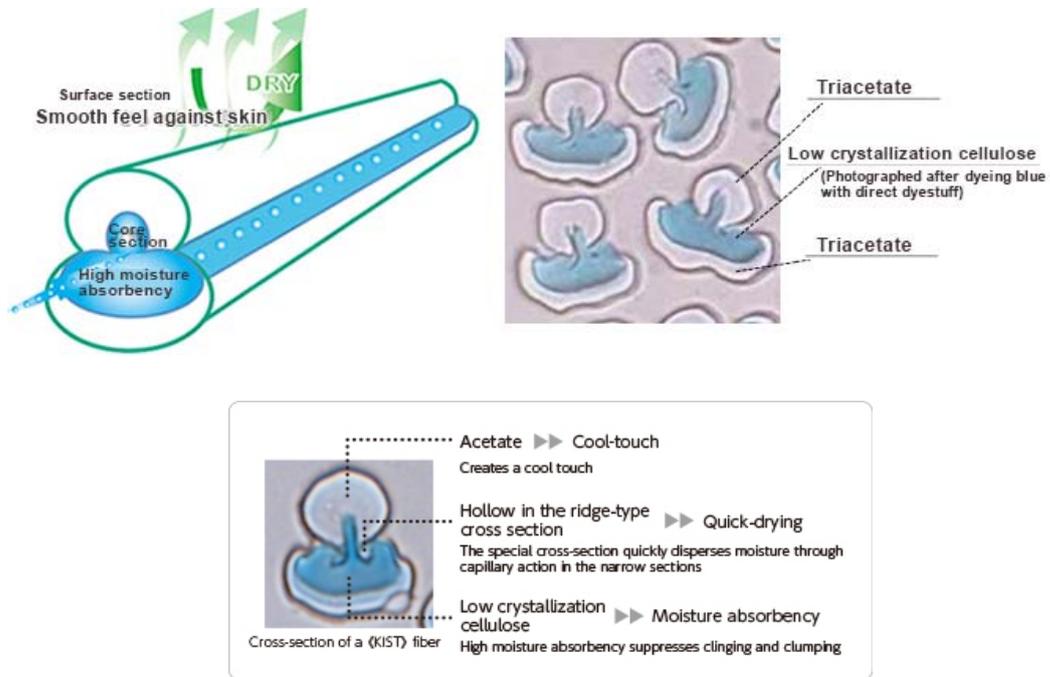
#### High functional products with unique structure by original spinning technology

To realize the concept of «KIST» controlling moisture (perspiration), we used our proprietary composite spinning technology. The greatest features of this are the special sheath core-type and ridged-type shapes.

The sheath-core type shape consists of a structure made up of the core and the sheath that surrounds it. By using a different material for each part, it realizes a hitherto unseen degree of functionality. The low crystallization cellulose core realizes high moisture absorbency and release, suppressing clinging or clumping. The triacetate sheath has vaporization heat that creates a cool touch as well as realizes outstanding luster and vibrant color. In addition, the original structure of the cross-sectional ridge-type quickly disperses moisture through capillary action in the narrow sections. (Fig. 1)

Having such a complicated structure required a complicated spinnerette structure during production when using conventional composite spinning technology. However, Mitsubishi Rayon was able to use its original composite spinning technology to simplify the fiber production process and make it easier to enter the market.

**Fig. 1: Structure of «KIST»**

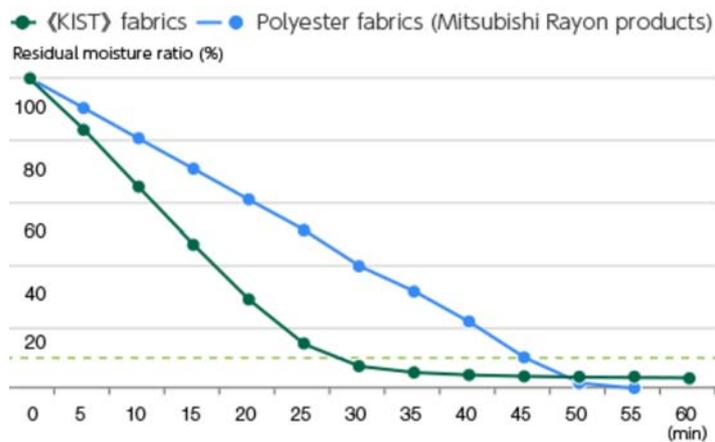


**Fiscal 2014 Results**

**Developing highly functional materials for fashionable clothing**

Initially, «KIST» was developed as a material for sportswear, but after its release in May 2013, it began to attract attention as a fashionable clothing material due to its outstanding functionality including absorption, quick-drying and cool touch characteristics (Fig. 2 and Fig. 3). In light of that, we started sales of luxury women's blouses ahead of the 2014 Spring-Summer season. We plan to expand items sequentially after taking into account the market evaluation.

**Fig. 2 Quick-drying Data of «KIST»**



Test method

- Dispersed residual moisture ratio (dripped under approx. 0.3 g of water)

- Residual moisture ratio (%)

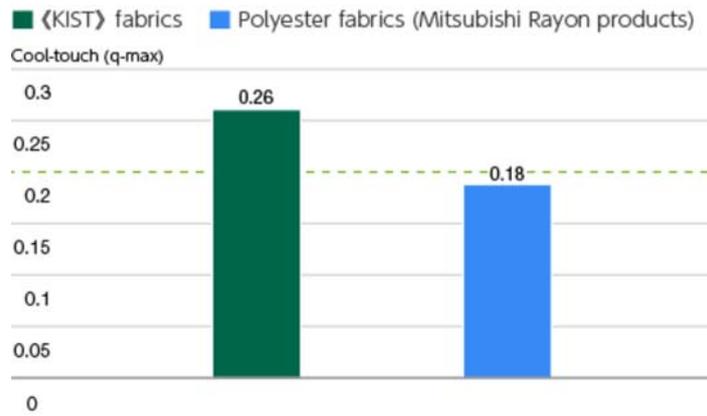
= Moisture amount (g) at each time / moisture amount (g) immediately after dripping water × 100

20°C / 65% relative humidity

Quick-drying performance evaluation condition (Mitsubishi Rayon standard)

- Time taken to reach moisture content ratio of 10%

Fig. 3 Cool-touch Data of 《KIST》



Test method

·Precise and Fast Thermal Property-Measuring Instrument

(KES-F7, Thermos Labo II) used

20°C / 65% relative humidity

Evaluation condition (Mitsubishi Rayon standard)

·Maximum heat absorption speed (q-max) more than 0.200 J/cm<sup>2</sup>-sec

### Key Persons' Voice

Front row center:

**Mr. Nomura** (Currently Section manager of the Filament Section at the Filament Plant)

This is a KAITEKI fiber that applies technology developed for sportswear to fashionable clothing.

Front row left:

**Mr. Ohno** (Currently in the Safety, Environment and Quality Management Department at the Toyama Production Center)

We have created this fiber by pursuing a stable balance in functionality. We hope you will try it for yourself.



Activity Highlights | Activity 2

Promoted Cleansui Long-Term Storable Water

## Providing long-term storable, and safe drinking water in case of disaster

### Environmental and Societal Issues

#### Responding to societal needs for safe drinking water in case of disaster

Water is a resource indispensable for people's lives and industrial activities, but amid a backdrop of such matters as population growth and water pollution there are a growing number of places around the world where water shortages are becoming an increasingly serious societal issue. Even in Japan, which is blessed with water resources, awareness of the need to ensure water resources is increasing following the March 2011 Great East Japan Earthquake. It is crucial to deal with the matter of securing a safe water supply in the event of lifelines being cut off due to factors such as a natural disaster. In April 2013, the Tokyo Metropolitan Government issued an ordinance to assist people who would have difficulty returning home in the event of a disaster. The ordinance calls on businesses to take the steps necessary to ensure that a three-day supply of food and water are stored on their premises.

Consequently, in response to society's demands, in 2012 Mitsubishi Rayon Cleansui Co., Ltd. became the first water purifier maker to release its own brand of storable drinking water, Cleansui Long-Term Storable Water.

### The Mitsubishi Rayon Approach

#### Utilizing expertise to realize long-term storage

Activated carbon filters used to be the mainstream type of water purifiers, but in 1984 Mitsubishi Rayon launched «Cleansui», the world's first water purifier using a hollow fiber membrane filter. The purifying capabilities, which included being about to eliminate rust and even bacteria, were highly regarded and we gained a greater market share. Water quality management techniques nurtured in the water purifier field were applied in the storage water field, and Cleansui Long-Term Storable Water enabled long-term storage in the event of the unexpected occurring.



In the event of a disaster, Cleansui Long-Term Storage Water can not only be used safely for drinking, of course, but also for meals, preparing baby and infant formulas or baby foods.

Generally, drinking water stored in PET bottles has a life of two years, but using well-sealed and outstandingly durable PET bottles improves the stability of the contents, and this enables the water to be preserved for a longer term of five years.

## Always continuing to improve based on customer feedback

Initially, we only sold Cleansui Long-Term Storable Water to corporate clients, but it was so well received that from 2013 we began selling it to general consumers as well. To avoid it being stored beyond its use-by date we changed over to a new package for general consumers' disaster-use water that prominently displayed in large characters the use-by date on the top and all sides of the packaging. In addition to the 2-liter size used for storage we also added a 500-millileter easy-to-carry bottle to the lineup. Furthermore, based on results of customer questionnaires we always continue to update, such as by revamping the product by using natural water from Okuchichibu, which we named Cleansui Gonen Hozonsui, water that can be preserved for up to five years.

### Key Person's Voice



**Ken Goto**

Project Manager, Creative Planning Department Sales Office  
Mitsubishi Rayon Cleansui Co., Ltd

Mitsubishi Rayon Cleansui's mission is to deliver reliable, safe and tasty water, and the company does not restrict itself to only providing water purifiers. We are not limited to be a water purifier manufacturer, but rather aim to be a water solutions company providing consumers with safe and tasty water in a variety of ways, as well as continuing to seek out the possibilities of new business. Selling drinking water in PET bottles has been a new business idea of ours for quite some time. The Great East Japan Earthquake and the Tokyo Metropolitan Government's ordinance requiring assistance be given to those having difficulty returning home in the wake of a disaster were undoubtedly major catalysts for launching this business. Intending to provide safe water for customers in times of need, the number one reason for launching this business was to deliver Cleansui-quality water in an easy-to-use form.

At first, we were mainly selling to companies, but recently we have had more buyers from the general public and growing numbers of public organizations are also starting to use our products. Looking ahead, to respond to the needs of a wide array of customers, and we will continue to provide our products in a variety of ways to contribute to people, society and the earth.

Activity Highlights | Activity 1

Further Evolved Golf Shafts

## Cutting-edge golf shafts produced with an integrated framework

### Environmental and Societal Issues

#### Making golf more attractive through the development and production of golf shafts

Developing an affinity for sports has a variety of benefits as regards the improvement of people's quality of life (QOL), including promoting better health, relieving stress, and achieving community bonding. Among the different sports, golf can be enjoyed by men and women of all ages, and the game has now become so popular it is now said to be a national sport.



《KURO KAGE》

The history of golf is also the history of golf equipment evolution. Golf shafts used to be manufactured from hickory, but later on steel was substituted to meet the need for greater durability and driving distance. Recent advances in golf clubs focused on the use of new materials in response to the demands of golfers. The representative of these is carbon fiber composite materials using carbon fibers that are stronger than steel and lighter than aluminum. Mitsubishi Rayon uses originally developed carbon fiber compound materials to create golf shafts that are highly rated by golfers all around the world.

### The Mitsubishi Rayon Approach

#### Utilizing rich expertise and technologies from carbon fibers to create the ideal golf shaft

Mitsubishi Rayon started R&D on carbon fibers from the late 1960s and possesses a product chain stretching from 《PYROFIL》 carbon fiber - made from polyacrylonitrile (PAN) filaments produced in-house - to intermediate materials and molded products based on carbon fibers. Mitsubishi Rayon's Carbon Fibers & Composite Materials business provides carbon fiber products used in a wide range of applications.

Golf shafts are one of the developments to have arisen from that. Mitsubishi Rayon leverages its strength of being able to develop and produce carbon fiber products by an integrated framework from raw materials to finished product. Mitsubishi Rayon employs precision design engineering, paying detailed attention to design that incorporates rigidity and twisting mechanisms into shafts from the base to tip in pursuit of the ideal shaft for golfers (Fig. 1).

《Diamana》 was first released in 2004 to provide golfers around the world with the fun and excitement of golf and continued to evolve. Today the product has reached its THIRD GENERATION, which we collaborated with Mitsubishi Chemical Holdings Group company Mitsubishi Plastics, Inc. to develop super-elastic pitch carbon 《DIALEAD》\* ultra-thin sheets. These have enabled us to achieve an even more precise and rigid design that has successfully improved performance even more.

## Integrated development and production framework



### Monomer

Basic raw material derived from acrylonitrile



### Precursor (acrylic yarn)

The main raw material acrylonitrile and acrylic fiber



### Carbon fiber

Highly functional material produced from polyacrylonitrile fibers carbonized at high temperature



### Resin

Matrix resin with functions heightened through combination with carbon fibers



### Prepreg

Carbon fibers in a sheet and permeated with resin



### Shaft

Mold using carbon fibers, each with a different performance depending on the part

## Fiscal 2014 Results

### Further strengthening the line-up with a new brand

Mitsubishi Rayon always strengthens its product line-up to respond to the diverse and advanced requirements of golfers. In September 2014, we launched the new «Diamana» R Series alongside the B Series and W Series, to complete the THIRD GENERATION product line-up. We are realizing a substantiated line-up that caters to the needs of diverse golfers, including through brands such as «FUBUKI» and «BASSARA»

Furthermore, in August 2015, we launched a new brand, «KURO KAGE». Utilizing an integrated development framework from the materials onward, this is a model that realized greater driving distance performance by making the metal line of the shaft tip through composite molding realized greater driving distance performance. Rising star players are already using this shaft and the market rates it highly. Currently, our two line-ups are the XM Series in addition to the XT Series.

Going forward, we will continue to release new products and continue to realize KAITEKI for golfers all over the world.

### Key Person's Voice



#### Akinari Ito

Manager in Charge of Marketing  
the «Diamana» Series

Our main brand «Diamana» is a professional brand that targets relatively advanced golfers as well as those possessing considerable power. With the THIRD GENERATION shafts specified to be lightweight at around 50g, we have developed product line-ups that can provide KAITEKI to an even wider array of golfers. The chic understated appearance of the shafts has been updated to be more visually attractive. We provide products that meet a variety of golfing needs for, of course, those who are experienced as well as those who want to improve their game, those who want to look good with their stylish golf equipment, and those who just love «Diamana». Now, adding our new brand, «KURO KAGE», further broadens the range of choice. We would like as many golfers as possible from athletes through to the average to try it out.

## Safety, Environment and Quality Assurance Management Structure

- ↓ [Basic Policy](#)
- ↓ [Organization to Promote Safety, Environment and Quality Assurance Management](#)
- ↓ [Audit on Safety, the Environment and Quality Assurance in Fiscal 2014](#)

### ■ Basic Policy

Based on the Responsible Care\* policy, The Mitsubishi Rayon undertakes business activities under the Basic Policy on Safety, the Environment, and Quality Assurance, Action Guidelines on Safety and the Environment and Basic Policy on Quality Management.

\* Responsible Care:

"Responsible Care" is a voluntary initiative in which companies ensure environmental friendliness, safety and health at all stages of chemical substance usage-from development to production, distribution, use and final disposal-while communicating with the public about these activities and achievements.

#### Basic Policies on Safety, the Environment, and Quality Assurance

- Top priority shall be placed on safety and the environment in all business activities, as these are essential for corporate existence.
- We shall supply our customers with satisfactory, safe, and reliable products.

(Established in 1998)

#### Action Guidelines on Safety and the Environment

- (1) Comply with any laws and regulations and should take measures over the legal requirement when it is considered necessary.
- (2) Any incidents can be prevented and should take measures as it is responsibilities of each individual.
- (3) Act with self-responsibility and self-management.
- (4) All business activities shall be carried out under consideration for environmental sustainability.
- (5) Every possible effort shall be made to uphold safety and reduce environmental burden throughout the entire life cycle of each product.
- (6) Education shall be used to improve awareness of safety & environment, with the result put to practical use at the workplace.
- (7) Active communication shall be maintained with society to raise the level of corporate transparency.
- (8) Scientific and technical means shall be utilized to make improvements on a constant step-by-step basis.

(Established in 1998 and partially revised in 2001)

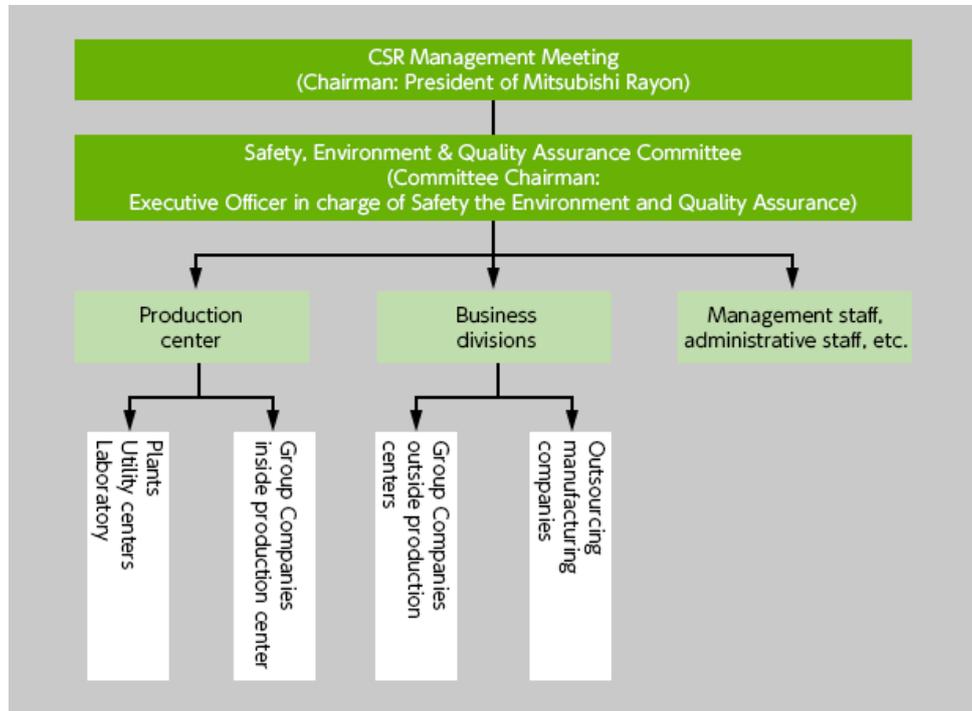
#### Policy of Quality Management

To manufacture and supply products that satisfy customers and meet their requirements, the Mitsubishi Rayon Group has established its Safety, Environmental and Quality Management Regulations. The Group takes a thorough approach to quality management through promoting cooperation between the relevant departments, and does its utmost to ensure quality both effectively and economically, thereby achieving its goal of quality assurance.

(Established in 1984)

## ■ Organization to Promote Safety, Environment and Quality Assurance Management (as of April 1, 2015)

The Mitsubishi Rayon Group's basic policy and measures of Safety, Environment and Quality management are determined by CSR Management Meeting (Chairman: President of Mitsubishi Rayon) which is the decision making body for all CSR activity. And according to these decisions, SEQ committee is established as the body to promote basic policy and measures by top-down type management.



### ● Establishment of the Safety, Environment and Quality Assurance Committee

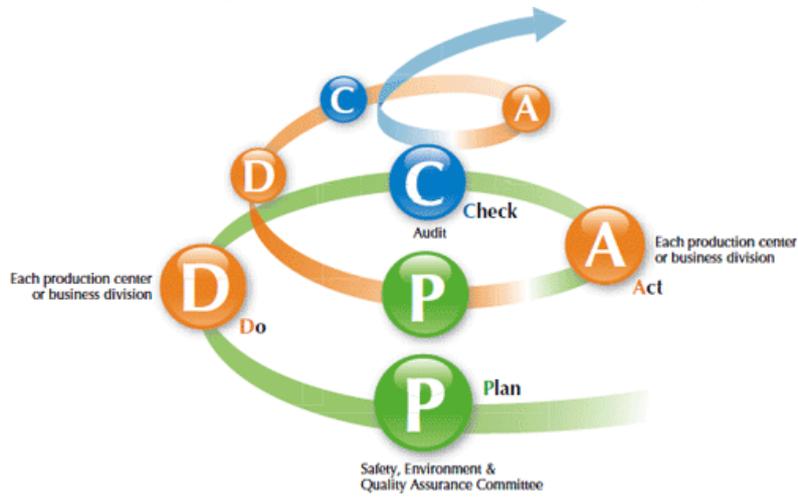
The Mitsubishi Rayon Group has established the Safety, Environment and Quality Assurance Committee to comprehensively decide and implement policies related to the management of safety, the environment and quality assurance, to formulate an annual plan and review all these, and to discuss and decide the evaluation and confirmation of their implementation.

The committee shall discuss and decide on:

- (1) Basic policy and plans related to the company's safety, environment and quality assurance management
- (2) Comprehensive policy related to the company's safety, environment and quality assurance management
- (3) Countermeasures and policies for important issues related to the company's safety, environment and quality assurance management
- (4) Regulation formulation, revision or abolition related to the company's safety, environment and quality assurance management that affect the whole company
- (5) Audits the contents of the safety, environment and quality management, and product liability

Each production center and division as well as Group companies falling under the jurisdiction of a division shall conduct specific activities in compliance with matters decided by the Safety, Environment and Quality Assurance Committee.

**Safety, Environment and Quality Assurance Implementation Flow (PDCA Cycle)**



**Audit on Safety, the Environment and Quality Assurance in Fiscal 2014**

**Audit Types**

Audit type	Audit target
<p><b>General audit</b> Audits conducted by management under the Safety, Environment &amp; Quality Assurance Committee (with a corporate auditor and an executive member of the union as observers) Conducted annually for four production centers</p>	MRC*, Lucite International Group
<p><b>Departmental audit</b> Audit to supplement general audit; this is a detailed audit on the sampled departments Conducted in cycles of 3-5 years</p>	MRC*
<p><b>Group company audit</b> Audit that is implemented as part of the Group's management under approval by the Safety, Environment &amp; Quality Assurance Committee Conducted in cycles of 3-5 years</p>	Group companies, (Lucite International Group excluded)
<p><b>High Pressure gas safety audit</b> Audit that is conducted by the Head Office on production centers authorized in accordance with the High Pressure Gas Safety Act Conducted annually for applicable production centers</p>	Production centers authorized in accordance with the High Pressure Gas Safety Act
<p><b>Special audit</b> Audit that is implemented under the direction of the Chairman of the Safety, Environment &amp; Quality Assurance Committee in the event of a serious injury and incident</p>	The Mitsubishi Rayon Group
<p><b>Extraordinary audit</b> Audit of production center and/or Group company that is implemented under the direction of the Chairman of the Safety, Environment &amp; Quality Assurance Committee</p>	The Mitsubishi Rayon Group
<p><b>Product liability and quality control audit</b> Audit that is implemented on all aspects of business activities from marketing to production under approval by the Safety, Environment &amp; Quality Assurance Committee Conducted in 3-year cycles</p>	MRC* product lines
<p><b>Quality control audit of outsourcing manufacturing companies</b> Quality control audit of companies manufacturing MRC* products as subcontractors Conducted in cycles of 3-5 years</p>	Outsourcing manufacturing companies

\* Please refer to "[Scope of environment related data collection](#)" for the scope of audit.

● List of Audits Executed in Fiscal 2014

Audit type	Department/Company	Audit target
General audit	Otake Production Center, Toyohashi Production Center, Toyama Production Center, Yokohama Production Center and Lucite International Group (major sites)	Safety and the environment
Departmental audit	Otake Production Center (four departments), Toyohashi Production Center (two departments), and Toyama Production Center (two departments)	Safety and/or the environment
Group company audit	Group companies overseas (three companies) and Group companies in Japan (one company)	Safety, the environment and quality assurance
High Pressure gas safety audit	Otake Production Center (one department)	Safety
Special audit	No applicable department in the fiscal year under review	Safety
Extraordinary audit	Otake Production Center, Toyohashi Production Center, Toyama Production Center, and Yokohama Production Center	Safety
Product liability and quality audit	MMA bloc (seven departments), AN bloc (four departments), Group companies outside production center (three companies)	Product liability and quality
Quality audit of outsourcing manufacturing companies	Outsourcing manufacturing companies (ten companies)	Quality

● Audit Results for Fiscal 2014

Audit type	Report
General audit	Audits were implemented at four production centers in Japan and at the major sites of Lucite International Group. As in fiscal 2013, inspections of production centers in Japan were performed at the department level closer to the frontlines, using check sheets prepared in advance. Although the overall level of safety and environmental management is being approached with seriousness, the effect of reducing accidents and worker's compensation incidents was judged insufficient. Workers were told to always check their daily workplace and environmental conditions by themselves, and to strive to maintain and improve the frontline activity standards, while managers were instructed to raise employee safety awareness and reminded of their responsibility to ensure a safe and secure working environment.
Departmental audit	In relation to safety and occupational health measures, frontline audits were conducted to inspect operational safety and identify unsafe locations while the management system was used to check the implement status of each measure. In relation to the environment, audits were conducted mainly on the management status concerning environmental impact and preparations for an occurrence of an environmental accident. Consequently, each audited department was requested to make improvements on the necessary items.
Group company audit	Audited companies in Japan were confirmed to have safety and health management systems, and the information communication to employees was also good. In addition, the audited companies conducted a high level of safety management activities, including the assignment of dedicated staff members for safety environments,

	conducting safety checks of plants through an outside safety consultant, and risk assessments and shift team -safety projects in which workers participated. The audited companies were requested to make necessary improvements with respect to material risks, and to further upgrade emergency responses and safety management systems.
<b>High Pressure gas safety audit</b>	The audit focused on the safety rules for industrial complexes and other facilities stipulated by safety management systems, status of conformity with certification notices, and the effectiveness of safety management activities. The audited sites were instructed on how to improve deficiencies. The adequacy of countermeasures against the outbreak of disaster and cause of troubles were verified to enhance audit effectiveness and eliminate the cause of accidents or disasters. The status of certified safety inspection management was also audited. These audits found that the status of compliance was good. However, instructions were given on how to improve deficiencies in the management of inspection records and related areas.
<b>Special audit</b>	Not implemented in the fiscal year under review
<b>Extraordinary audit</b>	Extraordinary audit was conducted at four production centers to confirm whether the operational management department had complied with management standards by eliminating all toxic substances that should have been removed from construction sites and sites made safe for transitional work. Requests for improvement were made, including for cases where transitional work plans and transition completion reports were insufficient, and for on-site monitoring method when equipment prevent a complete transition.
<b>Product liability and quality audit</b>	Audits were conducted on a total of 14 departments, including six target product lines, business divisions, factories and R&D departments. The audit focused on compliance in the areas of product liability and quality assurance systems, screening status until new product release, contract manufacturing partner management and chemical substance management during new product development. Each department was given specific instructions to make improvements.

#### **Scope of environment related data collection**

Only companies that mainly engage in manufacturing and processing are subject to the aggregation of environment-related data. See (1) through (4) below for expressions used in this report.

(1) MRC Group: companies that come under the following categories (2) to (4)

(2) MRC: Mitsubishi Rayon and Group companies operating at Mitsubishi Rayon's production centers

(3) Domestic Group: consolidated subsidiaries in Japan other than those which come under the above category (2)

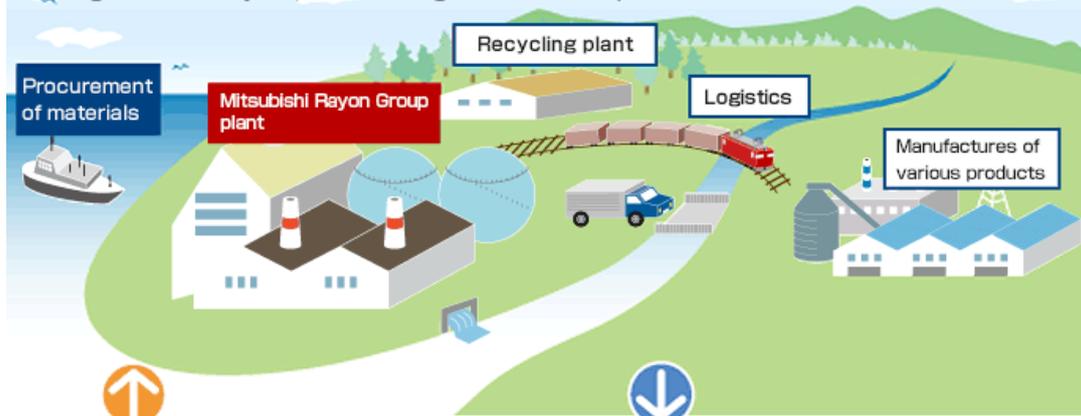
(4) Overseas Group: consolidated subsidiaries in other countries

Subject companies and data

**Material Balance**

**Overview of Environmental Burdens at the Mitsubishi Rayon Group\***

The Mitsubishi Rayon Group is gaining an understanding of the environmental impact of its products throughout their lifecycles, and is working to reduce this impact.



INPUT		OUTPUT			
Energy consumption (Converted into crude oil) MRC 290,000 kℓ Domestic Group 10,000 kℓ Overseas Group 878,000 kℓ	Total wastewater volume MRC 86 million m³ Domestic Group 4 million m³ Overseas Group 1 million m³	Chemical substances MRC 1,155 tons Domestic Group 48 tons Overseas Group 159 tons	Greenhouse gases (converted into CO <sub>2</sub> ) MRC 1,227,000 tons Domestic Group 26,000 tons Overseas Group 1,663,000 tons		
Water consumption MRC 103 million m³ Domestic Group 6 million m³ Overseas Group 3 million m³	BOD level MRC 36 tons Domestic Group 1 tons Overseas Group 5 tons	COD level MRC 635 tons Domestic Group 150 tons Overseas Group 62 tons	NOx emissions MRC 1,601 tons Domestic Group 28 tons Overseas Group 642 tons		
				SOx emissions MRC 516 tons Domestic Group 76 tons Overseas Group 1,399 tons	

\* The Mitsubishi Rayon Group:  
 Companies that come Mitsubishi Rayon, Domestic Group and Overseas Group. (Subject companies)

**Proper Management of Chemical Substances**

- ↓ [Chemical Emission Reduction](#) ↓ [Management of Chemical Substances in Procured Goods](#)
- ↓ [Commencing Treatments to Eliminate Polychlorinated Biphenyl \(PCB\)](#) ↓ [Providing SDS](#)
- ↓ [Promoting Global Product Strategy Activities](#) ↓ [Proceeding of REACH Registration](#)
- ↓ [Ensuring GHS Compliance in Individual Countries](#)

**■ Chemical Emission Reduction**

The Mitsubishi Rayon Group\* is reducing chemical emissions in accordance with its Fifth Chemical Substance Reduction Plan, with fiscal 2015 as the target year.

\* The Mitsubishi Rayon Group:

Companies that come Mitsubishi Rayon, Domestic Group and Overseas Group. ([Subject companies](#))

**<Targets>**

1. Reduction of total emissions (target year: fiscal 2015)

By the target year, total emissions of MRC-PRTR substances\* (442 substances) by the MRC Group (excluding Lucite International Group) shall be reduced to 70% of the emissions recorded in fiscal 2005 (reference year).

2. Reduction of emissions of specially managed substances (target year: fiscal 2015)

Reductions made in the specific substance groups detailed below:

- i) Twelve volatile organic compound (VOC) substances that account for most of MRC's air emission volume
- ii) Five substances that the MRC Group emits the most

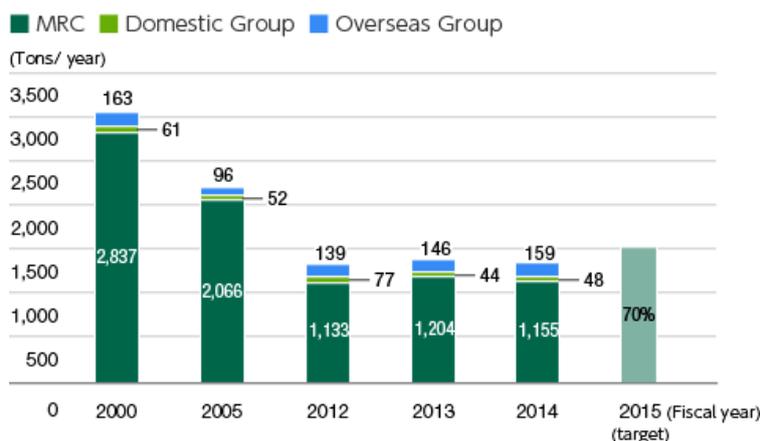
\* MRC-PRTR substances:

433 substances subject to the PRTR research conducted by the Japan Chemical Industry Association (JCIA) on its corporate members (including substances subject to legal notification) and 9 other substances emitted by MRC in high volumes for a total of 442 substances.

**<Fiscal 2014 Activities and Results>**

Overall, emissions tend to increase in proportion with the production size since the previous fiscal year. But by the approach to strengthen the wastewater treatment facility at the Otake Production Center, the amount of chemical substances in wastewater could be reduced. The Mitsubishi Rayon Group achieved its total emissions target, with total emissions of 1,362 tons in fiscal 2014 against a target of 1,550 tons for fiscal 2015.

**Chemical Substance Emissions**



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## ■ Management of Chemical Substances in Procured Goods

The Mitsubishi Rayon Group began conducting green procurement surveys in fiscal 2005 for all procured items to fully comprehend and manage substances that affect the environment (including raw materials and other procured goods) and have the potential to pose a health hazard. The Group will continue conducting green procurement surveys as well as take the steps necessary to effectively manage chemical substances.

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## ■ Commencing Treatments to Eliminate Polychlorinated Biphenyl (PCB)

In order to comply with the Act on Special Measures against PCB Waste established in 2001, the Mitsubishi Rayon Group adopted a policy of removing all equipment containing PCB by fiscal 2025, and is systematically proceeding with treatment. Furthermore, any equipment containing PCB within the Group is stored and managed properly according to the law, in order to prevent any loss or theft.

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## ■ Providing SDS

In the sale and delivery of chemical products, the Mitsubishi Rayon Group provides information on the properties, proper handling and disposal of the products by supplying Safety Data Sheets (SDS), to enable customers to safely handle the chemical products.

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## ■ Promoting Global Product Strategy Activities

As a member of the Mitsubishi Chemical Holdings Corporation Group, Mitsubishi Rayon is actively promoting a global product strategy (GPS)\* focused on the voluntary initiative in the chemical industry of risk-based chemicals management throughout supply chains and disclosure of information of risk management on chemical products.

Risk assessment has been conducting for the chemical products which Mitsubishi Rayon manufactures. And with the result of it, appropriate management are progressing. Risk assessments are summarized in safety summaries and published in Japan.

So far, we have published safety summaries for eight substances. We will continue to conduct risk assessments going forward.

\* Global product strategy (GPS):

In order to minimize the risk of chemical substances through the supply chain, risk assessment is enforced for the own chemical substances and appropriate management are required. Also the safety and risk information are disclosed to the customers and also to the public.

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## ■ Proceeding of REACH\* Registration

The registrations of deadline 2013 have been completed for the chemical substances the volume is over than 100 tons/year which was manufactured or imported to Mitsubishi Rayon. Now we are exceeding registration for the chemical substances over than 1 ton/year by the 2018 deadline.

\* REACH (Registration, Evaluation, Authorisation and Restriction of Chemicals) is an EU regulation to protect human health and the environment.

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## ■ Ensuring GHS\*<sup>1</sup> Compliance in Individual Countries

Reflecting GHS results into the SDS\*<sup>2</sup> have been completed in Japan and now in the world wide the establishing of legal framework for GHS are activated. The Mitsubishi Rayon Group is approaching to provide GHS in each country with searching for the routes to obtain GHS information of each country.

\*1 GHS:

Globally Harmonized System of Classification and Labelling of Chemicals

\*2 SDS:

Safety Data Sheet

**Preventing Global Warming**

↓ [Energy Saving Activities to Reduce CO<sub>2</sub> Emissions](#) ↓ [Initiatives in Logistics Operations](#)

**■ Energy Saving Activities to Reduce CO<sub>2</sub> Emissions**

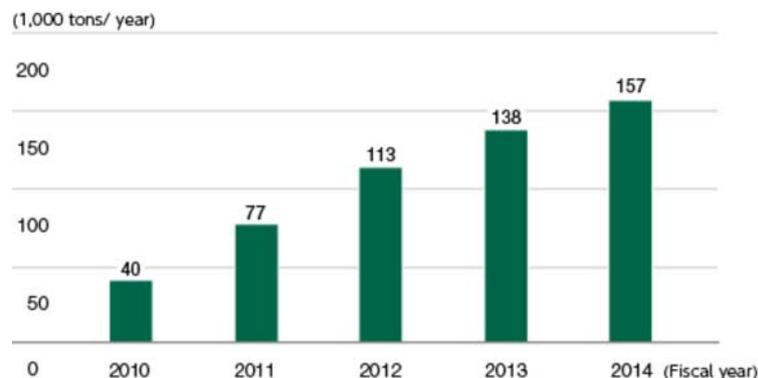
CO<sub>2</sub> accounts for the majority of greenhouse gases emitted by the Mitsubishi Rayon Group\*<sup>1</sup> in the course of its business activities. Eighty percent of CO<sub>2</sub> emitted by the Group comes from energy use. Consequently, we are applying fuel conversion and resource-saving activities centered on energy conservation as part of efforts to reduce CO<sub>2</sub> emissions.

\*1 The Mitsubishi Rayon Group:  
Companies that come Mitsubishi Rayon, Domestic Group and Overseas Group. ([Subject companies](#))

**● Energy Saving Activities**

The Mitsubishi Rayon Group sets specific numerical targets when promoting energy-saving activities. To achieve those targets, each production center has established an energy-saving activity committee and is tackling the issue from the divisional level. Since fiscal 2010, MRC\*<sup>2</sup> has reduced CO<sub>2</sub> emissions cumulatively by 157,000 tons.

**MRC CO<sub>2</sub> Reductions (Cumulative from Fiscal 2010)**



\*2 MRC:  
Mitsubishi Rayon and Group companies operating at Mitsubishi Rayon's production centers.

**<Target>**

Reduce energy consumption per unit of production by 3% by fiscal 2015, compared with the fiscal 2012 level

**<Fiscal 2014 Activities and Results>**

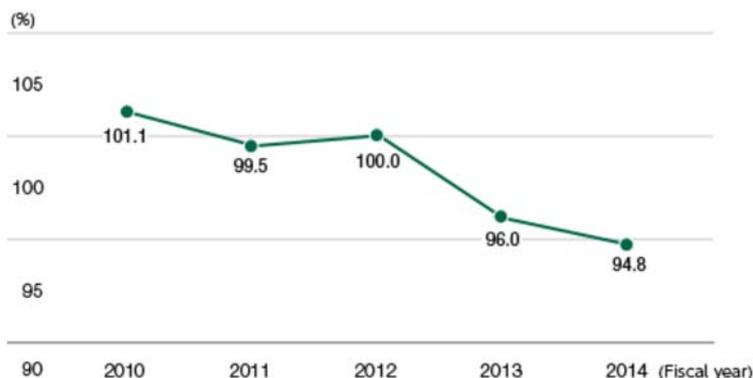
The Mitsubishi Rayon Group is promoting energy conservation in production divisions, including by installing energy-saving equipment in plants, undertaking equipment-related measures to promote fuel conversion, and changing manufacturing conditions.

As a result, energy consumption per unit of production in fiscal 2014 decreased 1.2% compared to the previous fiscal year. That result was a 5.2% reduction from fiscal 2012, thereby achieving the targeted 3% reduction compared to fiscal 2012.

Going forward, each division will continue to move ahead with energy conservation activities.

## Energy Consumption per Unit of Production by MRC

Units: Crude oil converted kℓ/t-Production output converted into base product units (Based on chemicals plant production output at Otake Production Center in fiscal 1990)



[▶ Click here for a detailed explanation of the chart and graphs](#)

## ■ Initiatives in Logistics Operations

The Mitsubishi Rayon Group is promoting modal shifts from truck transport to marine and rail transport, which has less environmental impact.

Mitsubishi Rayon became a certified "Eco-Rail Mark" company in April 2010 under a program promoted by the Ministry of Land, Infrastructure, Transport and Tourism. At the same time, Mitsubishi Rayon's acetate tow for cigarette filters, 《DIANAL》 acrylic coating material and 《ACRYPET》 acrylic molding material were certified as products allowed to carry the Eco-Rail Mark.

In fiscal 2014, the modal shifts continued together with mutual fusion of products made by other companies in the same industry, thereby enabling delivery from bases closer to customers to facilitate a reduction of transportation distances. However, due to the influence of an increase in production volume, CO<sub>2</sub> emissions increased 400 tons from the previous fiscal year.

Looking ahead, The Mitsubishi Rayon Group will continue to promote eco-friendly logistics operations.

### CO<sub>2</sub> Emissions in Logistics (outsourced) (1,000 tons of CO<sub>2</sub>/year)

Fiscal year	2010	2011	2012	2013	2014
CO <sub>2</sub> emissions	12.1	9.5	11.4	14.2	14.6



## Preventing Air Pollution, Water Quality and Soil Pollution

### ■ Initiatives for Preventing Pollution

Chemical substances are indispensable for the Mitsubishi Rayon Group's corporate activities. However, chemical substances may possibly cause air pollution, water quality and soil pollution if they are not handled properly. We endeavor to reduce the emission of chemical substances into the air or water, and to take measures to prevent leaks, as well as rigorously manage emissions. As a result of these efforts to reduce emissions and the introduction of environment-related equipment, we have significantly reduced emissions of sulfur oxide (SOx) and nitrogen oxide (NOx) into the air, and the chemical oxygen demand (COD) in waste water.

[▶ Click here for a detailed explanation of the chart and graphs](#)

## Preserving Water Resources

- ↓ [Efforts to Contribute to Resolving Water Supply-and-Demand Issues](#)
- ↓ [Efforts to Contribute to Water Supply-and-Demand Issues in terms of products](#)

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### ■ Efforts to Contribute to Resolving Water Supply-and-Demand Issues

The Mitsubishi Rayon Group endeavors to preserve water sources and maintain the water quality of seas and rivers, through managing wastewater quality appropriately and other measures.

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### ■ Efforts to Contribute to Water Supply-and-Demand Issues in terms of products

Water shortages resulting from increased populations and climate change brought about by global warming together with water pollution due to water for industrial use are becoming social issues across the world. The Mitsubishi Rayon Group develops and markets purifying products enabling the possibility of reusing wastewater. Through such measures and other steps, the Group helps society as a whole to preserve water resources.

Example: [Aqua solutions](#)

## Waste Reduction

↓ [Zero Emission Activities](#) ↓ [Resource Conservation Activities \(Biomass Energy Recycling\)](#)

### ■ Zero Emission Activities

The Mitsubishi Rayon Group is working to realize the fiscal 2015 waste reduction target of its Group-wide Zero Emissions Plan in order to decrease its external landfill volume.

#### <Targets>

Zero emissions\*1 will be achieved throughout the Mitsubishi Rayon Group in Japan (involving each production center and Group company\*2) by fiscal 2015. Data calculation includes all waste, excluding combustion ash from power generation.

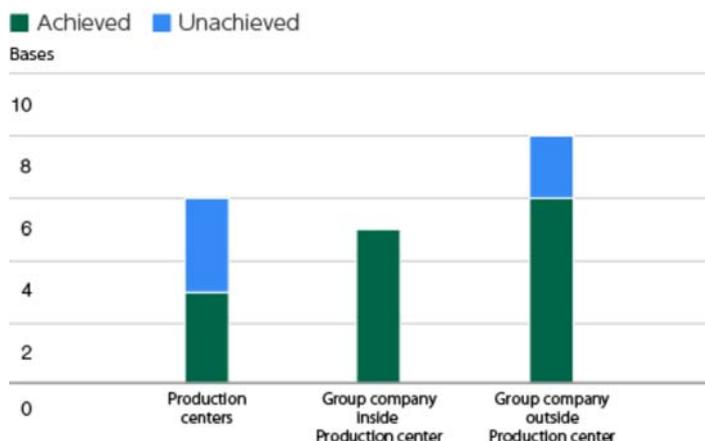
\*1 The term "zero emissions" refers to the ratio of landfill volume accounted for by waste that is 1% or below.

\*2 Data for six production centers in Japan, six on-site Group companies and 8 off-site Group companies in Japan

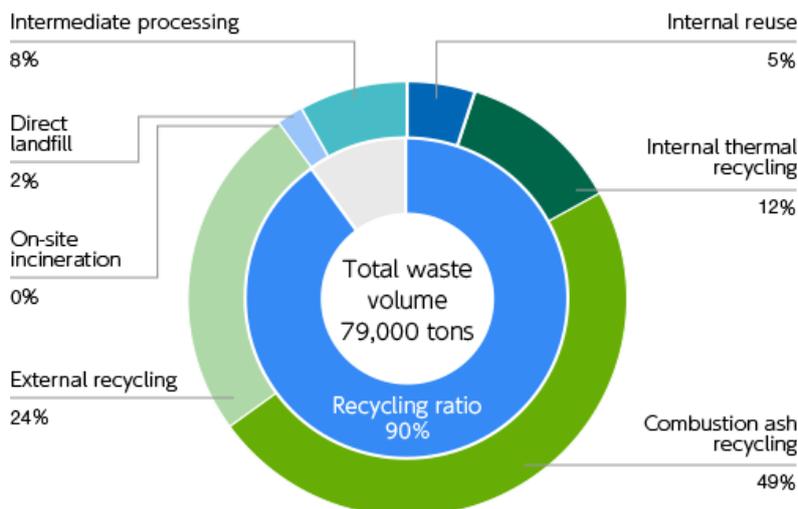
#### <Fiscal 2014 Activities and Results>

In fiscal 2014, the fourth year of the plan, the Group continued to make effort to reduce the volume of waste, and to increase the recycling rate, including for thermal recycling and resource recycling. As a result, three production centers and all 11 of the Group's on-site and off-site companies achieved zero emissions.

#### Zero Emission Achievement Status in Fiscal 2014



#### Breakdown of Waste Produce by MRC in Fiscal 2014



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## ■ Resource Conservation Activities (Biomass Energy Recycling)

At Toyama Production Center, waste cooking oil from the cafeteria was previously treated as waste, but since July 2007, it has been supplied to companies in the neighboring Eco Town industrial complex. Biodiesel fuel (BDF) produced at the complex is used in some of the transport vehicles used on the site. The site uses approximately 5,500 liters (fiscal 2014 result) of BDF each year.

Furthermore, as a renewable energy project, with the cooperation of Toyama City the center has installed two biogas boilers that run on biogas generated in the Eco Town industrial complex. The boilers generate some of the steam used by the center. In fiscal 2014, the center used about 550,000 m<sup>3</sup> of biogas.

Case study:[Biogas Boiler](#)

## Biodiversity Preservation

- ↳ [Initiatives for the Preservation of Biodiversity](#)
- ↳ [Protecting Ecosystems and Responding to Invasive Species](#)

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### ■ Initiatives for the Preservation of Biodiversity

The preservation of biodiversity is the foundation that is essential to realizing prosperous, comfortable human societies. It brings a host of benefits, including providing rich resources, mitigating climate change and alleviating natural disasters, and inspiring unique cultures and scientific discoveries rooted in nature.

With awareness of this, the Mitsubishi Rayon Group endorsed the Declaration of Biodiversity by Keidanren in 2010 and works for the preservation of biodiversity. We are also focused on developing new technologies, products and services that contribute to preserving diversity.

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### ■ Protecting Ecosystems and Responding to Invasive Species

The Mitsubishi Rayon Group conducts biodiversity preservation activities at production centers. The Toyohashi Production Center in Toyohashi City, Aichi Prefecture is conducting clean-up activities, along with tree planting and maintenance activities, near the Asakura River, where wastewater is released from the production center. Employee volunteers participate in these activities every year. The Otake Production Center in Otake City, Hiroshima Prefecture has displayed posters describing the features of redback spiders following the discovery of this alien species-a spider that could potentially cause harm to people-at Otake Port and other nearby locations. Through this poster, the company is making employees aware of the importance of stopping the redback spider from breeding in the area.

Example: [Clean-up activities](#)

## Safety and Disaster Prevention Initiatives

- [↓ Safety Measures](#)  
 [↓ Overview of Activities for Fiscal 2014](#)  
 [↓ Fiscal 2015 Action Plan](#)  
[↓ Disaster Readiness Measures](#)  
 [↓ Environmental Complaints](#)

### ■ Safety Measures

The Mitsubishi Rayon Group has been improving safety and disaster prevention under the principle of "Safety and Environment are the inevitable issue prior to any other issues for the sustainability of the company".

#### ● Main Initiatives for Ensuring Safety

1. Safety conventions, at which managers directly talk about the importance of safety
  - The president and the management team visit production centers every year to talk directly to employees about the importance of safety.
  
2. Enhance education
  - The Company has a systematic education program starting from when people join the Company. The program provides the necessary education to ensure safe operations and general safety. This training develops staff and operators to possess high technical knowledge and to be sensitivity for the process.
  - We also have an education program where employees can actually experience the feeling of danger, in order to increase their sensitivity to danger.
  - We conduct standardization activities to correctly pass on safe and assured operational techniques, by using experienced operators' knowledge and by documenting the reason and grounds for operations in a work standardization booklet.
  - The operation management division actively resolves operational issues, investigates the cause of any incidents or troubles, and takes countermeasures to prevent their recurrence.
  
3. Strengthening facility management
  - Operation department and maintenance department are ensuring keeping and improving of security with close communication.
  - We are maintaining soundness of equipment by investing resources and adapting new technologies.
  
4. Ensuring Safety
  - When we make changes to the existing patterns, such as changes in operating procedures and facility upgrades, we utilize risk assessment methods and other means to check for any issues in terms of ensuring safety and protecting the environment.
  - We use incident information from inside and outside the Group for inspections and survey activities (in fiscal 2012-2013 we conducted safety inspections of reaction process in the Company and Group companies as well as a monomer tank survey and a survey of the risk of being caught by rotating machinery). Looking ahead, we will continue to make effective use of information to ensure safety.
  
5. Support for cooperation companies
  - We work together with cooperation companies to ensure safety by establishing General Safety Management Meetings.
  - For employees at cooperation companies, we also provide both human and logistical support for safety education, such as providing risk information on the substances we handle, as well as operations.

## ■ Overview of Activities for Fiscal 2014

In line with the new APTSIS 15 medium-term management plan (target year fiscal 2015), the Group promoted and improved safety and disaster prevention initiatives. These initiatives centered on three goals set out in the plan:

- 1) eliminate injuries of lost work days and eliminate serious incident
- 2) support for Group companies

### ● 1) Eliminate Injuries of Lost Work Days and Eliminate Serious Incident

#### Activities Mostly Carried at Domestic Production Centers

1. Safety conventions, at which managers directly emphasize the importance of safety
  - Conducted at four production centers on July 2, 2014.
2. Company wide uniform patrol at workplaces by managers were conducted daily between 1:00 p.m. and 1:30 p.m.
  - Continued safety inspections by management as an opportunity for communication between employees and management.
3. Establishing Management of Change
  - 4M MOC (man, machine, material and method) was established and applied
4. Enhancement of maintenance management
  - Continued support for devices and equipment that have not been inspected over the long-term and confirmed progress of the overall project. The work scope and improvement plan is being reconsidered regarding inspections of external degradation, coating and insulation.
5. Workplace Safety Measures
  - We conducted the safety emphasis month (on July, December) by means of raising up awareness of operators and managers, and risk prediction of human error.
  - Conducted identification of irregular work.
6. Enhancement of construction safety accompanying Isolation.
  - Before starting work on the construction accompanying Isolation of equipment, we strengthened Group standards regarding safety management to eliminate risk or causes of danger related to construction.

#### Activities Undertaken Including Group Companies

1. Integrated training for safety personnel of Group companies in Japan
  - Conducted twice annually. Shared disaster information in the Mitsubishi Rayon Group and promoted measures to prevent recurrences.
2. Safety assessments of new equipment and renewed equipment (expansion of the scope of assessment)
  - Revised facility safety and environmental assessment rules, and continued the safety assessment of new equipment and renewed equipment.
3. Safety checks of plants with chemical reaction and of monomer tanks
  - For safety inspections of plants that have chemical reaction, follow-up checks were made for departments which have been inspected from fiscal 2012 to fiscal 2013. Safety checks were also conducted for Group companies in domestic and overseas.
  - Monomer tank inspections were conducted based on MRC Group policies as countermeasures to abnormal polymerization.

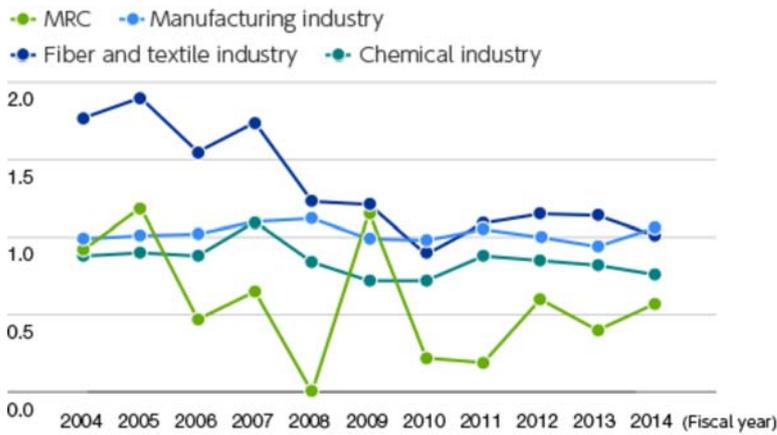
#### Injury

The number of injuries with and without lost work days decreased by 5 cases from the previous fiscal year. However, reportable injuries have been occurred as last fiscal year.

Direct causes of injuries were mainly human error, so each division analyzed the background of human error accidents and implemented recurrence prevention measures. At the major four production centers we are promoting measures against human error and strengthening maintenance management.

According to injury category, reportable injuries caused by slips or falls. To ensure that such accidents are never repeated we will implement thorough preventative measures throughout the Group and continue working to reduce occupational injuries.

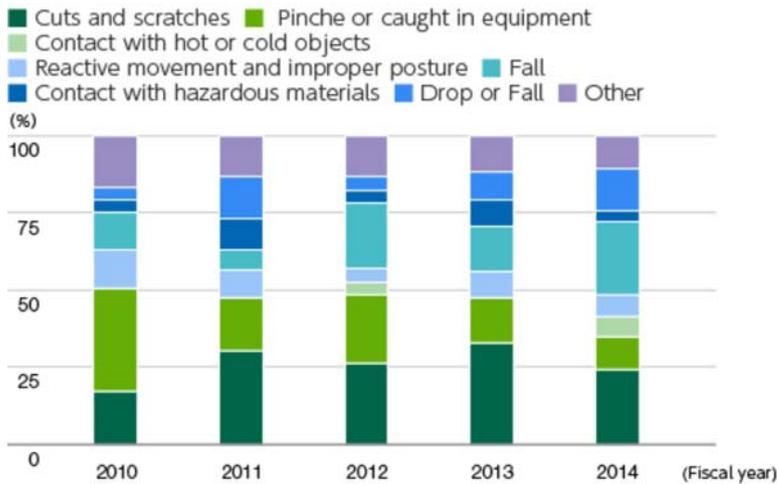
**Incidence Rates of Occupational Injuries with Lost Work Days (Absence of 1 Day or More)**



\* Injury frequency rate:  
Number of injuries with lost work days / 1 million work hours

**Causes of Occupational Injuries (MRC Group)**

\* Excluding cooperation companies. Figures from fiscal 2011 onward include Lucite International Group

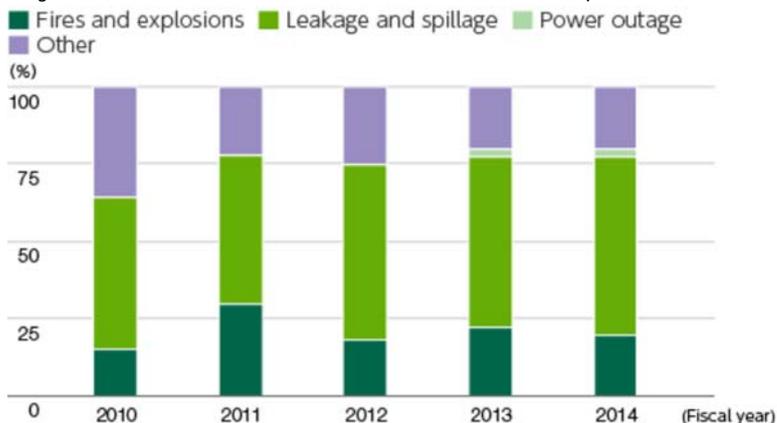


**Incident**

MRC Group's number of incidents remained at the same level as the previous fiscal year. However, at overseas Group companies there were two serious incidents. The causes were investigated and made counter measures preventing recurrence at the similar plants. In addition, we ensured the safety & environment risk assessment with including third party when plants are under the construction and refurbishments are undertaken. Furthermore, countermeasures have been taken against the external leakage of hazardous substances that occurred in fiscal 2011 and fiscal 2012. In fiscal 2014, there were 4 security incidents and 2 environmental incidents across the MRC Group. An overseas Group company was given an improvement order by a supervisory authority regarding the treatment of exhaust gases and promptly enacted countermeasures. There was no impact on local residents.

**Incident Causes (MRC Group)**

\* Figures from fiscal 2011 onward include Lucite International Group



## ● 2) Support for Group Companies

Since fiscal 2008, we have continued to hold training sessions for safety/environment personnel at domestic Group manufacturing companies.

In China, Mitsubishi Rayon (Shanghai) Co., Ltd. implemented various measures, primarily through its Safety, Environmental and Quality Products and Compliance Promotion Office, which included strengthening and expansion of safety management systems, audits and training.

## ● 3) Strengthen Security Management at Production Centers

At Otake Production Center, safety management policies were formulated and safety management strengthened as to handling high-pressure gas and the initiated serious incident prevention..

Furthermore, risk assessment have been done for the process of handling hazardous materials. Also conducted risk assessment for the irregular operations especially in fiscal 2014.

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## ■ Fiscal 2015 Action Plan

### ● 1) Aim to Eliminate Injuries with Lost Work Days and Eliminate Serious Incidents.

We will promote the full penetration and adherence to the countermeasures that we have implemented since fiscal 2013. Fiscal 2015 is the final year of the APTSIS 2015 medium-term management plan, so the measures formulated in fiscal 2013 will be completed and become a platform toward reducing incident.

For MOC (management of change), we will instruct improvements for contents deemed to be insufficient and stabilize more appropriate MOC. To strengthen maintenance management, we will continue to consider horizontal expansion of the evaluation system of equipment deterioration by surface coating analysis and equipment management system. We will also move ahead with the planned maintenance based on a risk assessment ahead of the full-scale operation of repair cost evaluation criteria in fiscal 2016.

Furthermore, continuing on from fiscal 2014, we plan safety emphasized month for the purpose of raising awareness of reducing of human error, responsibility for ensuring workplace safety, enabling management to ascertain comprehensive risk in their divisions and to ensure safety.

### ● 2) Support for Group Companies

We will continue providing environmental and safety-related support to Group companies.

### ● 3) Strengthen Safety Management at Production Centers

Guided by basic policies concerning safety, the environment and quality, Mitsubishi Rayon is implementing measures to prevent serious accidents by strengthening safety management in such areas as high-pressure gas or hazardous materials handling in accordance with the following safety management policies.

#### Safety Management Policies

1. Raise the level of process operational management, prevent incidents, natural disasters and abnormalities and achieve safe and efficient production by implementing appropriate preventive measures for hazards, including leakage of harmful substances and so forth.
2. Improve the level of each employee's safety management by entrenching, expanding and continuously improving safety management systems.
3. Comply with safety-related laws and voluntary standards, and take measures that exceed legal statutes when necessary.

With respect to the handling process for hazardous materials including high pressure gas equipment, we have conducted a risk assessment for irregular operations. Going forward, we plan verification using risk assessment guidelines as regards emergency stop procedures, start-up and shutdown operations, and operational error assumptions.

## ■ Disaster Readiness Measures

The Mitsubishi Rayon Group conducts disaster prevention activities, including safety training for employees, equipment improvements and disaster prevention drills. In addition, the Group plans and implements disaster drills and other events jointly organized with local organizations and public firefighters. The Group is also endeavoring to prevent incidents and disasters during transport and is adopting logistic safety measures should any incident occur.

For example, we regularly conduct disaster prevention drills, as well as drills on safe emergency stop procedures at plants, checking on the safety of team members, and evacuations. In this way we are constantly ready to deal with a major earthquake. Moreover, we are carrying out earthquake resistance analysis of our plant and factory buildings and systematically strengthening places that require reinforcement. Mitsubishi Rayon's earthquake resistant high-pressure gas facilities have all been built to meet the legal standard at the time of construction. However, we are now carrying out a survey to check facilities and structures that were built prior to current laws. In fiscal 2014, the survey determined whether the facilities and structures comply with current standards and the necessary important reinforcement plans were drafted. Going forward, we will implement reinforcement work in line with the reinforcement plan while piping systems will also be surveyed to check for compliance with current legal standards, and we will draft the necessary reinforcement plans for these as well.

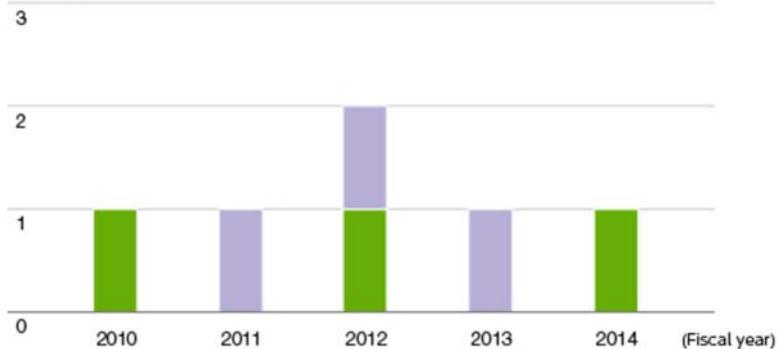
## ■ Environmental Complaints

In fiscal 2014, there was one minor complaint about noise and we responded appropriately. Going forward, we will strive to conduct business activities showing considering for the lifestyles of local residents.

### Number of Complaints Received by the MRC Group

■ Air pollution ■ Noise ■ Water quality ■ Odor ■ Other

(number of complaints)



**Environmental Data and References**

- ↳ [Scope of Aggregation for Environment-Related Data](#)
- ↳ [Initiatives for Preventing Global Warming](#)    ↳ [Environmental Data by Production Center](#)
- ↳ [Major Environmental Index](#)    ↳ [Total Chemical Emissions](#)
- ↳ [Major Chemical Emissions and Transfer Volumes](#)    ↳ [Initiatives for Reducing Waste](#)
- ↳ [Environmental Accounting](#)    ↳ [Green Purchasing](#)

**■ Scope of Aggregation for Environment-Related Data**

● **Scope of Data Collection Related to Environment in Fiscal 2014\*1**

		Reduction of Chemical Substances Emission		Zero emissions of waste	Prevention of Global Warming		Major Environmental Index					ISO Certification*3	
		Total emission targets	pecially managed substances		Energy consumption per unit of production	Greenhouse gas emissions	Water consumption	Total wastewater volume	BOD emissions	COD emissions	SOx emissions	NOx emissions	ISO 9001
MRC Group	(1) Otake Production Center and onsite Group companies	○	○	○	○	○	○	○	-	○	○	○	○
	Toyohashi Production Center and onsite Group companies	○	○	○	○	○	○	○	○	○	○	○	○
	(2) Toyama Production Center and onsite Group companies	○	○	○	○	○	○	○	-	○	○	○	○
	Yokohama Production Center and onsite Group companies	○	○	○	○	○	○	○	-	○	○	○	○
	Mizushima AN Plant	○	○	○	○	○	○	○	○	○	○	○	○
	Kurosaki NVF Polymer Plant	○	○	○	○	○	○	○	○	○	○	○	○
	(3) MRC Unitec Co., Ltd.	○	○	○	○	○	○	○	-	○	○	○	○
	Diatic Co., Ltd.	○	○	○	○	○	○	○	○	○	○	○	○
	Toeikasei Co., Ltd.	○	○	○	○	○	○	○	○	○	○	○	○
	CHALLENGE Co., Ltd.	○	○	○	○	○	○	○	○	○	○	○	○

G r o u p	Tosen Co., Ltd.	o	o	o	o	o	o	o	-	-	o		
	Ryoko Sizing Co., Ltd.	o	o	o	o	o	o	o	-	-			
	MRC Koda Co., Ltd.	o	o	o	o	o	o	o	-	-	-	o	o
	Mitsubishi Rayon Aqua Solutions Co., Ltd. * formerly Nippon Rensui Co.	o	o	-	o	o	o	o	-	-	-	o	
	Wellthy Corporation	-	-	-	-	-	o	o	o	o	o	o	o
	Nitto Gypsum Board Co., Ltd.	o	o	o	o	o	o	o	o	o	o	o	o
	Thai MMA Co., Ltd.	o	o	-	o	o	o	o	o	o	o	o	o
	Huizhou MMA Co., Ltd.	o	o	-	o	o	o	o	o	o	o	o	
	Suzhou Sanyouli Chemicals Co., Ltd.	o	o	-	o	o	o	o	o	o	o	o	o
	Diapolyacrylate Co., Ltd.	o	o	-	o	o	o	o	o	o	o	o	o
	Mitsubishi Rayon Polymer Nantong Co., Ltd.	o	o	-	o	o	o	o	o	o	o	o	o
	Diatec (Shanghai) Co., Ltd.	o	o	-	o	o	o	-	-	-	-	o	o
	Suzhou MRC Opto-Device Co., Ltd.	o	o	-	o	o	o	o	o	-	-	o	o
	(4) O v e r s e a s G r o u p	Dianal America, Inc.	o	o	-	o	o	o	-	-		o	
Mitsubishi Rayon Carbon Fiber and Composites, Inc.		o	o	-	o	o	o			o	o	o	
ALDILA, Inc.		o	o	-	o	o	-	-	-	-	-	o	
TK Industries GmbH		-	-	-	o	o	-	-	-	-	-	o	
Dalian Rayon Environmental Equipment Co., Ltd.		o	o	-	o	o	o	o	o	o	o	o	o
Wuxi MRC Membrane Technology Co., Ltd.		o	o	-	o	o	o	o	o	o	o		
Fengxin MRC JDL Environment Protection LTD.*2		-	-	-	o	o	o	o	o	o	o		
Mitsubishi Rayon Lucite Group Ltd.		-	-	-	o	o				o	o	o	o

\*1 Data related to Environment. o : required, - : not required, blank : not measured.

\*2 Group companies newly included in the scope of data collection from fiscal 2014.

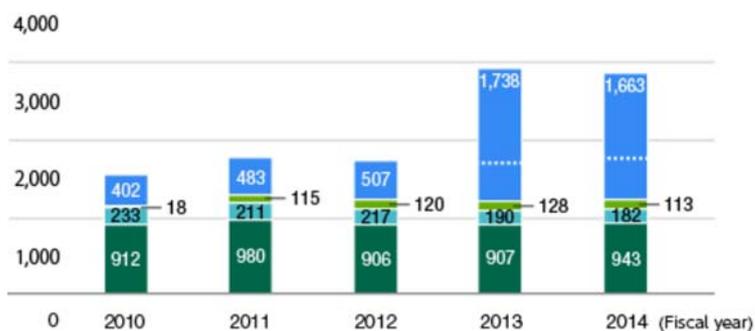
\*3 ISO acquisition. o : Companies with ISO acquisition (Some Lucite group companies are without acquisition).

## ■ Initiatives for Preventing Global Warming

### ● Greenhouse Gas Emissions (Converted into CO<sub>2</sub>)

■ MRC 1 ■ MRC 2 ■ Domestic Group ■ Overseas Group

(1,000 tons/ year)



\* MRC 1 is the volume of CO<sub>2</sub> emissions derived from energy use at the six production centers in Japan.

\* MRC 2 is the volume of CO<sub>2</sub> emissions derived from items added to comply with the revised Law Concerning the Promotion of the Measures to Cope with Global Warming and the revised Law Concerning the Rational Use of Energy.

\* Aggregate amounts of domestic onsite Group companies are included in Mitsubishi Rayon proper.

\* The number of overseas Group companies included in the scope of data aggregation has increased significantly from fiscal 2013.

The dotted line in the graph shows the fiscal 2012 standard of the scope of data aggregation.

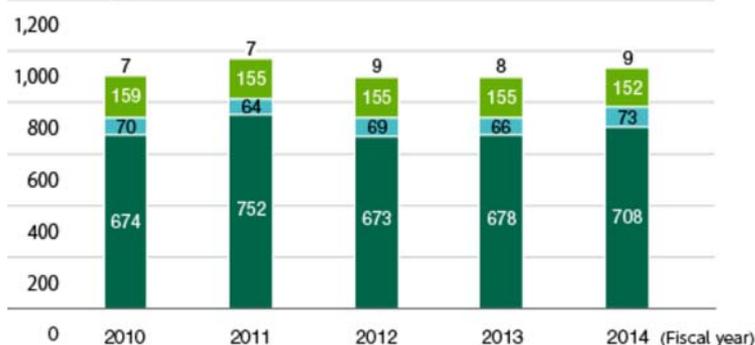
### ● Greenhouse Gas Emissions of Fiscal 2014 (Converted into CO<sub>2</sub>)

Breakdown for fiscal 2014 (1,000 tons/year)	CO <sub>2</sub>		Five other gases
	Energy-derived	Derived from other sources	
MRC	945	264	4.5
Domestic Group	24	0	0.4
Overseas Group	1,109	551	3.0

### ● MRC CO<sub>2</sub> Emissions Attributable to Energy Use

■ Otake Production Center ■ Toyohashi Production Center  
■ Toyama Production Center ■ Yokohama Production Center

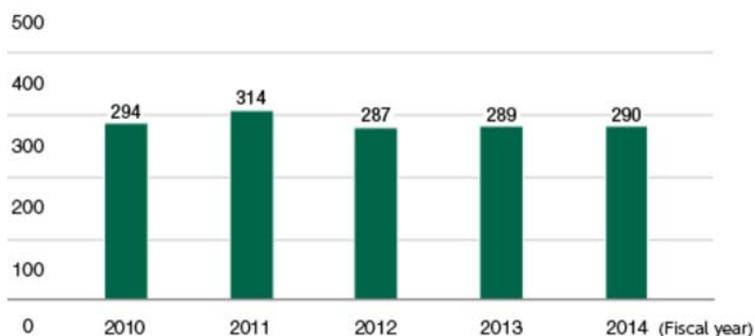
(1,000 tons/ year)



### ● Amount of Energy Used by MRC (Converted into Crude Oil)

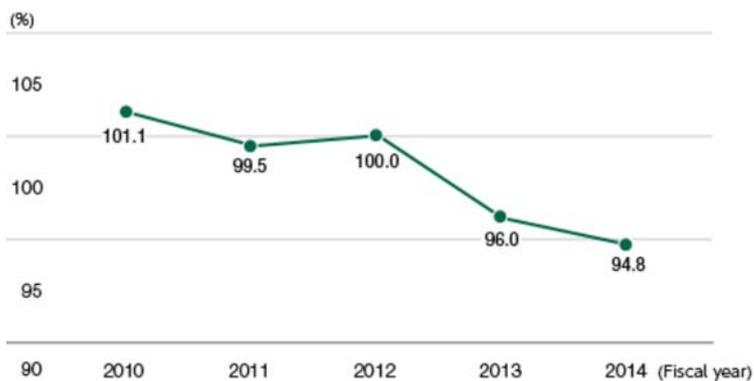
■ Amount of energy used

(1,000 kl/ year)



● **Energy Consumption per Unit of Production by MRC**

Units: Crude oil converted kl/t-Production output converted into base product units (Based on chemicals plant production output at Otake Production Center in fiscal 1990)



■ **Environmental Data by Production Center**

● **Environmental Data for Fiscal 2014 by Production Center**

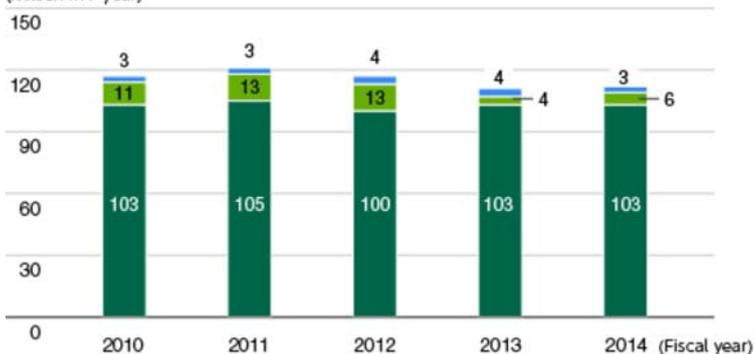
Production Center Name	Otake Production Center	Toyohashi Production Center	Toyama Production Center	Yokohama Production Center
Location	Miyukicho, Otake City, Hiroshima Prefecture	Ushikawadori, Toyohashi City, Aichi Prefecture	Kaigandori, Toyama City, Toyama Prefecture	Daikokucho, Tsurumi-ku, Yokohama City, Kanagawa Prefecture
Chemical emissions (tons) (Figures in brackets show the number of substances)	734 (79)	33 (27)	362 (21)	3 (11)
SOx emissions (tons)	452	21	43	0
NOx emissions (tons)	1,089	151	293	0
COD emissions (tons)	617	6	-	2
BOD emissions (tons)	-	3	33	-
Water Consumption (million m <sup>3</sup> )	86	5	11	0
Water drainage (million m <sup>3</sup> )	70	5	11	0
External landfill volume (excluding power combustion ash) (tons)	489	4	60	0
Energy use per unit (year-on-year change)	Down 4.2%	Down 5.7%	Up 2.5%	Down 13.5%

■ **Major Environmental Index**

● **Water Consumption**

■ MRC ■ Domestic Group ■ Overseas Group\*

(Million m<sup>3</sup>/ year)

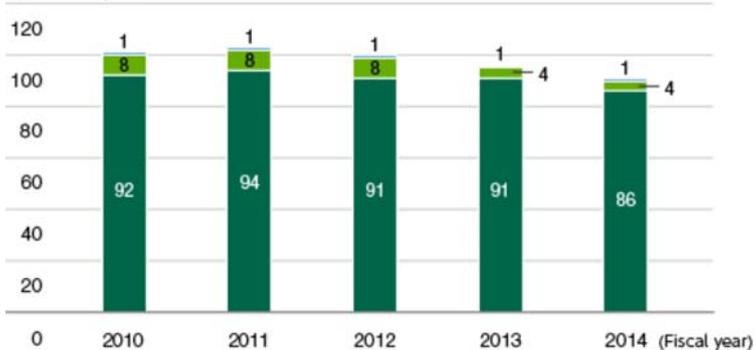


\* Data has been revised to reflect the inclusion of overseas Group companies in fiscal 2013.

**Total Drainage Volume**

MRC Domestic Group Overseas Group

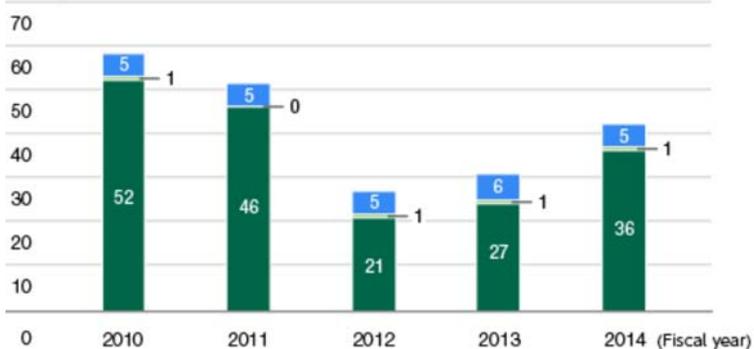
(Million m<sup>3</sup>/ year)



**BOD Emissions**

MRC Domestic Group Overseas Group

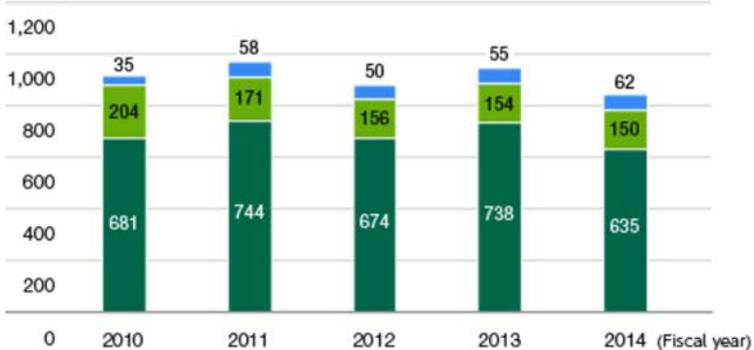
(Tons/ year)



**COD Emissions**

MRC Domestic Group Overseas Group

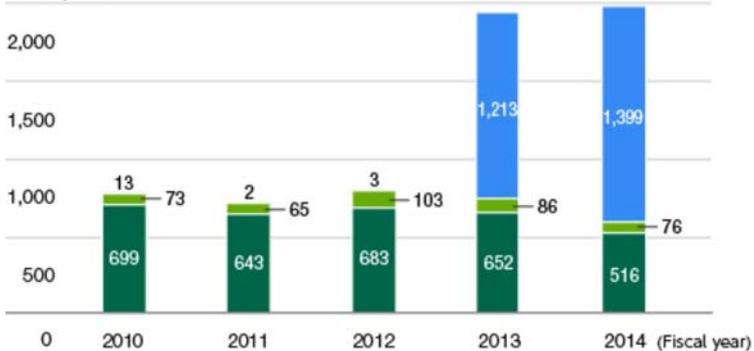
(Tons/ year)



**SOx Emissions**

MRC Domestic Group Overseas Group\*

(Tons/ year)



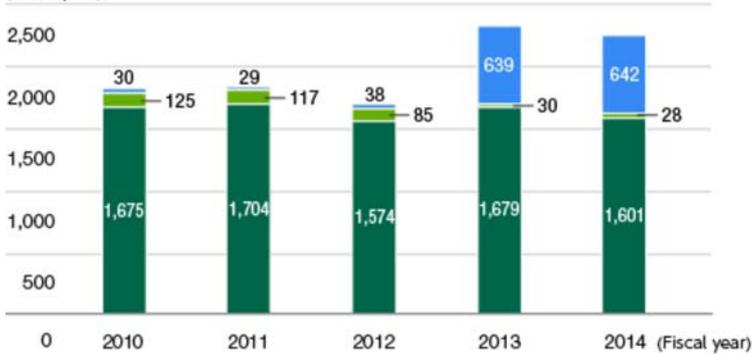
\* The number of overseas Group companies included in the scope of data aggregation increased significantly in fiscal 2013.

\* Data has been revised to reflect the inclusion of overseas Group companies in fiscal 2013.

● **NOx Emissions**

■ MRC ■ Domestic Group ■ Overseas Group\*

(Tons/ year)



\* The number of overseas Group companies included in the scope of data aggregation increased significantly in fiscal 2013.

\* Data has been revised to reflect the inclusion of overseas Group companies in fiscal 2013.

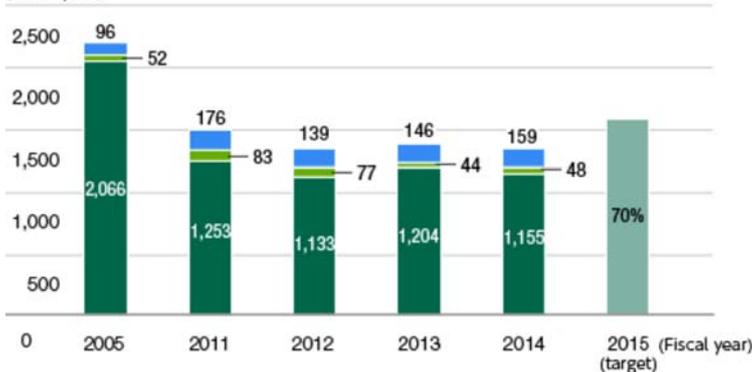
■ **Total Chemical Emissions**

● **Total Chemical Emissions (5th Plan Target 1)**

► [Detailed explanation](#)

■ MRC ■ Domestic Group ■ Overseas Group

(Tons/ year)



● **List of Individually Managed Substances (5th Plan Target 2)**

i ) Twelve VOC Substances that Mitsubishi Rayon Released into the Air in Large Volumes

Substance
Acrylonitrile
Dichloromethane
1,3-Butadiene
N,N-dimethylformamide
Styrene
Toluene
Methyl alcohol
Propylene
Isopropyl alcohol
Tert-butyl alcohol
Vinyl acetate
n-hexane

ii ) Five Substances That the Mitsubishi Rayon Group Emits the Most

Substance
Methyl methacrylate
Acetone
Dimethylacetamide
Inorganic cyanogen compound
Dimethyl ether

## Major Chemical Emissions and Transfer Volumes

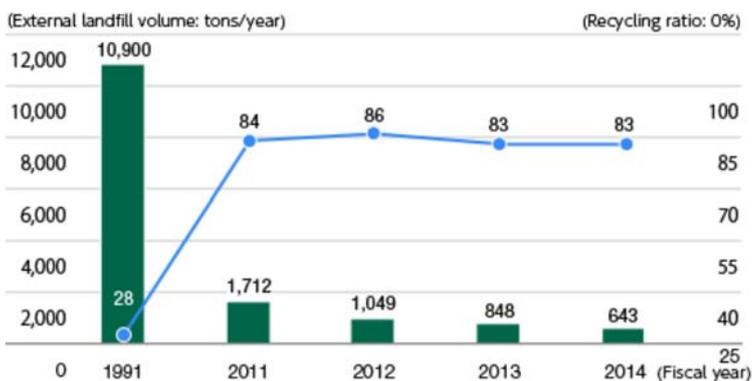
### Emissions and Transfer Volumes of MRC-PRTR Substances in Fiscal 2014 (Tons/year)

Substance	Atmosphere	Water	Soil	Total Emissions	Transfer Volume	
Dimethylacetamide	344	22	0	365	173	
Acetone	295	34	0	329	215	
Methyl methacrylate	86	46	0	132	224	
Dimethyl ether	24	57	0	81	0	
Dichloromethane	80	0	0	80	6	
Tert-butyl alcohol	54	1	0	56	0	
Inorganic cyanide	50	0	0	50	0	
Methyl alcohol	22	8	0	31	280	
N,N-dimethylformamide	28	2	0	29	129	
Ammonia	27	0	0	27	1	
Other substances	138	43	0	182	1,160	
<b>Total (Including revised PRTR Law substances)</b>	<b>1,148 (681)</b>	<b>214 (96)</b>	<b>0 (0)</b>	<b>1,362 (777)</b>	<b>2,188 (1,295)</b>	
<b>Breakdown</b>	MRC	978	177	0	1,155	1,127
	Domestic group	48	0	0	48	348
	Overseas group	122	36	0	159	712

\* Includes MRC-PRTR substances and substances added under the revised PRTR Law

## Initiatives for Reducing Waste

### External Landfill Volume (Excluding Power Combustion Ash) and Recycling Ratio



## Environmental Accounting

### Aggregate Results for Environmental Accounting in Fiscal 2014

(Million yen)

Aggregate items established in the Ministry of the Environment guidelines		Investment	Cost
Environmental conservation costs	[1] Pollution prevention costs	714	2,157
	[2] Global environmental conservation costs	52	19
	[3] Resource recycling costs	248	1,351
	(2) Up / Down stream costs	0	192
	(3) Administration cost	0	634
	(4) Social activity cost	27	118
(5) Environmental remediation cost	0	81	
Total		1,040	4,552

(Million yen)

Aggregate items established in the Ministry of the Environment guidelines		Investment
Economic benefit	(1) Proceeds from recycling activities	695
	(2) Expense reductions due to energy conservation	354
	(3) Reduction in waste disposal expenses	62
Total		1,111

(Million yen)

Wastewater measures costs (disposal costs, etc.) shown as an amount within compliance costs (operation and maintenance expenses) related to pollution control/environmental laws and agreements	124
Waste disposal costs shown as an amount within waste reduction and resource management promotion costs (operation and maintenance expenses)	405

## ● Basic Information on Environmental Accounting

### Environmental Accounting in General

- Scope of aggregation:  
Costs and benefits of activities mainly aimed at environmental conservation
- Scope of companies:  
Mitsubishi Rayon Co., Ltd.
- Period:  
fiscal 2014

### Environmental Conservation Costs

- Scope/Classification:  
Conforms to the Ministry of the Environment's "The Establishment of an Environmental Accounting System (2000 report)"  
Cost includes personnel costs.  
Depreciation costs of facility investments are excluded.  
Research and developments costs are excluded.

### Economic Benefit

- Scope/Classification:  
Results of environmental and safety-related activities in fiscal 2014, which can be calculated rationally.
- Revenues:  
Cash proceeds from the sale of valuable material and trading in scrap materials, etc.
- Energy conservation:  
Amount of energy savings derived from energy conservation initiatives in production activities
- Waste disposal:  
Amount of cost reduction compared with the previous fiscal year

## ■ Green Purchasing

Mitsubishi Rayon promotes green purchasing through the purchase of environment-friendly products used internally, including stationery and office equipment.

### ● Green Purchasing Results at Mitsubishi Rayon

(Fiscal year)

		2010	2011	2012	2013	2014
Paper	Copy paper	96%	100%	95%	97%	96%
	Toilet paper	100%	100%	100%	100%	100%
Stationery	Notebooks	98%	64%	81%	90%	100%
	Pens	100%	95%	95%	88%	92%
	Files	92%	94%	86%	63%	95%
Office equipment	Personal computers	100%	100%	100%	91%	88%
	Printers	100%	100%	100%	78%	85%
	Facsimiles, copying machines and multifunctional printers	67%	100%	100%	100%	100%
Other items	Lighting equipment	69%	73%	97%	99%	95%
	Fluorescent lights	79%	84%	87%	85%	86%

\* Figures above are totals for MRC

▶ [Click here for more information on the scope of aggregation for environmental data](#)

**Relationships with Local Communities**

**Basic Concept**

The Mitsubishi Rayon Group strives to make a social contribution through its business activities based on the Mitsubishi Chemical Holdings Group Corporate Citizenship Activities Policy. At the same time, it deepens understanding of the culture and customs of the countries and communities in which it engages in business, and contributes to the development of local communities by proactively promoting activities that live up to the demands and expectations of each community as a good local citizen.

**Exchanges with Local Communities**

The Group conducts factory tours mainly for government officials and nearby residents as part of its efforts to interact with local communities both in Japan and abroad. These activities proactively provide opportunities to promote understanding of the Group's businesses as well as its environmental and safety measures.



Responsible Care Aichi Dialogue  
(Toyoashi Production Center)



Career Start Week  
(Otake Production Center)

**Volunteer Activities by Overseas Group Companies**

Overseas Group companies are engaged in volunteer activities that incorporate the needs and requirements of local people.

On Thai National Children's Day, Thai MMA Co., Ltd., together with business partner the Siam Cement Group, hosted enjoyable recreation activities for children from a school near the plant. The event was organized under the concept of learning outside the classroom and to raise awareness of concern for social responsibility among children.



Huizhou MMA Co., Ltd. carried out a garbage clean-up on the greenbelt and road near its site on UN World Environment Day. The individual participants have a new resolve to contributing to environmental improvements through business and day-to-day life with a high awareness of environmental issues.



### ● Exchanges with Local Communities through Sports

Each production center and Group company makes its grounds, gymnasiums and other facilities available to the local community, and they are used by many local residents. In addition, each production center and Group company organizes sports tournaments in an effort to foster exchanges with local residents and promote the development of young people.

### ● Clean-Up Activities

To keep local communities clean, Mitsubishi Rayon carries out clean-up activities in neighboring areas on a regular basis. Through these efforts, we are undertaking environmental beautification activities that reflect local interests but efforts are not limited to internal activities as we join clean-up campaigns organized by local governments and non-profit organizations.



(Yokohama Production Center)



(Toyama Production Center)



(Toyohashi Production Center: near the Asakura River)

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## ■ Activities for Nurturing and Educating the Next Generation

The simple questions "Why?" and "How?" that children ask are the origins of manufacturing. Wishing for many children to gain these capabilities and to convey the wonders and delights of science using its products and everyday items, the Mitsubishi Rayon Group conducts various science experience lessons.

### ● Science Experience Lessons

Volunteers participated as members of the Mitsubishi Chemical Holdings Corporation Group in the chemistry event held yearly by the Yume Kagaku 21 Committee. In August 2015, the Science Museum (Tokyo) held the Summer Vacation Chemistry Experiment Show and in October of the same year, Kyocera Dome Osaka hosted the Children's Chemistry Experiment Show where children could make moving slime and attracted children's attention by an experiment mixing salt and vinegar into the slime to observe how it changed.



The Mitsubishi Rayon Group company, ACRY-SUNDAY Co., Ltd., holds ACRY Club workshops at home center outlets and public facilities.

At the workshops, parents and children experience the basic processing of acrylic resin sheets and participate in a hands-on workshop to complete making one product, thereby enjoying the easy and fun aspects of processing.



The Toyama Production Center conducts classes at Toyama Technical High School each year to support nurturing students looking to become the technicians of the future.



At the Otake Production Center, we hold a workshop for local elementary school students each year at the Otake Ran-Ran College organized by Otake City. This year, the children made glittering, shiny snow domes utilizing an acrylic resin palette. The event was highly regarded for creating a valuable memory for the 40 elementary school pupils who took part and made a favorite toy into a snow dome.



#### ● Supporting the 《Soalon》 Design Contest

Mitsubishi Rayon Textile Co., Ltd. supports a design contest for Bunka Gakuen students, who are expected to eventually play an active role in the fashion industry. Mitsubishi Rayon Textile supplied 《Soalon》, a rare triacetate fiber that is environmentally friendly, for the textiles used in the contest.



#### ● Supplying Carbon Fiber to Schools Competing in Japan's Student Formula SAE Competition

Lightweight and strong, carbon fiber has gained attention as a material that enables massive weight reduction for increased mobility. In Student Formula SAE Competition of Japan, teams of students compete in a test of their overall manufacturing capabilities as they plan, design and produce car bodies. Mitsubishi Rayon supplies carbon fiber as a material for the car body and parts to Toyohashi University of Technology's Automotive Research club, one of the competitors.



**Relationships with Customers / Product Safety**

- ↓ [Product Safety](#)
- ↓ [Communicating with Customers](#)
- ↓ [Establishing a Customer Service Hotline](#)
- ↓ [Supporting Customers' CSR Activities](#)

**■ Product Safety**

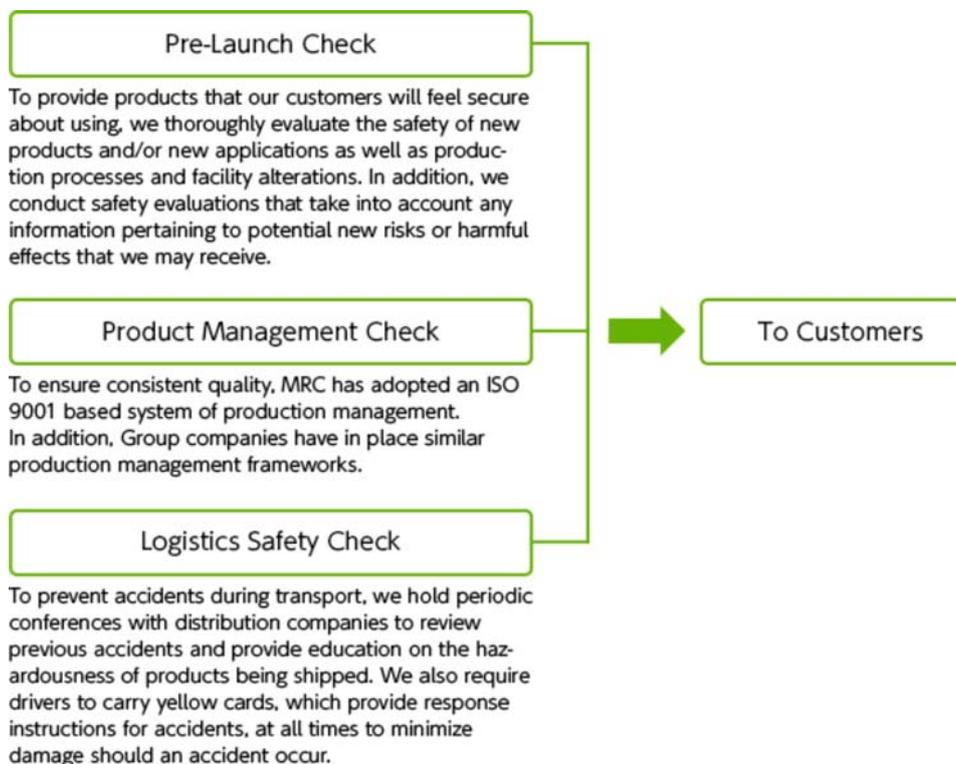
**● Approach and Initiatives regarding Product Safety**

Mitsubishi Rayon aims to prevent product accidents and ensures customer safety by complying with related laws and regulations as a matter of course and endeavoring to improve product safety at every stage from pre-launch to production and distribution based on the Product Safety Basic Policy through such measures as holding joint safety conferences with distribution companies and conducting periodic product liability audits.

**Basic Policy on Safety of Product**

The Mitsubishi Rayon Group has established the basic management policy of providing safe products that are reliable and satisfactory from our customers' perspective.

Established in 1995



**■ Communicating with Customers**

**● Utilizing the Open Laboratory**

Applying fiber, resin and biotechnologies developed over many years, Mitsubishi Rayon developed

the highly sensitive and reproducible DNA chip 《Genopal》. This is provided to a variety of research markets, including medical care and foodstuffs.

For the development, Mitsubishi Rayon utilized a special open laboratory of DNA chips. It was established in 2001 within our Yokohama Research Laboratories to collect voice of the researchers from companies and universities to the maximum extent. We communicate with customers by explaining how to use devices and giving a demonstration.

### ● Participation in Exhibitions

The Mitsubishi Rayon Group is working to initiate direct dialogue with a greater number of customers by proactively taking part in exhibitions. To provide products and services that achieve greater customer satisfaction, the Group reflects feedback from customers in its product safety and quality improvement initiatives.



Automotive Engineering Exhibition

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## ■ Establishing a Customer Service Hotline

### ● Operating a Customer Service Hotline

Mitsubishi Rayon Cleansui Co., Ltd. has established, Cleansui Service Center, a toll-free hotline to opinions, inquiries, and complaints from customers in relation to our 《Cleausui》 home water purifiers. Inquiries are also possible via email through our website.

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## ■ Supporting Customers' CSR Activities

### ● Cooperation with Green Procurement

To help customers with green procurement, Mitsubishi Rayon cooperates by maintaining a structure to provide rapid replies in response to requests for inspections for various types of environmentally hazardous substances in products and the like. To do that, we maintain a database of information on environmentally hazardous substances obtained from raw materials suppliers, and produce Safety Data Sheets (SDS) for each product.

## Relationships with Suppliers

[↓ Basic Concept](#)
[↓ CSR Procurement](#)
[↓ CSR Logistics](#)

### ■ Basic Concept

The Mitsubishi Rayon Group acts in line with its basic policy of fair and transparent transactions with all suppliers in Japan and overseas. The Group has formulated the CSR Procurement Policy and CSR Logistics Policy to ensure compliance with laws and regulations, to preserve the environment, to ensure safety, and to respect human rights, throughout the entire supply chain.

### ■ CSR Procurement

#### ● Principles

The Mitsubishi Rayon Group acts in line with its basic policy of undertaking fair and transparent transactions and strives to build healthy business relationships with business partners. In October 2008, we formulated the CSR Procurement Policy to work together with our supplier to contribute to better lives and realize a sustainable society. Based on this policy and with the collaboration of our suppliers, we are engaged in promotion of activities such as compliance with laws and regulations, preservation of the environment, ensuring safety and respecting human rights.

#### CSR Procurement Policies

The Mitsubishi Rayon Group's corporate philosophy is "Best Quality for a Better Life." "Best Quality" refers to our products, services, and the quality of each individual employee, while "Better Life" is meant to imply all people in society, including all of our stakeholders.

In keeping with this philosophy, we keep a very open attitude to suppliers when purchasing and procuring raw materials, components and construction work, and operate on a basic policy of fair and transparent transactions.

We promote CSR activities Group-wide in order to realize our corporate philosophy, and in our purchasing and procurement activities, the cooperation of our suppliers of products and services is essential. We ask them to understand the main tenets of CSR procurement and to cooperate with us in order to contribute to a richer future and realize a sustainable society.

#### 1. Compliance with laws and social standards

We will maintain high ethical standards and adopt a basic stance of complying with laws and social standards to conduct sound purchasing and procurement and we will endeavor to operate fairly and equitably.

#### 2. Securing the ecological soundness and safety of products purchased

We will always place top priority on environmental considerations and maintenance of safety when purchasing and procuring products and services.

#### 3. Respect for human rights and improvement of working conditions

In purchasing and procurement, we will respect the fundamental human rights of workers and carry out our operations without unjust discrimination. In parallel, we will strive to ensure the safety and health of all those working in the Mitsubishi Rayon Group's workplaces and to improve working conditions.

#### 4. Development of partnerships

We will maintain mutual relationships of trust with all the business partners under the

fundamental awareness that we are working together, mutually for business implementation and for conducting fair and transparent purchasing and procurement.

#### 5. Requests for business partners

In promoting the CSR activities of the Mitsubishi Rayon Group, we will ask our business partners to undertake appropriate corporate activities with respect to the following points.

- (1) Compliance with laws and social standards
- (2) Provision of products and services whose ecological soundness and safety have been ensured
- (3) Initiatives for raising respect for human rights and improving working conditions
- (4) Provision of satisfactory quality and prices, reliable delivery periods and timely information

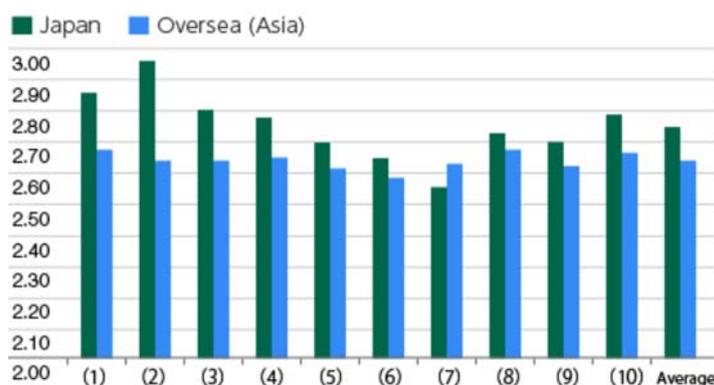
#### ● CSR Procurement Questionnaire

Mitsubishi Rayon conducted a CSR Procurement Questionnaire among suppliers from fiscal 2008 to fiscal 2010. The three times the questionnaire was conducted covered 98% of purchase amounts and 91% of orders. In providing feedback, we explained statistical results during commercial talks while from fiscal 2014 to fiscal 2015 visits were conducted to exchange opinions on future policies with suppliers that had given a low self-evaluation in questionnaire responses.

In fiscal 2013, through our six main Group companies in Asia, we conducted our CSR Procurement Questionnaire for countries including China, South Korea and Thailand, covering the same material as the questionnaire we use in Japan. Questionnaire results showed that there were issues with items such as ensuring safety and reducing environmentally hazardous substances so we asked through Group companies for improvements to be made.

Going forward, we will further raise the level of communication on both sides and further strengthen CSR initiatives in the supply chain.

#### Suppliers' Self-Evaluation for CSR Procurement Questionnaire Q1-10



▶ [CSR Procurement Questionnaire](#) 

#### ● Using the MCHC Group's Common Guidelines

To promote CSR procurement, it is crucial for business partners to understand its importance. In November 2014, the Mitsubishi Rayon Group held a briefing for business partners using the MCHC Group's newly formulated and Groupwide CSR procurement guidelines, Developing Cooperative Business Practices with Suppliers and Business Partners, outlining the scope of sharing.

#### ● Response to the Subcontract Act

The Mitsubishi Rayon Group strives to comply with the Act against Delay in Payment of Subcontract Proceeds, Etc. to Subcontractors (Subcontract Act) in order to respect the rights of business partners and maintain a healthy relationship.

A specific example of this is management of payment methods and settlement conditions through a subcontractor management database to prevent irregularities from occurring. Periodic training for buyers is also carried out to prevent abuse of a superior bargaining position.

## ■ CSR Logistics

### ● Basic Policy

The Mitsubishi Rayon Group acts in line with its basic policy of undertaking fair and transparent transactions and strives to build healthy business relationships with business partners.

In November 2010, we formulated the CSR Logistics Policy to work together with our business partners commissioned to undertake distribution operations to contribute to better lives and realize a sustainable society. Based on this policy and with the collaboration of business partners, we are engaged in promotion of activities such as compliance with laws and regulations, preservation of the environment, ensuring safety and respecting human rights.

#### CSR Logistic Policy

The Mitsubishi Rayon Group's corporate philosophy is "Best Quality for a Better Life." "Best Quality" refers to our products, services, and the quality of each individual employee, while "Better Life" is meant to imply all people in society, including all of our stakeholders.

In line with this philosophy, we keep a very open attitude to suppliers in our logistics activities, and operate with a basic policy of conducting fair and transparent transactions.

We promote CSR activities Group-wide in order to realize our corporate philosophy, and in our logistics activities, the cooperation of our suppliers of services is essential. We ask our suppliers to understand the main tenets of CSR logistics and to cooperate with us in order to contribute to a richer future and realize a sustainable society.

#### 1. Compliance with laws and social standards

We will maintain high ethical standards and adopt a basic stance of complying with laws and social standards to conduct sound logistics and we will endeavor to operate fairly and equitably.

#### 2. Securing ecological soundness and safety in logistics activities

We will always place top priority on environmental considerations and maintenance of safety when conducting logistics activities.

#### 3. Respect for human rights and improvement of working conditions

In logistics, we will respect the fundamental human rights of workers and carry out our operations without unjust discrimination. In parallel, we will strive to ensure the safety and health of all those working in Mitsubishi Rayon Group workplaces and to improve working conditions.

#### 4. Development of partnerships

We will maintain mutual relationships of trust with all business partners under the fundamental awareness that we are working together, mutually for business implementation and for conducting fair and transparent logistics activities.

#### 5. Requests for business partners

In promoting the CSR activities of the Mitsubishi Rayon Group, we will ask our suppliers to undertake appropriate corporate activities with respect to the following points.

- (1) Compliance with laws and social standards
- (2) Provision of logistics services whose ecological soundness and safety have been ensured
- (3) Initiatives for raising respect for human rights and improving working conditions
- (4) Provision of satisfactory logistics quality and prices, reliable delivery periods and timely information

### ● CSR Logistics Questionnaire

Mitsubishi Rayon conducted a CSR Logistics Questionnaire among business partners in the logistics field four times from fiscal 2010 to fiscal 2013.

From fiscal 2012, we also conducted surveys of distribution companies' energy conservation initiatives. The survey results confirmed that respondents were implementing new initiatives that include obtaining qualifications, particularly the Safe Workplace (G-Mark) Certification and Green

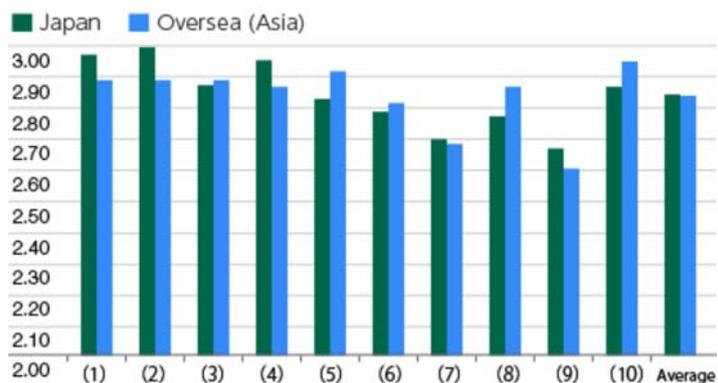
Management Certification, as well as introducing eco drive recommendations, and energy saving vehicles and equipment.

In fiscal 2013, through our six main Group companies in Asia, we conducted our CSR Logistics Questionnaire for countries including China, South Korea and Thailand, covering the same material as the questionnaire we use in Japan.

In providing feedback, we introduced the energy saving measures of each logistics company, and promoted replication of exemplary qualifications and activities between all companies. We also communicated our intention to include each company's stance on energy-saving initiatives in our supplier evaluations.

In fiscal 2014, we visited Japanese logistics companies that had overall low self-evaluations for the Global Compact to exchange opinions. At the same time, we held discussions with them on ways to reduce CO<sub>2</sub> emissions and cooperate as consigners, such as adoption of eco-cars and practice of environmentally conscious driving styles as well as shortening waiting times and fuel surcharges.

**Business Partners' Self-Evaluation for CSR Logistics Questionnaire Q1-10**



Ast Corporation being awarded a prize for zero transport accidents at the Hazardous Materials Logistics Safety Conference.

▶ [CSR Logistics Questionnaire](#) PDF

## Relationships with Employees

- [↓ Basic Policy](#)   [↓ Human Resource Development](#)   [↓ Work-Life Balance](#)
- [↓ For a More Enjoyable Working Environment](#)   [↓ Health Management](#)

### ■ Basic Policy

The Mitsubishi Rayon Group follows a basic policy of "Business Management utilizing people's capabilities." We respect employee diversity and aim to create workplaces where each employee can play an active role with a high level of enthusiasm.

### ■ Human Resource Development

#### ● Approach to Human Resource Development

Based on its view that the capabilities of people and organizations are the key source of corporate growth and competitive ability, the Mitsubishi Rayon Group views human resource recruitment, training and utilization, and fair evaluation as important management challenges, and focuses its efforts on these areas.

#### ● Basic Policy for Employing Human Resources

The conditions in which companies operate are changing on a daily basis along with social frameworks. Only companies that can sensitively detect these changes and respond adequately will be able to win out against the fierce competition and survive.

In recognition of this, the Mitsubishi Rayon Group seeks to continue hiring diverse individuals who can help it to realize its goal of being a "highly profitable corporate group that continues to grow." To this end, the Group aims to hire "individuals who will not be satisfied with the status quo, and will work ceaselessly to transform their surroundings;" that is, individuals with the "power to change things."

#### ● Training Programs

The Mitsubishi Rayon Group supports employees' efforts to develop their capabilities and skills by combining daily on-the-job (OJT) training with training programs and activities that assist in personal development.

The Group has adopted human rights education, legal compliance, thorough enforcement of corporate ethics, the promotion of safety and environmental management, and the strengthening of mental health care, as common themes of the stratified training programs according to employees' career background.

In addition, in view of the Group's increasing global operations, it is increasing its efforts to develop global leader who can serve as managers based on their understanding of the cultures and systems of each region.

## Main Training System

Positions	Changes of roles	Training						Common and self-directed learning
		Reinforcement of management/organizational capabilities	Global program	Training by level	Training by objective			
					Human skills	Technical skills	CSR-Related	
(Executive officer) Division general managers Laboratory general managers Plant directors Department directors Group leaders Managers	High-level experts Specialists Line managers	MCHC Management seminar	Global leadership training	Training for newly appointed managers	Seminars to support second careers Career development training	Labor management foundational training	Compliance promotion training	Annual Groupwide TOEIC testing Correspondence education and systems for supporting the acquisition of licenses and certificates Various e-learning programs
Mid-career employees	Operational promotion	MCHC Junior management seminar	Global business training	Training for mid-career employees (2)	Coaching foundation training Team building training	Manufacturing leadership training Training on intellectual property Innovation creation course	Harassment consultation desk officer training Risk management implementation training Information security education	
Junior employees			Cross-cultural understanding, language training	Training for mid-career employees (1)	Mentorship training	Production engineering courses - applied studies and foundation studies	e-learning for upgrading qualifications	
New employees			Overseas assignment training	Training for third-year employees New employee/follow-up training		Technical lectures for new employees		

### ● COM-PAS Personnel Evaluation System

The Mitsubishi Rayon Group takes the view that strong unity of direction across all Group members while leveraging the capabilities of each individual, based on the Corporate Behavior Charter, is critical for its sustained development in the years ahead.

Based on this view, in fiscal 2006 the Group introduced a personnel performance evaluation system that stimulates communication within its organization, provides employees with common organizational targets, and accurately rates individuals who work hard and succeed in achieving the targets. This system is nicknamed COM-PAS (Communication, Plan, Action & Success).

Under the system, there is an initial period (February-March), in which employees set individual targets based on consultation with management, an intermediate period (September-October) for progress checking, and a final period (February-March the following year) during which the employee and management evaluate and confirm the achievement of the individual targets. In this way targets are managed with a PDCA cycle. The Mitsubishi Rayon Group believes that utilizing this target-based personnel management process maximizes the capabilities of individual employees and, by extension, allows the entire Group to display its organizational strength.

Furthermore, to make the system more effective, the Group offers manager-focused training to evaluators on an annual basis in order to increase the fairness, persuasiveness and transparency of the evaluations. In fiscal 2014, the training was conducted for managers twice (two days each) and for shift team leaders four times (one day each).



Target-based (evaluator) training

## ● Career Development

To promote management that makes the most of people's abilities, Mitsubishi Rayon promotes career plan development for career-track employees from their third year in the Company onwards. The objective is to foster their awareness of self-initiated skills development by having them envisage their future roles.

The career plans are created while filling out future information (plans) on a "career sheet" that records their past information (work history, qualifications, etc.)

The human resource information that is systematically compiled on the career sheet is utilized by human resource management throughout the company to help increase our organizational strength.

## ● Internships

Mitsubishi Rayon offers an internship program that is available mainly to students from universities, graduate schools and technical colleges. Across the Company, 10 to 20 students are accepted every year, which gives the students the opportunity to gain firsthand experience in manufacturing and research on-site and to consider their career options. Mitsubishi Rayon makes the internship program available to foreign students in Japan as well.

In fiscal 2014, the internship program was held for 13 themes for two weeks between August 25 and September 5, as a public invitation.

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## ■ Work-Life Balance

### ● Action Plan for Supporting the Nurturing of the Next Generation

To boost employees' vitality and fulfill its responsibility to society, Mitsubishi Rayon is striving to develop better working conditions for employees, which includes supporting their efforts to manage work and family life. As part of this, from 2005, Mitsubishi Rayon established and implemented its Action Plan for General Business Operators in accordance with the Act on Advancement of Measures to Support Raising Next-Generation Children. With the Fourth Action Plan (fiscal 2012-fiscal 2013) we have also been certified by the Tokyo Labor Bureau as a General Business Operator Conforming to Standards, in 2014 we received the Kurumin Certification Mark for a third time following on from 2008 and 2010.

The measures of our Fifth Action Plan (fiscal 2014-fiscal 2017), which we started in fiscal 2014, are as follows.



Next Generation Kurumin Certification Mark

### **Action Plan for General Business Operators in accordance with the Act for Measures to Support the Development of the Next Generation (Fifth)**

The following action plan has been formulated to enable all employees to reach their full potential by achieving a harmonious balance between their work and family life, and by creating positive working environments.

#### **1. Four-year plan from April 1, 2014 to March 31, 2018**

## 2. Overview

### <Objective One>

Create an environment that makes it easier for male and female employees to manage work and family life and, in turn, fosters an ongoing sense of enthusiasm toward for their duties

The following measures will commence from April 2014:

- Create an environment that will dispel employees' concerns over managing work with child rearing and enable them to work with a vision for the future
- Encourage male employees to participate in child rearing
- Promote understanding regarding managing engaging both work and nursing care

### <Objective Two>

Undertake measures to create enthusiastic and dynamic workplaces

The following measures will commence from April 2014:

- Implement measures to reduce overtime work and encourage employees to take paid holidays
- Conduct initiatives to realize a highly productive and efficient, flexible working style that is not tied to a fixed approach
- Undertake measures to increase mutual understanding and cooperation among employees with diverse backgrounds

### <Objective Three>

Implement measures that foster the development of the next generation

The following measures will commence from April 2014:

- Provide opportunities for children to tour workplaces and so forth
- Provide opportunities for youth to think about what's it like to be a working adult and receive hands-on work experience

## ● Measures for Supporting Efforts to Balance Work and Family Life

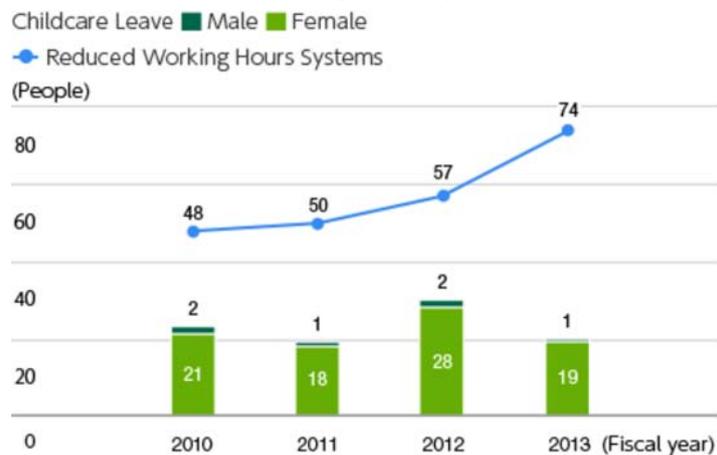
Mitsubishi Rayon has a flexible support system that goes far beyond the legally mandated standards. In addition to childcare leave, we also have a system for shortened working hours for childcare that employees can use up until the end of their child's third year at elementary school, as well as a nursing care leave system that can be used with 60% of the employee's salary. We have worked to promote knowledge and use of these systems, and recently almost 100% of employees who have given birth have taken childcare leave.

These initiatives have been positively evaluated, and in 2010 the Company received the Tokyo Labor Bureau Director's Excellence Award from the Ministry of Health, Labour and Welfare at the Commendations for Equal and Balancing Promotion Companies (Family-Friendly Company category).

The Company aims to create conditions that enable employees to fulfill their family responsibilities while working enthusiastically to reach their full potential. To support those taking childcare leave, the Company conducts three-party consultations (between the individual taking leave, their supervisor and the HR department manager). This aims to maximize alleviation of anxieties about a work-life balance and supports a positive attitude toward returning to work.

In fiscal 2014, we held a "Working Mothers Exchange Meeting" using the lunch hour period. In other initiatives, at the Toyama Production Center, we hosted a "Household Education Course" run by the prefectural government at the center and made other efforts at the workplace-level.

## Use of Childcare Leave and Reduced Working Hours Systems (People)



\* Leave is based on the fiscal year when it was initially taken

\* Shortened working hours are based on the fiscal year when the system was used

### ● Measures for Supporting both Work and Nursing Care

Mitsubishi Rayon has maintained programs to support employees engaging in both work and nursing care, including a nursing care leave system that allows up to a maximum of one year's leave or divided leave, a system of shortened working hours for nursing, and a financial assistance (nursing) system. These programs exceed legal standards by a significant margin

Since 2012, we have partnered with external NPOs to enhance information provision systems, such as a free telephone consultation service, intended to alleviate nursing care-related anxiety and difficulties. Through these efforts, we are striving to ease the mental and physical burdens placed on employees providing nursing care and create an environment that makes it easy to engage in both work and nursing care.

In fiscal 2014, we held seminars on the theme of "managing work and nursing care" which we relayed by live television to all work sites.

### ● Welcome Back Scheme

Mitsubishi Rayon maintains the Back-To-Work Registration Scheme ("Welcome Back Scheme") to give former employees who had left voluntarily the opportunity to return to work with the Company. Registration is open to all former employees who have worked for three consecutive years or longer, regardless of their reason for leaving, including childbirth and nursing.

When recruitment needs arise in the Company, we send recruitment notices to registered employees who suit the position and skills (for up to five years after registration).

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## ■ For a More Enjoyable Working Environment

### ● Respect for Human Rights

The Mitsubishi Rayon Group expresses its fundamental policies on human rights in the Corporate Behavior Charter and Compliance Behavior Standards, and has formulated the Human Rights Enlightenment Policy. The Mitsubishi Rayon Group respects human rights and strives to create fair working environments for employees. In addition, the Mitsubishi Rayon Group is seeking to raise awareness of the need to respect human rights by conducted regular lectures for management-level personnel, as well as giving human rights education lectures in stratified training programs.

With regard to sexual harassment and power harassment, the Company makes it clear to all employees that such behavior is prohibited. All managers are required to take e-learning programs regarding these issues, and in fiscal 2014, all business sites production areas held training for supervisors to prevent power harassment. The Mitsubishi Rayon Group is also raising awareness of

these issues through in-house magazines and various employee training programs.

In addition, the Mitsubishi Rayon Group has set up compliance consultation desks, as well as harassment counseling desks in head offices, branch offices and production centers, and establishes a committee to formulate countermeasures in a bid to develop a system able to rapidly respond to any form of harassment if such a situation were to occur.

#### ● **Diversity Promotion**

Mitsubishi Rayon established the Diversity Promotion Department in April 2015, with the aim of enhancing its organizational strength by recruiting and appointing diverse human resources, regardless of nationality, gender, or the presence of a disability. We will formulate human countermeasures to cope with the globalization of our businesses, and take steps to raise awareness over human rights, encourage active participation by women, and promote the employment of people with disabilities.

#### ● **Promoting Affirmative Action for Women**

To provide a wider scope for participation by women, the Diversity Promotion Department is leading initiatives such as 1) changing the awareness of management, 2) changing the awareness of women themselves, and 3) providing opportunities.

#### ● **Employment of People with Disabilities**

To carry out CSR through our main business, we support people with disabilities in finding work and are expanding our employment opportunities for them. We coordinate with special needs schools and other facilities to proactively provide work experience opportunities, and carefully match jobseekers with workplaces to ensure they settle in to the workplaces.

We will continue aiming to achieve and exceed the statutory employment ratio of people with disabilities through recruitment activities and take steps to establish suitable workplace environments.

#### ● **Reemployment System**

Mitsubishi Rayon Group reemploys workers who have reached retirement age in accordance with the intention of the revised Act on Stabilization of Employment of Elderly Persons. In principle, all employees who wish to continue working, including managers, are eligible for reemployment after the age of retirement based on the conditions specified by the Company. Approximately 80% of employees have used the reemployment system.

Mitsubishi Rayon has established a compensation system based on work style, such as appointing the target management system for those who wish to continue in a similar work style to before their retirement so that they can continue to feel as motivated as ever.

#### ● **Mentoring Program**

In fiscal 2010, Mitsubishi Rayon introduced the Mentoring Program, under which senior employees provide ongoing support and guidance to young employees.

The system aims to provide indirect support for new employees and help them adapt to the work environment, learn new ideas as a member of society and improve their job performance.

#### ● **Support for Resuming Work after Forced Absences Due to Illness and Injury**

It is important to prevent physical and mental illness and injury through lifestyle improvements and everyday care. However, if employees do become ill or injured, it is essential to create an environment that allows them to concentrate on their treatment for the required length of time and then return to work without any problems.

Accordingly, Mitsubishi Rayon has established a work recovery and return support system for

employees who have been away from work due to personal events, injury, or sickness, or on leave. We offer follow-ups to employees in cooperation with occupational physicians while they are undergoing treatment. In addition, we produce a work resumption program for each employee following his or her application to resume work. Based on the program, Mitsubishi Rayon workers can return to work in two stages, which consist of working on a trial basis and shorter working hours upon returning to work. These support initiatives allow employees to return to full-time work smoothly.

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## ■ Health Management

### ● Establishment of a Health and Hygiene Group

The Health and Hygiene Group was established in 2012 to oversee Group-wide activities concerning employee hygiene and health. In cooperation with occupational physicians and occupational health staff members, the Health and Hygiene Group devises activity principles and policies as well as common measures regarding improvement of operating environments and methods, and employee health maintenance and improvement. In addition, internal policies are formulated in accordance with the Industrial Safety and Health Act and other health-related laws to proactively promote measures in such areas as overwork-related health disorder prevention and mental health strategies.

In fiscal 2014, we established standard procedures for the entire Company with regard to determining work categories and guidance categories and post hoc measures, and to industrial physician consultations and health checks to be conducted as measures to prevent overwork.

Looking ahead, the Mitsubishi Rayon Group will expand in stages the scope of its health-related activities to all Group companies, including those located overseas. The Group will strive to create KAITEKI workplaces where all employees can continue working in a safe, secure and healthy manner.

#### Mitsubishi Rayon Group Health Creation Activities Policy

The Mitsubishi Rayon Group will work on behalf of its employees to make them healthy in mind and body. We will aim to be a healthy company where each employee works brightly and cheerfully in good health.

### ● Health Management System

Mitsubishi Rayon has introduced an independent health examination system to help create an environment where employees can work with confidence.

This system keeps electronic records of health check results, making operations more efficiency by advancing the level of management and analysis and automating invitations to at-risk individuals to attend consultations. Since its introduction, the system has made it possible to grasp the health status and trends of employees in fine detail, and the accumulated data is reflected in the Industrial Health Action Plan for the following fiscal year.

## Editorial Policy

The Mitsubishi Rayon Group utilizes its website to enable its many shareholders to understand the Company's initiatives related to corporate social responsibility (CSR) and to enable information to be easily searchable. Contents of the website have been compiled into a book issued in PDF format.

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### ■ Reporting Period

**April 1, 2014 - March 31, 2015**

However, compilation periods of some documents may differ slightly.

- **Date of issue: November 2015**
- **Planned date of next issue: November 2016**

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### ■ Reporting Boundary

The scope covered in the report is Mitsubishi Rayon and domestic and overseas Group companies. Please refer to the Environmental Data page for the scope of data aggregation of Responsible Care Activities regarding environment-related data collected.

## Site map

### › **CSR Top**

#### › **Top Message**

#### ■ **CSR Management**

- › [The MCHC Group's Vision and CSR](#)
- › [The Mitsubishi Rayon Group's CSR](#)
- › [Corporate Governance](#) 
- › [Compliance](#) 
- › [Risk Management](#) 

#### › **Activity Highlights Top**

- › [Activity 12 Our Global Carbon Fiber Business](#)
- › [Activity 11 Strengthen the MMA Monomer Production System](#)
- › [Activity 10 Establish Mitsubishi Rayon Aqua Solutions](#)
- › [Activity 9 Promotion of Fuel Conversion](#)
- › [Activity 8 Global Development of Acrylamide Manufacturing Technology](#)
- › [Activity 7 Spread Use of Skylights Made From Acrylic Resin](#)
- › [Activity 6 Groundwater Membrane Filtration System](#)
- › [Activity 5 Expansion of the Market for Artificial Carbon Dioxide Baths](#)
- › [Activity 4 Next Stage of Development in DNA Chips 《Genopal》](#)
- › [Activity 3 Development of Core-sheath Acetate Fiber 《KIST》](#)
- › [Activity 2 Promoted Spread of Cleansui Long-Term Storage Water](#)
- › [Activity 1 Further Evolved Golf Shafts](#)

#### ■ **Responsible Care Activities (Safety, Environment and Quality)**

- › [Safety, Environment and Quality Assurance Management Structure](#)
- › [Material Balance](#)
- › [Proper Management of Chemical Substances](#)
- › [Preventing Global Warming](#)
- › [Preventing Air Pollution, Water Quality and Soil Pollution](#)
- › [Preserving Water Resources](#)
- › [Waste Reduction](#)
- › [Biodiversity Preservation](#)
- › [Safety and Disaster Prevention Initiatives](#)
- › [Environmental Data and References](#)

#### ■ **With Stakeholders**

- › [Relationships with Local Communities](#)
- › [Relationships with Customers / Product Safety](#)
- › [Relationships with Suppliers](#)
- › [Relationships with Employees](#)

#### › **Editorial Policy**

#### › **Previous Issues of CSR Report**

## Previous Issues of CSR Report

### ■ KAITEKI Report 2015

The Mitsubishi Chemical Holdings report can be accessed here.

[KAITEKI Report 2015](#) 

### ■ Mitsubishi Rayon Group CSR Report

From fiscal 2011, the method of reporting on CSR initiatives changed from a printed format to a website.

[2015 Report]

Reporting period: April 1, 2014-March 31, 2015

However, some reported examples may contain content from after April 1, 2015.

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[2015 Report](#)  (PDF 4.15 MB)

\* Please be aware that the file may take some time to open due to the large file size.

### ■ Previous Issues

#### ■ 2014 Report

Reporting period: April 1, 2013-March 31, 2014

However, some reported examples may contain content from after April 1, 2014.

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[2014 Report](#)  (PDF 2.77 MB)

#### ■ 2013 Report

Reporting period: April 1, 2012-March 31, 2013

However, some reported examples may contain content from after April 1, 2013.

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[2013 Report](#)  (PDF: 6.02 MB)

#### ■ 2012 Report

Reporting period: April 1, 2011-March 31, 2012

However, some reported examples may contain content from after April 1, 2012.

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[2012 Report](#)  (PDF: 4.40 MB)

■ Previous Reports from 2011 and Earlier



[2011 Report](#)



(PDF: 3.46 MB)



[2010 Report](#)



(PDF: 4.36 MB)



[2009 Report](#)



(PDF: 3.79 MB)



[2008 Report](#)



(PDF: 7.10 MB)



[2007 Report](#)



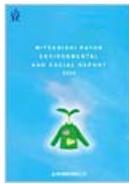
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[2006 Report](#)



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[2005 Report](#)



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[2004 Report](#)



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[2003 Report](#)



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[2002 Report](#)



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[2001 Report](#)



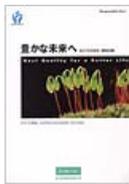
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[2000 Report](#)



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[1999 Report](#)



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[1998 Report](#)



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