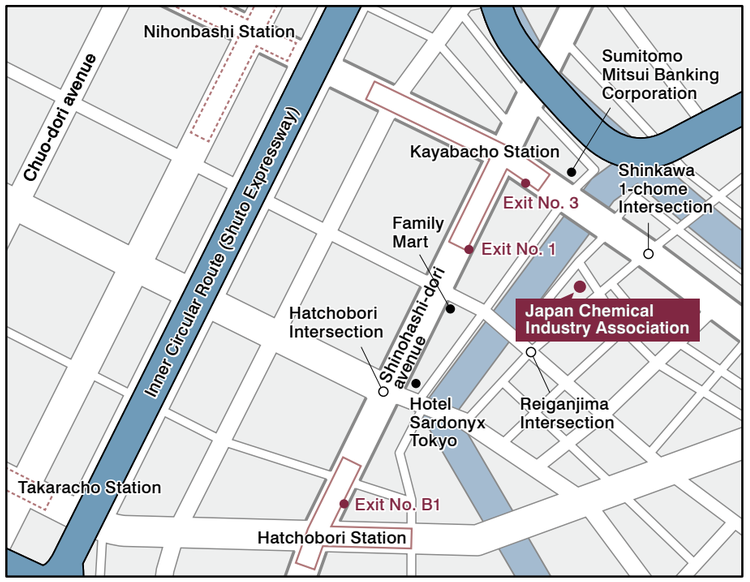

Access

Kayabacho Station (Tokyo Metro Hibiya and Tozai Lines)
Walk straight ahead from Exit No. 3 and turn right
at the Shinkawa 1-chome Intersection.
Approximately 3 minutes on foot

Kayabacho Station (Tokyo Metro Hibiya Line)
Walk straight ahead from Exit No 1,
turn left at the intersection with a Family Mart store,
and then turn left at the Reiganjima Intersection.
Approximately 3 minutes on foot

Hatchobori Station (JR Keiyo Line)
Approximately 8 minutes on foot from Exit No. B1

Contacts

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Labor Department
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FAX 03-3297-2615

Technical Affairs Department
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FAX 03-3297-2604

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JCIA Annual Report 2013

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1-4-1 Shinkawa, Chuo-ku, Tokyo 104-0033

[JCIA URL]
http://www.nikkakyo.org/

QR Code

14.04.UC200

JCIA Annual Report 2013

Japan Chemical Industry Association

Chemistry Builds the Earth's Future

Humankind has developed civilizations and achieved ever greater affluence through the control of chemical reactions by its own power. That is the role of the chemical industry. It is our duty to pass the history of life, extending back over four billion years, onto the next generation, and the pursuit of sustainable growth, emphasizing social responsibility, coexistence, and co-prosperity, is an important issue for our industry.

The chemical industry has made a huge contribution to society by widely supplying, through the concept of Responsible Care (RC), products and technologies to improve people's affluent lifestyles, reduce CO_2 emissions, purify industrial wastewater, and so on. In accordance with the basic principle of RC, the chemical industry is committed to contributing to the Earth's future by fulfilling its role as a solution provider for the realization of sustainable growth.

＊ This report outlines the activities of the Japanese chemical industry and the Japan Chemical Industry Association (JCIA) in support of people's lives and with the aim of achieving sustainable growth.
For details about Responsible Care (RC), please see page 17.

JCIA Activities

- ▶ Safety and environment
- ▶ Technology and human resources
- ▶ Messages to society

Aim of the JCIA
Sustainable Growth

CONTENTS

Special Feature

Chemistry Has Supported the Times

—Chronology of Chemical Technology Continuing into the Future—

The relationship between humankind and chemistry began in ancient times. Ancient people used what is known today as chemical technology to extract iron, copper, gold, and so on from minerals and make alloys by mixing zinc and tin with iron and copper. While assisting the development of civilization, these techniques also gave rise to alchemists trying to make a quick fortune. Just as alloys could be made, people dreamed that they might be able to make gold, and for two millennia alchemists repeated a process of trial and error.

In the eighteenth century people emerged who observed the properties of matter and their changes and tried to confirm their findings through experiments. Subsequently, people attempted to give scientific explanations of matter and chemical phenomena. The history of modern chemistry had begun.

In Japan, the successive industrialization of chemical products made progress in the twentieth century.

Beginning of aluminum smelting
1934
Beginning of aluminum smelting
(Nihon Iodine K.K.; now Showa Denko K.K.)
Succeeded in Japan's first production of domestic metal aluminum using alum stone

Beginning of synthetic fiber
1916
Japan's first industrialization of viscose rayon
(Azuma Kogyo Yonezawa Artificial Silk Factory; now Teijin Ltd.)
1950
World's first integrated production of vinylon
(Kurashiki Rayon Co., Ltd.; now Kuraray Co., Ltd.)
1950
Beginning of nylon fabric manufacture
(Toyo Rayon Co., Ltd.; now Toray Industries, Inc.)

Petrochemical complex
1958
Opening of Japan's first petrochemical complex
(Mitsui Petrochemical Industries, Ltd.;
now Mitsui Chemicals, Inc.)
Begins the domestic production of
petrochemical products, such as polyethylene

The domestic production of petrochemical products
1957
Opening of Japan's first petrochemical complex (Maruzen Petrochemical Co.,Ltd.)
Begins the domestic production of
2-Butanol and methyl ethyl ketone (MEK)

Chemical technologies that built today's world

Beginning of synthetic rubber
1960
Japan's first general-purpose synthetic rubber manufacturing facility
(Japan Synthetic Rubber Co., Ltd.; now JSR Corporation)
Manufactures butadiene, SBR, and other products

Industrialization of chemical fertilizer
1935
Start of manufacture of ammonium sulfate
(Toyo Koatsu Industries, Inc.; now Mitsui Chemicals, Inc.)

Beginning of coal chemistry
1912
Koppers coke oven
(Mitsui Kozan K.K. Miike Dye Factory;
now Mitsui Chemicals, Inc.)
Began the retrieval of gas and coal tar discharged in the process of manufacturing coke from coal and the manufacture of various chemical products

Beginning of synthetic resin
1940
Industrialization of polyvinyl chloride with production scale of 1.5 tons/day
(Nippon Chisso Hiryo K.K.; now JNC Corporation)

Beginning of Modern Chemistry

Synthesis of organic matter

Modern times began with the awakening of people's rational intellect. The method of modern science became one of establishing theories on the basis of the results of careful observations and experiments. This method was taken up in the world of chemistry as well, and a group of people under Antoine-Laurent de Lavoisier caused a fresh breeze to blow in eighteenth-century Europe. Thanks to them, chemistry was released from the shackles of alchemy and set out on a new history.

Familiar chemical products began to appear in this period

TOPICS

- **Discovery of oxygen from combustion experiments**
  ⇒ Identification of the existence of 33 basic elements, such as nitrogen, hydrogen, sulfur, and carbon
- **Successful industrialization of sodium carbonate (soda)**
  ⇒ Makes possible the mass production of textile products
- **Successful artificial synthesis of urea**
  ⇒ Can make organic substances from inorganic substances

Development of Coal Chemistry

Synthetic resin/synthetic rubber/synthetic detergent

The main actor in the first industrial revolution, which fostered the early-period chemical industry, was coal.
The so-called coal chemical industry, which used coal as its raw material, witnessed tremendous development from the mid-nineteenth century following the success of synthetic dyes.
Plastics made an early appearance as well. Various products shifted from natural to synthetic, and chemical technology became an important foundation supporting modern life.

Basic materials supporting daily life began to appear following the development of chemical synthetics

TOPICS

- **Synthetic dye created from coal tar**
- **Chemical structure of benzene clarified**
- **First synthetic resin (phenolic plastic, or bakelite) created**
- **Overcoming famine by making fertilizer from water and air (ammonia)**
- **Digestive enzyme and adrenal hormone extracted**
  ⇒ Enables application in medical drugs (digestive medicine)

Development of Petrochemical Industry

Plastics/synthetic fiber

In the second industrial revolution, which advanced in the twentieth century, the main actor as the source of energy shifted from coal to petroleum. Petroleum had immense value for chemistry.
As a consequence of the development of high polymer chemistry, many new materials were created from petroleum, beginning with synthetic fiber and plastics. Today petrochemistry still accounts for the main part of the chemical industry.

Mass production becomes possible, increasing the convenience of daily life

TOPICS

- **Innovations in oil refining technology**
  ⇒ Becomes possible to extract double the amount of gasoline
- **Successful synthesis of speedy drug to remedy syphilis**
- **Discovery that the umami flavor of kelp is produced by glutamic acid**
- **Clarification of full picture of high polymer compounds**
  ⇒ Enables the synthesis of nylon, polyethylene, and polypropylene
- **Toward Japan's first full-fledged mass production of synthetic fiber (vinylon)**

Successful development of desulfurization equipment

Pollution and impact on ecosystem: Atmospheric pollution, soil pollution, depletion of the ozone layer, global warming, etc.

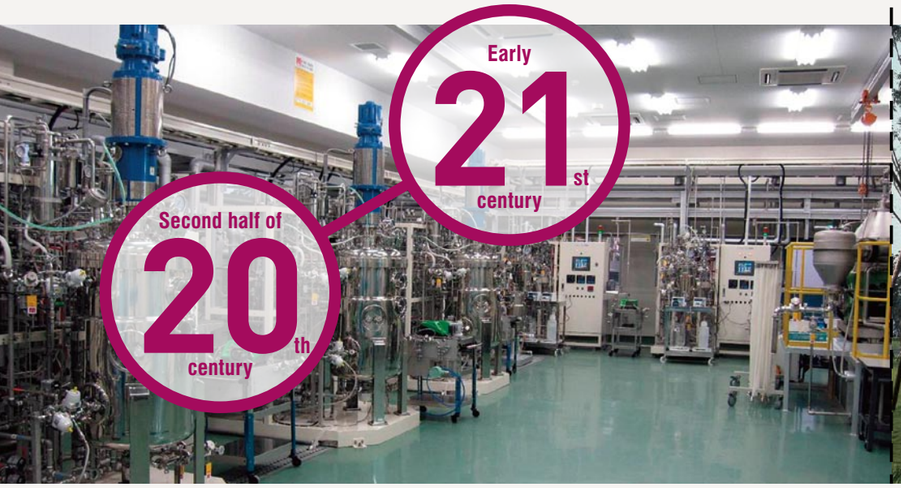
Exhaustion of resources: Consumption of fossil fuels

As well as developing civilization and improving affluence, chemistry created a negative legacy in the form of pollution, accidents, its impact on the ecosystem, the exhaustion of resources, and an adverse impact on people's health. However, it was also from chemistry that the technologies for solving these issues emerged.

Era of New Chemicals

Toward an era of biochemicals and green chemicals

The development of science and technology since the second half of the twentieth century has been truly spectacular.
The characteristic of modern high-tech industries is that all branches of science are cooperating with one another. Among them, chemistry in particular has a close relationship with various fields, including electronics, biotechnology, and new material development.
A brilliant and creative era, appropriately called the era of “new chemicals,” has begun.



Toward the Future

A new chemistry is beginning to grow toward the development of new materials to support affluent lifestyles,
including the creation of a long-term sustainable global environment;
the realization of safe, secure, and healthy long lives;
and the sustainable and stable supply of energy.

Contribution through Chemistry

The world is faced with the huge problem of meeting the needs of a growing population using increasingly scarce resources and without damaging our shared environment, health, and safety. Through the development of new and innovative products and more efficient technologies, the chemical industry is playing an important role in tackling these issues.
Specifically, it is expected that the chemical industry will contribute to such factors as the pursuit of sustainable growth, the securing of product safety and product stewardship (PS*), the minimization of the risk of chemical substances, the improvement of energy efficiency and realization of renewable energy, the promotion of innovation and technological progress, and economic development.

Development of new materials leads to essential components for high-tech industries

TOPICS

- **Successful recombination of DNA in test tube**
  ⇒ Industrialization of human insulin, growth hormones, interferon
- **Successful development of instant adhesive for use in surgical operations**
- **Successful development of carbon fiber, a dream material that is “stronger than steel, lighter than aluminum”**
- **Becomes possible to commercialize such products as metals like glass, alloys with memory, ultra-heat-resistant alloys, and ultra-moldable alloys**
  ⇒ Used for space shuttle, aircraft engines, fuel tanks, etc.

Development of alternative CFCs

Establishment of the International Council of Chemical Associations (ICCA*)

Beginning of responsible care (RC) activities

Becoming an industry that contributes to sustainable growth

TOPICS

Reducing CO_2 with bioplastics

Use of CO_2 as a resource
⇒ Successful synthesis of polycarbonate plastic using CO_2, a major cause of global warming

Bioenvironmental purification
⇒ Establishment of bioremediation technology using microbes to break down harmful substances in the soil, such as PCB

Successful development of catalyst to reduce the environmental load
⇒ Successful development of new catalyst to prevent the generation of unnecessary byproducts in the synthesis process of caprolactam (the raw material of Nylon 6)

- **Successful development of an erasable printing ink that can be simply erased even after printing, thereby enabling reuse of the paper**

Photovoltaic cells **Fuel cells** **Storage batteries**

Potential of the Chemical Industry

The powerful chemical industry has contributed to the development and improvement of our society and lives, from the development of the electronics field, as symbolized by computers, to the extension of people’s longevity. From now on also, as in the past, the chemical industry will continue to make efforts to build a sustainable future for our planet toward the realization of people’s hopes and dreams.

Social Contributions of the Chemical Industry

As one of the key industries, the chemical industry contributes to society by supplying raw materials, synthetic materials, and so on to various industries. Here, as examples, we introduce the chemical industry's specific contributions to the automobile and medical device industries, which play an integral part in our daily lives.

In the case of the auto industry, the chemical industry has greatly contributed to improving the fuel efficiency and basic performance of automobiles by making numerous parts lighter. In the case of the medical device industry, the chemical industry supports the improvement of patients' quality of life through the use of various materials.

Contribution of the chemical industry

For example, with respect to automobiles and medical equipments...

Automobiles

Interior parts and bumpers

Lighter weight has been realized through the use of light polypropylene foam in interior door-trims and urethane material in bumpers.

Lighter weight

Plastic Fuel Tank

Since it has outstanding freedom of shape, this polyethylene multitier fuel tank is about 20% lighter than conventional steel tanks and also has improved corrosion resistance.

Lighter weight, better corrosion resistance

Exhaust gas purification catalyst

By chemical reaction, this catalyst neutralizes the harmful substances in exhaust gas. Since the honeycomb structure has a small volume yet wide area, it displays outstanding exhaust gas purification performance.

Neutralization

Fuel efficient tire

The fuel efficient tire contributes to reduce the fuel consumption of automobiles by reducing rolling resistance. In view of the demand for a compatibility with maintaining grip, the tire uses rubber chemicals and various other chemical materials.

Reduction of fuel consumption

Medical equipments

Surgical suture

This suture is made from biodegradable plastics, such as polyglycolic acid. After an operation, it turns into carbon dioxide and water and is excreted from the body.

Reduced burden on patient

Dialyzer

This dialyzer used in dialysis treatment uses a hollow-fiber filter made from chemical fiber. It removes waste that has accumulated in the blood.

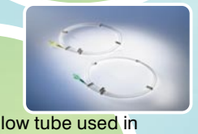
Removal of waste

Dental adhesive

This dental adhesive is used for such purposes as bonding fillings and caps on teeth and fixing loose teeth. The powerful adhesive is safe for the human body, fits perfectly on the tooth, and does not detach.

Safe and strong material

Catheter



This catheter, a hollow tube used in medical treatment, is made from silicon and other materials. In an operation, it is inserted into a blood vessel to treat the affected part.

Insertion into diseased area

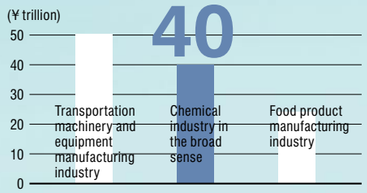
Cooperation: Japan Auto Parts Industries Association, FTS Co., Ltd., Japan Polyethylene Corporation

Cooperation: Japan Federation of Medical Devices Associations, Japan Dental Trade Association, Asahi Kasei Medical Co., Ltd., Kaneka Corporation

Outline of Japan's Chemical Industry

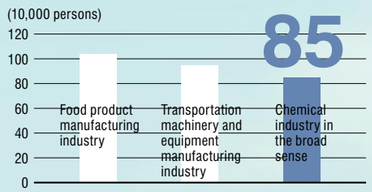
Japan's chemical industry seen in graphs

Shipment Value (2011)



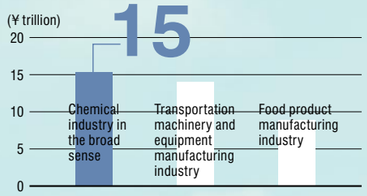
Source: Ministry of Internal Affairs and Communications and Ministry of Economy, Trade, and Industry, FY 2012 Economic Census: Activity Survey

No. of Employees (2011)



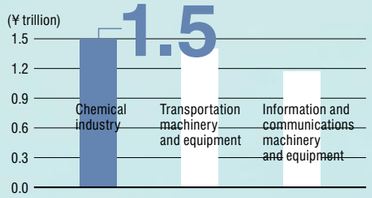
Source: Ministry of Internal Affairs and Communications and Ministry of Economy, Trade, and Industry, FY 2012 Economic Census: Activity Survey

Added Value (2011)



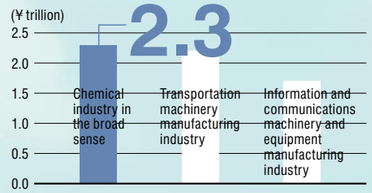
Source: Ministry of Internal Affairs and Communications and Ministry of Economy, Trade, and Industry, FY 2012 Economic Census: Activity Survey

Capital Investment (FY 2011)



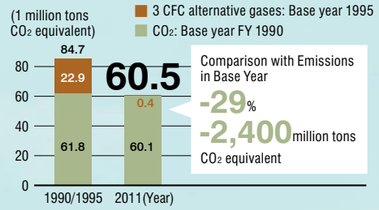
Source: Ministry of Finance, Survey of Corporate Statistics by Year

Research Expenditure (FY 2011)



Source: Ministry of Internal Affairs and Communications, Survey of Science and Technology Research

Achievement in Reduction of Greenhouse Gas Emissions Through the Chemical Industry's Voluntary Action Plans



Source: Japan Chemical Industry Association

Profile of the Japan Chemical Industry Association

Name: Japan Chemical Industry Association (JCIA)
Established:
April 1948: Establishment of the Japan Chemical Industry Association
June 1991: Status change to incorporated association
April 2011: Status change to general incorporated association

Objective: The objective of the JCIA is to realize the sound development of the chemical industry by conducting surveys and research on production, distribution, consumption, etc. relating to the chemical industry, conducting surveys and research on issues involving technology, labor, the environment, safety, etc. relating to the chemical industry, and planning and promoting countermeasures, thereby contributing to the prosperity of the Japanese economy and the improvement of national life.
Business content: The JCIA conducts the following activities relating to the chemical industry:
(1) Surveys and research on production, distribution, consumption, etc.
(2) Surveys and research on issues involving technology, labor, the environment, the safety of chemical products, etc. and the planning and promotion of countermeasures
(3) Awards for outstanding technological development achievements, safety results, etc.
(4) Collection and supply of information, exchange and cooperation with related organizations in Japan and overseas
(5) Dissemination and education, holding of study groups, seminars, etc.
(6) Other activities necessary to achieve the objective of the JCIA
Business year: April 1 to March 31 in the following year

Message from the Chairman

As a global citizen, the chemical industry contributes to the building of a sustainable society

Behind-the-scenes support for social development

Throughout its history, the Japanese chemical industry has provided behind-the-scenes support for social development. Immediately after the end of World War II, when Japan was struggling to pick itself up from ruins, the chemical industry contributed immensely to solving the issue of securing food as a first step toward reconstruction by increasing fertilizer production. After that, the industry contributed to the development of society by mass producing and cheaply supplying high-quality materials for products and cutting-edge industries representative of the times: in the period of rapid economic growth in the 1960s, the so-called three sacred treasures of television, refrigerator, and washing machine, then automobiles, and now information technology equipment.

In order to create products for specific needs, it is essential to have materials that give shape and functionality to ideas. As an essential supplier industry, creating materials that are built into products, the chemical industry has constantly innovated to develop and manufacture new materials required by the times.

On the flip side, together with social development, it is also a fact that the negative aspects of the chemical industry have become apparent. In response to these issues, rather than going on the defensive, the chemical industry is aggressively adopting problem-solving measures.

Recognizing issues and finding solutions

Among its various activities, the JCIA proposes guidelines to solve industry-wide issues that are difficult to tackle at the individual company level, expedites industrial policy, and promotes the formulation of international standards. Unfortunately, in recent years there has been a spate of serious accidents at chemical plants in Japan. We have thoroughly investigated these serious accidents together with the closely related Japan Petrochemical Industry Association, Japan Dyestuff and Industrial Chemicals Association, and Petroleum Association of Japan and, with the cooperation of experts, compiled the Safety and Accident Prevention Guidelines (first edition). From now on we will rotate the accident-prevention PDCA (plan, do, check, act) cycle, requesting member companies to carry out self-checks based on these guidelines and submit the results back to us so that we can further revise the guidelines.

We also believe that the chemical industry has a major role to play in tackling chemicals management and global environmental problems. Moves to find specific solutions through frank discussions among the top management of chemical companies around the world are gaining momentum as well. The JCIA participates in the International Council of Chemical Associations (ICCA) as the representative of Japan and, as a core member, serves as chair of the committee on climate change and energy, promoting the formulation of new standards to evaluate the contribution of chemical products to society.

Establishing the chemical industry's full citizenship

When I was appointed chairman of the JCIA last year, I advocated the goal of establishing full citizenship for the chemical industry. Sixteen Japanese have been awarded Nobel prizes in the field of natural sciences, such as chemistry and physics. Furthermore, the share of R&D is very high in the chemical industry, which is the only industry bearing an academic name. There are still countless issues that must be solved in order to achieve the sustainable development of society in the future. The Japanese chemical industry will contribute to other industries by creating valuable technologies and products. For that purpose, we ourselves must understand the role of the chemical industry, offer solutions in collaboration with academia and the government, and actively publicize our achievements so that recognition of the Japanese chemical industry as an important citizen permeates throughout society.

Even more than before, the chemical industry must fulfill an important role as a global citizen and a provider of solutions for a sustainable society.

September 2013

Chairman of the Japan
Chemical Industry Association

The JCIA's Governance and Internal Control

Responding to social expectations and issues and proposing concrete solutions as a fair organization

In 2011 the JCIA became a general incorporated association. This status change was extremely important for us, as it meant that we had become an organization able to make decisions for the chemical industry even more precisely than before. In order for the JCIA to function effectively, it is essential for us to clearly identify the expectations of society and our own issues and to tackle them unanimously and with a common awareness. This is the premise on which we operate our organization through governance and internal control.

First of all, regarding governance, we revised the content of our articles of incorporation to guarantee more objectivity and transparency and at the same time clarified them to enable top-down management to function. The Board of Directors, which meets once every three months, brings together five standing directors and 15 non-standing directors and makes decisions concerning the industry. The non-standing directors in particular serve as the chairpersons and presidents of leading chemical companies, so decisions by the board are decisions not only of the JCIA but of the industry as a whole.

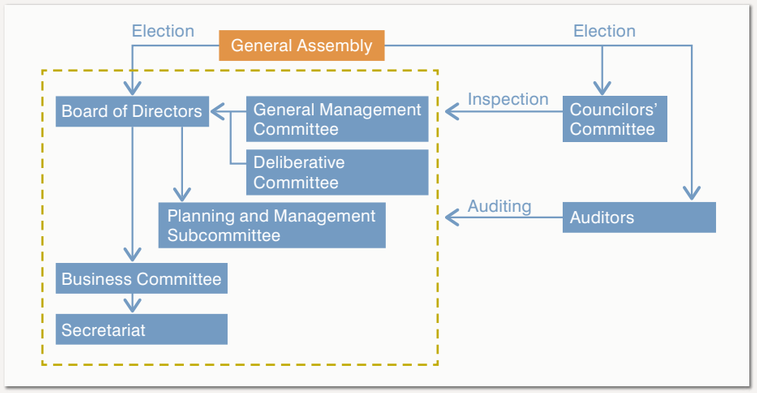
Furthermore, the everyday activities of the JCIA are carried out by committees on such matters as safety, health and environment and chemicals management and by various departments of JCIA. In order to reflect the information surfacing from these committees and departments in decisions, emphasis is placed on frequent bottom-up and top-down exchanges.

Regarding internal control, so as to build relations in which work is transparent, all rules are decided in coordination with other departments and business is performed in accordance with rules. The JCIA stipulates rules of compliance and a code of ethics and endeavors to raise awareness of them through staff training and other activities. By thoroughly abiding by these rules, we believe that the JCIA also will be able to respond to crises and unexpected situations, and relay information quickly and appropriately. By combining the "hard" element of rules and the "soft" element of communication, the JCIA facilitates smooth operation of the organization.

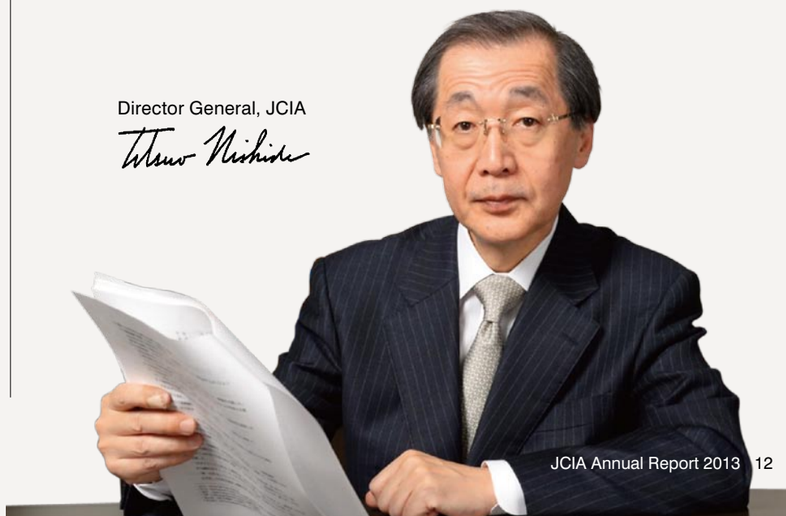
Furthermore, for an industrial body like the JCIA, it is especially important to be fair. Accordingly, we have compiled the Antimonopoly Act Guidelines, to which all members declare allegiance at the beginning of board and committee meetings.

The JCIA is now undergoing a major change. As an association representing the chemical industry, we believe that the JCIA must strengthen its response to demands from society. Domestically, we are actively taking up and replying to issues relating to chemicals management, safety and disaster prevention, health problems, and other negative aspects of chemicals. And overseas as well, we are beginning to assert our presence as the representative of Japan's chemical industry and address such global issues as energy and global environmental problems, as well as contributing to system building in developing countries. We will offer concrete responses to each and every issue of concern so that the Japanese chemical industry gains the trust of Japanese and international society.

JCIA Governance System



Director General, JCIA



CLOSE UP 2012

The JCIA's Safety and Disaster-Prevention Efforts

Safety and disaster prevention are the basic physical strength of a chemical plant
Supporting safety and disaster prevention as a means of enhancing pride and confidence in the workplace

This assistance ranges from utilization of the Safety and Accident-Prevention Guidelines to the sharing of best practices and development of human resources. The following is an introduction to the JCIA's efforts to prevent the reoccurrence of serious accidents.

Yutaka Haruyama
Executive Director and General Manager,
Environment and Safety Department, JCIA

Identification of common points and issues in accidents and compilation of the Safety and Accident-Prevention Guidelines

Safety and disaster prevention are most important issues for the chemical industry, but unfortunately several serious accidents have occurred at chemical plants over the past couple of years. As a specific effort to prevent the reoccurrence of serious accidents, the JCIA has compiled the Safety and Accident-Prevention Guidelines.

In the compilation of these guidelines, we placed emphasis on identifying the common points in serious accidents, visualizing them as common issues for chemical plants, and encouraging their use for the improvement of workplaces and organizations. As a result of the joint analysis of accidents by a group of chemical industry experts, including scholars, the Japan Petrochemical Industry Association, the Japan Dyestuff and Industrial Chemicals Association, and the Petroleum Association of Japan, we identified three common factors. First, the triggers for accidents lie in errors of judgment in unsteady work and failure to spot abnormal signs. Second, special abnormal reactions are a problem in chemical plants. And third, there are delays in spotting the outbreak of abnormal reactions, and plants have inadequate tools for spotting them. We then compiled the guidelines emphasizing that these three factors are vital points that absolutely cannot be overlooked in the prevention of serious accidents.

The recent serious accidents have occurred in large plants, but by identifying the common points from a broad perspective, we hope that small and medium-sized plants will realize that accidents could occur at their facilities as well.

Deepening of on-site communication and organizational improvement

In this project, we placed importance not on simply compiling the guidelines themselves but on getting them used in the workplace. As a means of achieving this purpose, we adopted a questionnaire format. There are a variety of people working in plants in their respective positions, including operators, production engineers, equipment management engineers, managerial staff, and environment and safety personnel, who provide objective support for the site. Safety and disaster prevention involve all of these people, so it is essential to establish a setup in which they can mutually cooperate. The questions in the guidelines are not only directed at the production site. They are geared toward stimulating discussions, so that even if production site workers reply "Yes, we're okay there," staff in charge of environment and safety or production technology will ask things like "Specifically, how far does this go? Have you had enough training?"

We want the guidelines to be used not only by the production site but by the organization as a whole. In our analysis of accidents, we emphasized not just the identification of specific causes but also the clarification of background factors. As a result, it became evident to us that the causes of accidents lay more in organizational problems than in individual errors of judgment. Safety and disaster-prevention arrangements should not rely on individual judgment but should be established on an organizational level. If something is lacking in an organization, the seeds of an accident are sown. And if nobody notices, the seeds will grow, and eventually an accident will occur. However, it is possible to prevent accidents from occurring if production site staff and managers deepen their communication and make efforts together. I hope that by using the guidelines, people will notice ways of improving their organizations.

In April 2013 we issued the first edition of the guidelines. We did not simply publish them but also held an explanation meeting to encourage their use. And we deliberately called it the first edition because we want to get feedback on the use of the guidelines so that the content can be further improved and upgraded.

Sharing best practices and developing human resources

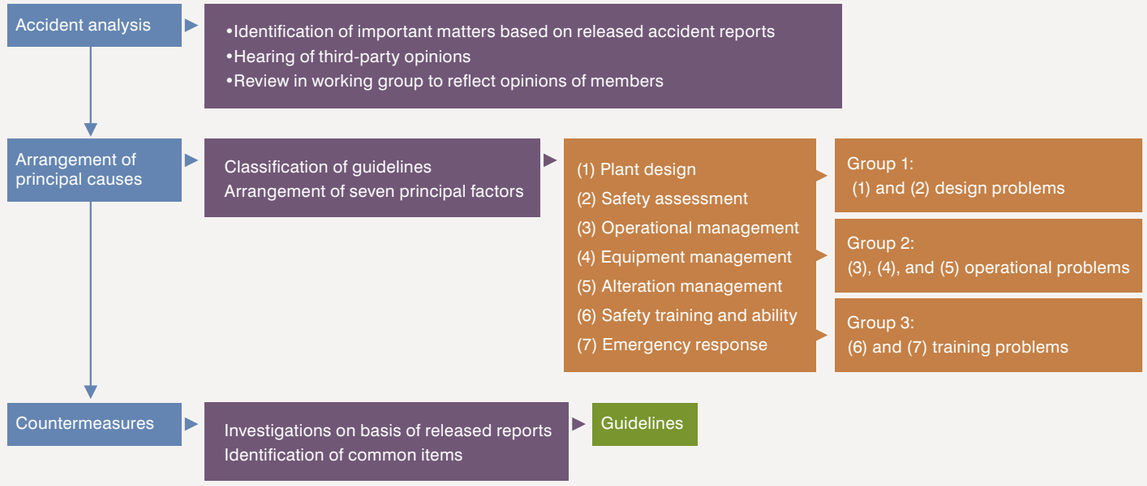
In September the JCIA, which has been presenting safety awards to accident- and disaster-free plants for 37 years, collected and issued a collection of best practices. The guidelines were born from a negative legacy of our industry, namely, accidents, but we also hope to raise the level of safety and disaster prevention by sharing the commendable activities of production sites throughout the chemical industry as a whole and expanding this positive aspect.

In addition, the JCIA is also considering support measures for the people who actually operate production sites. In the chemical industry, each company implements safety education. However, if they could make joint use of top-class educational facilities and curriculums, the safety and disaster-prevention level of the entire industry would be raised. Therefore, we are in the process of considering how to bring together facilities in the industry that could be widely used in human resource development and make them available to the whole industry. We also believe that it is the JCIA's job to make requests to governmental agencies regarding this matter.

Pride and confidence in safety and disaster prevention

Safety and disaster prevention are most important issues for the chemical industry. Why? Using the human body as an example, accidents are like illnesses or injuries, and safety and disaster prevention can be called the basic physical strength necessary for taking the next action. If the basic physical strength is lacking, the plant will not gain the trust or cooperation of the local community and society. Safety and disaster-prevention activities, the foundation stones of production, are essential in order to create and continue creating new things. From now on also, the JCIA will continue to assist these activities, which are supported by production sites, so that every individual at the product site can feel pride and confidence in the plant's safety and disaster prevention.

Procedure for Compilation of Safety and Accident-Prevention Guidelines



Safety and Accident-Prevention Guidelines Explanation Meeting

FY 2012 Achievements and FY 2013 Activity Plan

Summary of Activities

In accordance with its objectives of realizing the sound development of the chemical industry and thereby contributing to the prosperity of the Japanese economy and improvement of people's lives, the JCIA promotes activities focusing on dissemination of the Responsible Care (RC) initiative and the achievement of goals stipulated by theme in three activity areas.

Purpose	FY 2012 activity plan	FY 2012 achievements	Page with report	FY 2013 activity plan	Principal promoting body
Dissemination of RC activities	◎ Further promotion of RC activities	○ Realized full integration of the Japan Responsible Care Council and the JCIA ○ Communicated with communities through town hall meetings etc. and shared best practices through member exchange meetings	P17	◎ Continuous improvement of RC activities and promotion of social recognition	Responsible Care Committee
Safety and environment					
Efforts concerning safety and disaster prevention, industrial safety and health, and environmental issues	◎ Promotion of safety and accident-prevention measures ◎ Promotion of efforts to address environmental and safety problems	○ Established the Safety and Accident Prevention Study Working Group ・Issued the Safety and Accident Prevention Guidelines (First Edition) ○ Responded to the Industrial Safety and Health Act, etc. ○ Coordinated the reduction of industrial waste and reduction of chemical substance discharges	P13	◎ Promotion of safety and accident-prevention measures ・Promotion of use of the Safety and Accident Prevention Guidelines (First Edition) through explanatory meetings, questionnaires, etc. ◎ Promotion of efforts to address environmental and safety problems	Environment and Safety Committee
Efforts on prevention of global warming and dissemination of cLCA*	◎ Further promotion of global warming countermeasures	○ Followed up on the Voluntary Action Plan on the Environment and prepared for participation in the Action Plan on a Low Carbon Society ○ Dissemination of the cLCA methodology ・Issued second edition of case studies ・Received the Life Cycle Assessment Society of Japan's Award of the Director General of the Industrial Science and Technology Policy and Environment Bureau, Ministry of Economy, Trade, and Industry	P18 P19 P20 P23	◎ Calculation, analysis, and summary of achievements in the final year (FY 2012) of the Voluntary Action Plan on the Environment ◎ Launching of Keidanren's Commitment to a Low Carbon Society activities ◎ Publication of cLCA global guidelines	Technical Affairs Committee
Chemical product management	◎ Enhancement of efforts to address domestic and overseas chemical product management problems and communication to members	○ Promoted risk management* activities throughout the chemical product supply chain ・JIPS* activities achieved the targeted results ・Enhanced assistance to members, especially for compliance with regulations in Asian countries		◎ Enhancement of efforts to address domestic and overseas chemical product management problems and communication to members ・Enhancement of assistance for members' chemical product management work and further strengthening and expansion of the industry's voluntary contributions	Chemicals Management Committee
Technology and human resource development					
Human resource development, chemical education, and enlightenment	◎ Development of Human Resources Fostering Program in Chemistry ◎ Continuation and expanded support of the "Chemistry Makes Our Dreams Come True"* project ◎ Chemical Risk Forum	○ Held research plan presentation meetings for doctor's course students ○ Held the first student-company exchange meeting with the participation of doctor's course students and companies ○ Continued campaigns targeting young people who will play leading roles in the next generation ・New approaches by holding chemical experiment classrooms and seminars for teachers in the regions ○ Fostering of personnel capable of handing chemical substance risk assessment*	P21 P22	◎ Development of Human Resources Fostering Program in Chemistry ・Support for internships, holding of research presentation meetings, introduction of examples of doctoral activities, holding of student-company exchange meetings, etc. ・Follow-up of supported-major graduates ◎ Continuation and expansion of the "Chemistry Makes Our Dreams Come True" project ・Continuation of the ongoing project and expansion of chemical experiment classrooms and seminars for teachers in the regions ◎ Expansion of the Chemical Risk Forum	Labor Committee Council of Human Resources Fostering Program in Chemistry Public Relations Committee
Research support	◎ Research support through the LRI*	○ Launch of "New LRI" ○ Held 1st JCIA New LRI Research Report Meeting and Symposium on "Future Issues in Risk Assessment of Nanomaterials"		◎ Consolidation and strengthening of the New LRI's organizational operation and proper management of commissioned research ◎ Effective communication of research policies and plans, the state of activities, and research results	Chemicals Management Committee
Messages to society					
Public relations activities	◎ Strengthening PR and public hearing activities	○ Implemented PR activities to enhance the presence and social credibility of the chemical industry with the aim of establishing "full citizenship" for the chemical industry	P23 P24	◎ Establishment and permeation of the chemical industry's "full citizenship" through strengthened PR and public hearing activities	Public Relations Committee
International activities	◎ Efforts to address international commercial issues ◎ Supporting for Japanese corporations operating overseas	○ Issued proposals from the chemical industry regarding economic partnership agreement (EPA) and free trade agreement (FTA) negotiations ○ Promoted international exchange with related organizations in Asian nations and strengthened ties with Japanese corporations operating overseas ○ Participated in and supported ICCA activities		◎ Efforts to address international commercial issues ◎ Support for Japanese corporations operating overseas	International Activities Committee
Tax system lobbying	◎ Opinion reports on moves by the government to revise the tax system	○ Demanded and lobbied for the realization of tax reform with the aim of putting Japan's business environment on an equal footing with that in other countries ・Drastic revision of the tax for Climate Change Mitigation, expansion of the tax scheme to promote R&D, etc.		◎ Demands and proposals on tax reform, deregulation, subsidies, etc. in response to moves by the government to compile a growth strategy	Economy and Tax System Committee

Responsible Care (RC)

What is Responsible Care?

The chemical industry is committed to the safe, responsible, and sustainable management of chemical substances by all companies handling chemical substances in every process, from the development, manufacture, transportation, and use of chemical substances to disposal and recycling after final consumption. Responsible Care means voluntarily ensuring environmental, safety, and health standards, publishing the results of activities, and engaging in dialogue and communication with society in order to realize this commitment.

The guiding principles of Responsible Care

The Responsible Care Global Charter stipulates the guiding principles set by the International Council of Chemical Associations (ICCA) for the development of the Responsible Care Initiative. Member companies conduct activities on the basis of this charter.

Implementation of Responsible Care (commitment to better safety, environment, and health)

Together with member companies, the RC Committee makes efforts to achieve the following five goals.
It also promotes **communication with society** by publishing the results of activities.

Environmental protection

We shall protect peoples' health and nature around the world.

Safety and disaster prevention

We shall endeavor to prevent industrial accidents and adopt measures against natural disasters.

Industrial safety and health

We shall protect the safety and health of working people.

Chemicals and product safety

We shall clarify the properties and handling procedures of chemical products and protect the safety, health, and environment of all handlers, including customers.

Distribution safety

We shall endeavor to prevent accidents and disasters in distribution.

FY 2012 Topic

In fiscal 2012 the JCIA positioned Responsible Care as a priority issue, going ahead with the full integration of the Japan Responsible Care Council and the JCIA and strengthening PS/GPS*. In addition, through its activities as the chair association of APRO*, the JCIA continued its efforts to disseminate RC activities in Asian countries in cooperation with the ICCA's Responsible Care Leadership Group. In Japan, the JCIA held local town hall meetings in Osaka, Yamaguchi Higashi, Okayama, Chiba, Kashima, and Aichi. Furthermore, it held member exchange meetings in Tokyo, Osaka, and Oita in which Responsible Care Awards were presented and award winners reported on their activities. In this way, the JCIA is endeavoring to continuously improve, promote, and disseminate RC activities.

FY 2012 Responsible Care Awards

JSR Corporation, Chiba Plant
Mitsui Chemicals, Inc.
Mitsubishi Chemical Corporation, Yokkaichi Plant
Sanyo Chemical Industries, Ltd.

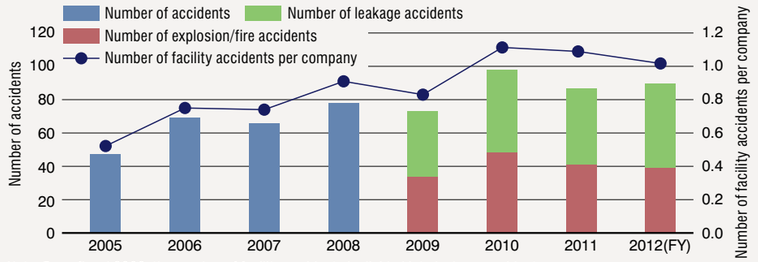
Responsible Care Award winners (Tokyo, May 2013)

Safety and Environment

Safety and disaster prevention

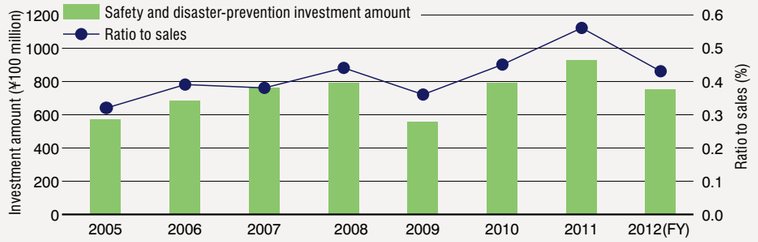
Based on its understanding that ensuring security and safety is the paramount issue for the chemical industry, the JCIA called on chemical industry circles and established the Safety and Accident-Prevention Study Working Group, proceeded to analyze accidents, share information, and study accident-prevention measures, and published the Safety and Accident Prevention Guidelines (First Edition). From now on, the JCIA will provide more active support for the voluntary safety measures of member companies by, among other things, promoting use of the guidelines.

Facility Accident Occurrences (Explosion, Fire, Leakage, Etc.)



Note: From fiscal 2009, the number of facility accidents is divided into leakage accidents and explosion/fire accidents.

Investment in Safety, Security, and Disaster-Prevention Measures

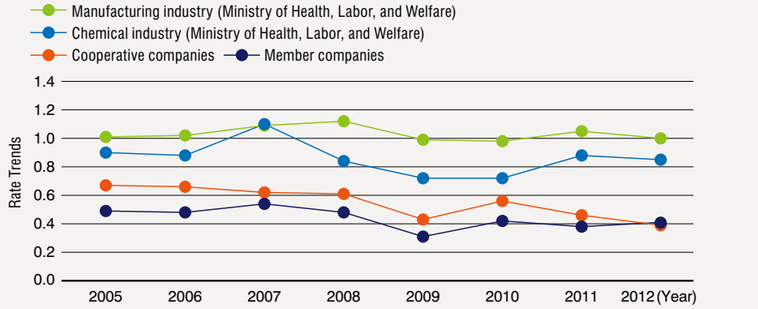


Industrial health and safety

The prevention of industrial accidents is also a major issue for the chemical industry as a whole. The JCIA participated as a member of the Health and Safety Subcommittee of the Ministry of Health, Labor, and Welfare's Labor Policy Council and made efforts to have the requests and opinions of industrial circles reflected in the setting of appropriate goals in the 12th Industrial Accident Prevention Plan. In addition, as one aspect of the voluntary promotion of health and safety in the chemical industry, every year the JCIA gives awards to model plants that implement outstanding safety activities and holds a safety symposium centered on activity reports by the award recipients.

Frequency Rate Trends

Frequency rate = Number of accident victims requiring absence from work / Total working hours (per one million hours)



FY 2012 JCIA Safety Award Grand Prize and Safety Effort Awards

Safety Award Grand Prize	Asahi Kasei Chemicals Corporation, Suzuka Plant
Safety Effort Awards	Asahi Kasei Metals Ltd., Tomobe Plant*
	Showa Aluminum Can Corporation, Oyama Plant
	Showa Denko K.K., Institute for Advanced and Core Technology*
	Taoka Chemical Industry Co., Ltd., Yodogawa Plant

＊ Safety Effort Award Special Prizes

Award winners who gave lectures at the Safety Symposium (Tokyo, June 2013)

The JCIA's Activities

Safety and Environment

Industrial waste reduction

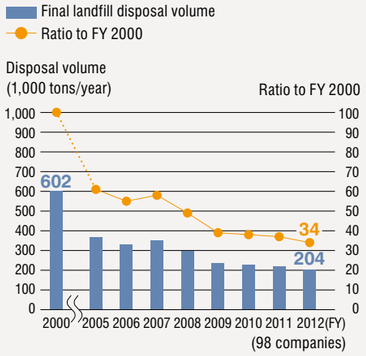
The JCIA endeavors to gather and reflect the opinions and demands of member companies concerning study groups, collected materials, and moves toward legislative revisions relating to the environment conducted by the Japanese government or other domestic or international organizations. Aiming to build a recycle-oriented society that curbs the consumption of resources and protects the environment, JCIA member companies make efforts to reduce the volume of industrial waste and final disposal volume by, among other things, reviewing raw materials and production processes and promoting retrieval and reuse. The JCIA keeps track of their achievements.

Industrial Waste Volume and Effective Resource Utilization Ratio

(The JCIA's interim report figures for FY 2012)

Final Disposal Volume

(The JCIA's interim report figures for FY 2012)



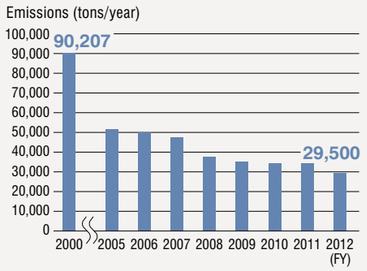
Reduction of chemical emissions

JCIA member companies are making efforts to prevent atmospheric, water, and soil pollution by improving disposal technology and conducting positive capital investment. Significant results have been achieved in the reduction of chemical substance emissions, including the reduction of volatile organic compound (VOC*) and PRTR* substances. The JCIA keeps track of their achievements.

The graphs below show atmospheric, water, and soil emissions, but actually there were almost no soil emissions in the years surveyed (less than 0.2% of the total).

VOC Emissions

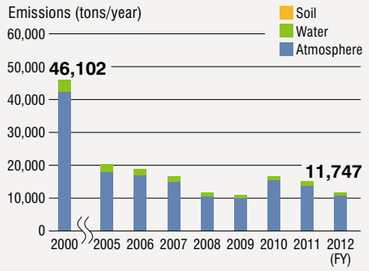
(The JCIA's interim report figures for FY 2012)



A facility for recovering volatile organic compounds prevents air pollution by various methods, such as concentration and adsorption.

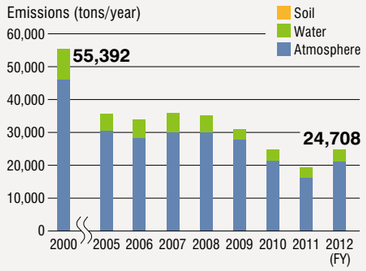
Emissions of PRTR Substances

(The JCIA's interim report figures for FY 2012)

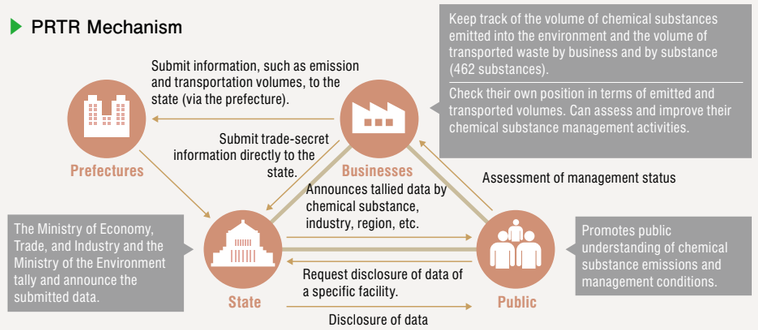


Emissions of Voluntarily Surveyed Substances

(The JCIA's interim report figures for FY 2012)



PRTR Mechanism



＊ Data of individual businesses have been available on the website since fiscal 2008 (quoted from the METI website).

Prevention of global warming

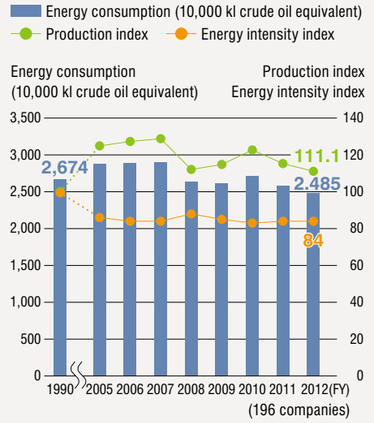
The JCIA kept track of voluntary environmental action plans and proceeded with preparations to participate in the Keidanren's Commitment to a Low Carbon Society compiled by Nippon Keidanren (Japan Business Federation).

In the voluntary action plan relating to energy saving, after the initial target of an energy intensity index of 90 (1990=100) was achieved, further energy-saving efforts brought about an average of 85 in the five years from 2008 to 2012.

The reduction of greenhouse gas emissions (CO_2 and three types of gasses including HFCs) amounted to 24 million tons in fiscal 2011 (see bottom of page 10 for details), which was a significant achievement corresponding to 1.8% of the annual greenhouse gas emissions of 1.3 billion tons in Japan.

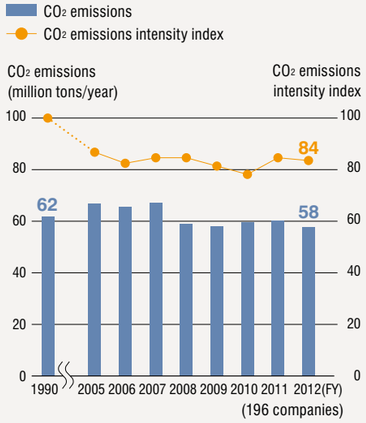
Trends in Energy Consumption, Energy Intensity Index, and Production Index

(The JCIA's interim report figures for FY 2012)



Trends in CO_2 Emissions and Intensity Index

(The JCIA's interim report figures for FY 2012)



Notes: CO_2 emissions intensity: CO_2 emissions per 1 ton of production
Intensity index: 1990=100

Chemicals management

At the World Summit on Sustainable Development (WSSD*) held in Johannesburg in 2002, agreement was launched to minimize the negative impact of chemicals by 2020, and at the 1st International Conference on Composite Materials (ICCM*) in 2006, the Strategic Approach to International Chemicals Management (SAICM*) was adopted as a specific measure. The JCIA is conducting various activities to support members in their efforts to tackle issues in accordance with the SAICM.

In particular, the JCIA promoted activities in response to international-level efforts toward the minimization of risks in the supply chain as a whole on the risk based management.

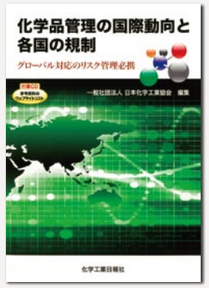
Specifically, the JCIA engaged in the collection, analysis, and supply of information on regulatory and institutional trends relating to chemicals management in Japan and overseas, made policy proposals to related governmental authorities, and further strengthened support to members in their compliance with regulations being adopted in other countries, especially in Asia.

Furthermore, the JCIA domestically promoted the Japanese Initiative of Product Stewardship (JIPS) as Global Product Strategy (GPS), a voluntary initiative of the ICCA, as a activity (as Japanese industry voluntary), and the targeted results were achieved. The JCIA is also actively involved in programs run by international organizations, such as the United Nations Environmental Programme (UNEP*) and the Organization for Economic Cooperation and Development (OECD), and in policy support for the Japanese government.

GPS/JIPS Seminar (Tokyo, February 2013)

GPS/JIPS portal site

International Trends of Chemicals Management and respective National Regulations (March 2013)



Guidelines for PL Countermeasure in the Chemical Industry (March 2013)

GHS* Guidelines (June 2012)

The JCIA's Activities

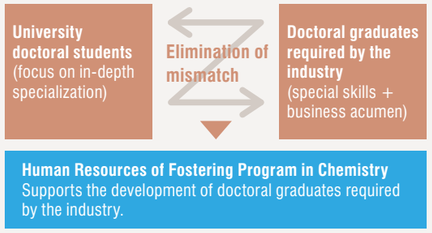
Technology and Human Resource Development

Human Resources of Fostering Program in Chemistry

Human Resources of Fostering Program in Chemistry, established in 2010 to fill the gap between the type of doctoral graduates that the industry needs and the type of doctoral graduates turned out by universities, supports graduate school majors that meet the chemical industry's human resource requirements and the students engaged in such studies. At present, 37 companies participating in the program support 19 graduate school majors selected by screening.

As a fiscal 2012 initiative, the 2012 Symposium and Research Presentation Meeting was held in October to share the importance of doctoral human resource development. In addition, a student-company exchange meeting was held in March 2013 at which doctoral course students and company representatives had the opportunity to talk directly about employment and recruitment.

The program's objective is to foster the high-level human resources required by the chemical industry.



Summary of the Program

1 Publication of activities in supported majors
2 Employment support
3 Holding of research presentation meetings
4 Support for activation of internships
5 Cooperation in curriculum reform
6 Scholarships

Symposium and research presentation meeting (Tokyo, October 2012)

Student-company exchange meeting (Tokyo, March 2013)

Support for research concerning impact on human health and environment (LRI)

The LRI (Long-range Research Initiative) is an initiative to support long-range research on the impact of chemicals on people's health and the environment. Since 2000, the JCIA has supported approximately 300 research themes selected from open applications, mainly from universities and public research institutions. The results of such research are made public every year as an annual report.

In 2011 the JCIA developed to the "New LRI," and operation under the new organization started in 2012. The first JCIA New LRI research report meeting was held in August 2012. Following a briefing on the New LRI and a special lecture, the results of research by 25 researchers selected by the LRI were presented through posters, and opportunities were provided for direct discussions. In addition, among other events, there were lectures by nanomaterial researchers from industry, government, and academia and a general discussion with active participation from the audience, giving the occasion a different style from that of conventional research report meetings.

Research Fields to Be Covered by the New LRI

1 Development of new risk assessment methods and assessment
2 Research of chemical safety for new chemical substances, including nanomaterials
3 Research concerning the impact of chemicals on children, elderly people, genetic disorders, etc.
4 Assessment of impact on the ecosystem and environment
5 Other issues requiring an urgent response

The New LRI's first research report meeting (Tokyo, August 2012)

The New LRI annual report for 2012 (March 2013)

Chemical Risk Forum

Amid growing public concern about the safety of chemicals, corporate setups and human resource development capable of scientifically assessing and managing the risks are becoming increasingly important for the sustained development of the chemical industry.

The JCIA established the Chemical Risk Workshop in 2002 (renamed the Chemical Risk Forum in 2008) to train personnel to handle risk assessment of chemical substances and enable them to acquire a wide range of knowledge and techniques concerning risk assessment. Many people who have participated in the forum are now engaged in risk assessment of their own company's products. Ten sessions were held in fiscal 2012.

Main Subjects of the Chemical Risk Forum

1 Overall picture of risk assessment
2 Assessment methods of health and environmental impact
3 Exposure assessment
4 Risk assessment tools
5 Risk tradeoffs
6 Risk reduction measures
7 Risk communication
8 Domestic and international chemicals management

Technology Awards

The JCIA Technology Awards commend companies that have contributed to the progress of the chemical industry and the economy through the development and industrialization of outstanding chemical technologies. The JCIA calls for applications from chemical-related companies and awards the Grand Prize, Special Technology Prize, and Environmental Technology Prize for selected excellent achievements.

FY 2012 (45th) Technology Awards

Grand Prize
Mitsubishi Chemical Corporation

Special Technology Prize
Mitsubishi Rayon Co., Ltd.

Environmental Technology Prize
Kao Corporation

Members of Mitsubishi Chemical Corporation, winner of the Grand Prize (March 2013)

Chemical education and enlightenment ("Chemistry Makes Our Dreams Come True"* project, etc.)

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* The Dream Chemistry 21 Committee, which implements the "Chemistry Makes Our Dreams Come True" project, comprises four organizations: the Chemical Society of Japan, Society of Chemical Engineers, Japan, Japan Association for Chemical Innovation, and Japan Chemical Industry Association.

Summer vacation chemistry workshop for children (Tokyo, August 2012)

Chemistry seminar for teachers (Natori City, Miyagi Prefecture, October 2012)

Overview of Chemistry Education and Enlightenment

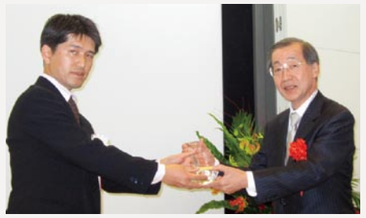
The JCIA's Activities

Messages to Society

Aiming to be a good partner of society

—Main publicity, public hearing, and enlightenment activities in FY 2012—

In order to realize sustainable growth, the JCIA energetically conducts publicity, public hearing, and enlightenment activities both domestically and internationally. As a member of the International Council of Chemical Associations (ICCA), the JCIA participates in its priority efforts concerning chemicals management, the prevention of global warming, and Responsible Care (RC) and in particular takes the initiative in promoting enlightenment activities in Asia.
Domestically, the JCIA exchanges information with and submits opinion reports to related governmental bodies and others so as to solve issues involving the chemical industry as swiftly as possible.



▶ **JLCA Awards Ceremony (Tokyo, December 2012)**

▶ **The JCIA's cLCA report, second edition (December 2012)**

▶ The chemical industry's contribution global and enlightenment toward reduction of CO_2 emissions (global and domestic)

Energy-saving products utilizing materials and technologies provided by the chemical industry significantly contribute to the prevention of global warming. The JCIA quantified the contribution of chemical products to reducing CO_2 emissions by applying the new method of cLCA (carbon Life Cycle Analysis) and published a report summarizing the cases, titled "Life Cycle Analysis of Chemical Products in Japan and around the World*."

The JCIA also prepared a domestic version of "Guidelines for Calculation of the Avoided CO_2 Emissions" in February 2012. On the basis of these guidelines, the Chemical Sector of the World Business Council for Sustainable Development (WBCSD*) and the ICCA jointly compiled global guidelines on the cLCA method. From now on the JCIA intends to disseminate this method not only in the chemical industry but in other industries too.

These initiatives were highly evaluated, and in the 9th (FY 2012) JLCA Awards the JCIA received the Award of the Director General of the Industrial Science and Technology Policy and Environment Bureau, METI, from the Life Cycle Assessment Society of Japan (JLCA), a forum of industrial circles, academia, and national research institutes involved in life cycle assessment in Japan.

* The first edition was published in fiscal 2011. More cases were added to the first edition in fiscal 2012.

▶ Disseminating and supporting sound chemicals management throughout the entire supply chain (domestic)

In recent years the mainstream of chemicals management has come to be risk based management not only based hazardous but based on exposure level in consideration of conditions use etc. In order to achieve the goal of minimizing the chemical risk by 2020, the JCIA cooperates with not only chemical manufacturers but also users and since April 2011 has been conducting voluntary activities (GPS/JIPS) to thoroughly perform risk assessment and management throughout the whole supply chain.

In fiscal 2012, stimulated by the holding of the third session of the International Conference on Chemicals Management (ICCM-3) in Nairobi, Kenya, in September, chemicals management made significant strides throughout the whole supply chain.

▶ Demands for tax reform (domestic)

The Japanese chemical industry can be described as a large industry supporting the Japanese economy and employment. Domestically, it ranks second in terms of the shipment value and third in terms of the number of employees (see page 9 for details); internationally, it ranks third in terms of shipment value after China and the United States. Nevertheless, the business environment is harsh. On behalf of the chemical industry, therefore, the JCIA has submitted tax reform demands to the Japanese government to put the business environment of the Japanese chemical industry on an equal footing with that of other countries.

In fiscal 2012 the JCIA submitted the following demands to the government:

- ○Drastic revision of taxes for Climate Change Mitigation
- ○Expansion of tax measures to promote R&D
- ○Exemption in principle of the gasoline tax and the petroleum and coal tax levied on materials for manufacturing petrochemical products
- ○Reduction of the corporate tax rate

▶ Trade promotion (international)

The building of cooperative international relations is essential to realize sustained economic growth. In constant cooperation with the government and related ministries, the JCIA provides various assistance, including the supply of information, for intergovernmental negotiations.

In fiscal 2012 the JCIA and the European Chemical Industry Council (Cefic*) in June issued a joint statement calling for the early conclusion of a Japan-EU FTA. In November the JCIA, together with the Canadian Chemical Producer's Association, similarly issued a joint statement calling for the early conclusion of a Japan-Canada FTA.

▶ Support activities in Asia (international)

The improvement of risk assessment and chemicals management is an urgent issue in Asian countries, where populations are increasing and economies are achieving spectacular growth. As well as actively supporting the dissemination of RC activities in Asian countries as a member of the ICCA, the JCIA is also involved in such activities as dissemination of the Globally Harmonized System of Classification and Labelling of Chemicals (GHS) and the holding of workshops aimed at publicizing the GPS, especially in ASEAN countries.

Furthermore, the JCIA makes efforts to raise Japan's presence in Asia by strengthening solidarity through dissemination activities likely GPS workshop and related information exchange with chemical industry associations in Asian countries.

▶ **GPS workshop (Malaysia, October 2012)**

▶ Energy and environmental policies (domestic)

For resource-lacking Japan, the securing of energy at affordable prices and in a stable manner is an important issue. The industrial world, which experienced oil crises twice in the 1970s, has made relentless efforts to improve energy efficiency, and today Japan is known as an "advanced energy-saving nation."

Self-help efforts have a limit, however. In order to achieve sustainable economic growth, it is necessary to insist on the viewpoint of the industry so that appropriate measures are taken in energy policy as well.

In fiscal 2012 the JCIA on three occasions submitted its opinions and demands regarding the government's proposed scenario in its "Innovative Strategy for Energy and the Environment." The main problems in the proposed scenario are as follows:

- ○The excessive cost burden could lead to a loss of international competitiveness, threaten the industry's survival, and hamper contributions to solving the problem of global warming.
- ○Uncertainty about the feasibility of introducing renewable energies
- ○Vagueness of risk countermeasures and roadmap

Glossary

(In the main text, terms are marked with an asterisk on first mention.)

Term/abbreviation	Official name	Explanation	Page
"Dream Chemistry 21" project	"Chemistry Makes Our Dreams Come True" project	Educational program for the next generation run by the Dream Chemistry 21 Committee comprising four organizations in academic and industrial chemical circles. It was launched in 1993 for the purpose of chemical enlightenment and promotion of understanding of the chemical industry's contribution to society. The program operates Children's Chemical Experiment Show, Weekend Experiment Classroom, and a chemistry contest grand prix and also sends representative students to the International Chemistry Olympiad.	P15, P16, P22
Risk assessment/ risk management	Risk evaluation Risk management	Establishment of a qualitative or quantitative relationship between risks and benefits, involving the complex process of determining the significance of the identified hazards and estimated risks to those organisms or people concerned with or affected by them. It is the first step in risk management. Risk control strategy to reduce hazard and/or exposure by means of substitution, prevention or reduction of emissions and exposure, training, hazard communication etc. thereby reducing the risk to human health or the environment.	P15, P21, P23
APRO	Asia Pacific Responsible Care Organization	Founded in 2003 as a supporting organization of the Asia Pacific Responsible Care Conference (APRCC). Japan is the current chair.	P17
Cefic	The European Chemical Industry Council	Forum and the voice of the chemical industry in Europe.	P24
cLCA	carbon Life Cycle Analysis	A calculation, as avoided emissions, of the difference in CO_2 emissions between finished products using chemicals and comparative products in their respective life cycles, from the extraction of materials to disposal.	P15, P16, P23
GHS	Globally Harmonized System of Classification and Labelling of Chemicals	The globally harmonized system of classification and labelling of chemicals (GHS) was recommended by the UN on July 2003 to provide standard criteria for classifying chemicals according to their hazards and informing users about their hazards using labelling and Safety Data Sheet (SDS). It is revised every 2 years.	P20, P24
GPS	Global Product Strategy	The Global Product Strategy (GPS) was developed by the International Council of Chemical Associations (ICCA) as part of its commitment to the United Nations Strategic Approach to International Chemicals Management program. GPS is part of the international chemical industry's voluntary Responsible Care Global Charter 1. It commits companies to promote the safe use of chemical products and enhance product stewardship throughout the value chain. GPS is a capacity-sharing exercise working towards: • Reducing differences in the safe handling of chemical substances between developing, emerging and industrialized countries. • Ensuring the correct handling and use of chemicals across the value chain and across geographical boundaries by providing relevant and reliable information. • Greater transparency, by helping companies provide stakeholders with information about marketed chemicals in an easily understandable format: the GPS Safety Summary.	P17, P20, P23, P24
GSC	Green Sustainable Chemistry	People- and environment-friendly chemistry and chemical technologies supporting the sustainable growth of society. The initiative aims to reduce the burden on the Earth's environment and ecosystem and establish chemical technologies and products that will bring about a safe, secure, affluent, and sustainable society by overseeing the total life cycle of products from design, the selection of materials, manufacturing, and use to recycling and disposal.	P26
ICCA	International Council of Chemical Associations	An organization representing the world's chemical industry. As well as Responsible Care, it places importance on activities relating to chemicals safety management through the Global Product Strategy, international discussions on climate change, support for developing nations, and communication with stakeholders.	P07, P11, P15, P17, P20, P23, P24
ICCM	International Conference on Chemicals Management	At the first conference held in Dubai in February 2006, the Strategic Approach to International Chemicals Management (SAICM) was concluded. The third conference (ICCM-3) was held in Nairobi in September 2012.	P20, P23
JIPS	Japan Initiative of Product Stewardship	A Japanese voluntary initiative by the industry based on risk assessment and risk management taking the supply chain into account. Japanese version of the ICCA GPS.	P15, P20, P23
LRI	Long-range Research Initiative	An initiative to give long-range support to research on the impact of chemicals on human health and the environment utilizing funds provided by LRI member companies. Three chemical organizations (the JCIA, American Chemistry Council, and Cefic) manage the initiative under the ICCA.	P15, P16, P21
PRTR	Pollutant Release and Transfer Register	A system that (i) requires businesses handling chemical substances potentially hazardous to the environment to estimate the amounts of chemical substances released and transferred in waste, and to report the data to their local governments, and that (ii) the national government then compiles data submitted and makes the results public.	P19
PS	Product Stewardship	The industry's management of EHS performance of chemical products throughout their entire lifecycle. PS is an important pillar of Responsible Care.	P08, P17
SAICM	Strategic Approach to International Chemicals Management	Compiled at the International Conference on Chemicals Management (ICCM-1) in 2006. Further ICCM meetings are scheduled to be held in 2015 and 2020 for follow-up.	P20
UNEP	United Nations Environmental Programme	In response to a proposal made by the UN Conference on the Human Environment, held in Stockholm in June 1972 with "Only One Earth" as its slogan, the UNEP was established on the basis of a UN General Assembly resolution in the same year as an organ to put the Declaration of the United Nations Conference on the Human Environment and the Action Plan for the Human Environment, adopted at the same conference, into practice. Its office is in Nairobi.	P20
VOC	Volatile Organic Compounds	The generic chemical name of the organic compound which has volatility and becomes gas-like in the atmosphere. They include a wide range of substances, such as toluene, xylene, and ethyl acetate.	P19
WSSD	World Summit on Sustainable Development	The WSSD was held in Johannesburg, South Africa, in August 2002 and hosted by the United Nations. The purpose was to draw the world's attention to the difficult issues facing humankind and prompt worldwide action to find solutions. The WSSD adopted the Johannesburg Declaration as an expression of its political determination to achieve sustainable development.	P20

Expectations of the JCIA

Chemistry to Lead Next-Generation Industries

—Impressions after reading the annual report—

Makoto Misonou
(Professor Emeritus, University of Tokyo)

Graduated from the Department of Applied Chemistry in the Faculty of Engineering of the University of Tokyo in 1961; completed the doctor's course in synthetic chemistry at the same university in 1966. Doctor of engineering. Subsequently served as research associate, lecturer, and assistant professor and became a full professor in 1983. Since his retirement in 1999, has served as professor at Kogakuin University, professor emeritus at the University of Tokyo, and president of the National Institute of Technology and Evaluation (2002–09). Is currently senior supervisor at the Japan Science and Technology Agency. Has also served in such posts as member of the Science Council of Japan, president of the Chemical Society of Japan, president of the Japan Union of Chemical Science and Technology, and vice-president of the Engineering Academy of Japan.

Chemical technology undoubtedly played an important role in the progress of science and technology and supported the development of the material civilization of the twentieth century. It is a fact that many serious problems arose in the process, but after earnest efforts they have mostly been solved. If we compare the merits and the demerits, the merits are overwhelming. This is not difficult to imagine if you consider the spectacular extension of the average longevity of human beings. Nevertheless, we cannot predict what may occur and when. From now on also, therefore, it is important to continue making improvements and giving due consideration to the risks. This annual report covers these matters in a balanced manner. Under the leadership of the JCIA, I hope that the chemical industry will continue to make further efforts in the future. That is my first impression of the report.

My second impression concerns the future vision of the chemical industry. I am delighted that the chemical industry is enhancing its presence, and I consider this to be the result of relentless efforts by the companies concerned. But what about the future? Various changes are already occurring. At least in the developed countries, affluence and lifestyles are being reviewed amid the aging of the population accompanied by a low birth-rate, limitations on resources, and other factors. How about drawing a favorable and realistic picture of the future and conceptualizing appropriate new industries? That would surely lead, for example, to the birth of industries reflecting people's daily lives. And "chemistry" would play a key role here. As a core advocate of positive GSC* (green sustainable chemistry), I have great expectations of this potential.

My third point concerns human resource development. In the coming era, the key will lie in the existence of people capable of promoting a new chemical industry with new ideas. I hear that the JCIA's new human resource development program has got off to a good start, and I look forward to its ripple effects. Through this initiative, based on an understanding that the core function of universities is academic study, I hope that industry, government, and academia will cooperate in fostering people with broad and flexible thinking who are capable of shrewdly conceptualizing technologies for the new age.

Finally, I would like to mention communication regarding the chemical field. For scientists and engineers, conveying the significance of their discipline to society and gaining recognition of that significance, and performing their duties in an ethical manner, are the conditions of their existence. For companies as well, their social contributions and ethics are conditions for their raison d'etre, and they are rewarded, I believe, with profits.

In this sense, the JCIA and chemical companies are engaged in a host of activities, such as the RC Initiative, various awards, and this report as well. It would be marvelous if this report gives encouragement to everyone working in the chemical industry and makes them want to show it to their families and friends and explain about the importance and attractions of chemistry.

■ Editorial policy

The Japan Chemical Industry Association (JCIA) has published the "JCIA Annual Report" for the first time. This annual report has been issued to explain to a wide range of stakeholders what kind of organization the JCIA is and what activities it is engaged in. Accordingly, the history of chemical technology and the status of the chemical industry's contribution to other industries have been summarized in an opening feature. We have also highlighted safety and disaster-prevention efforts, which were the most important topics in fiscal 2012, and in the latter half of the report we have briefly described the JCIA's activities in the year, including the Responsible Care Initiative. For more details about these activities, please visit the JCIA's website. (Directions are given for each relevant section.) Please also note that the content of the "Responsible Care Reports" that we used to publish are now incorporated in the "JCIA Annual Report Reference."

■ Targeted organizations
Targeted organizations are the Japan Chemical Industry Association and member companies and organizations.

■ Languages
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