

JCIA ANNUAL REPORT 2022

This pamphlet serves as a supplement to the JCIA Annual Report to introduce various data and initiatives relating to the activities of JCIA. It is intended to be read together with JCIA Annual Report 2022.

**Reference
Materials**



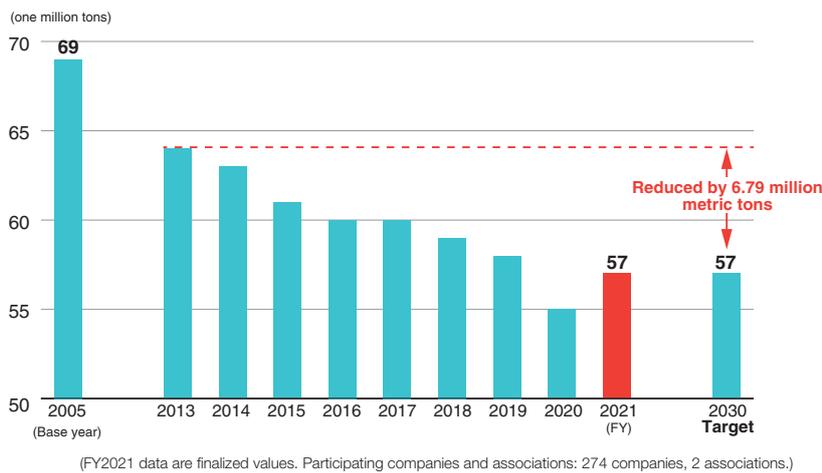
Japan Chemical Industry Association

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1 – 1 Environmental Protection (Prevention of Global Warming)

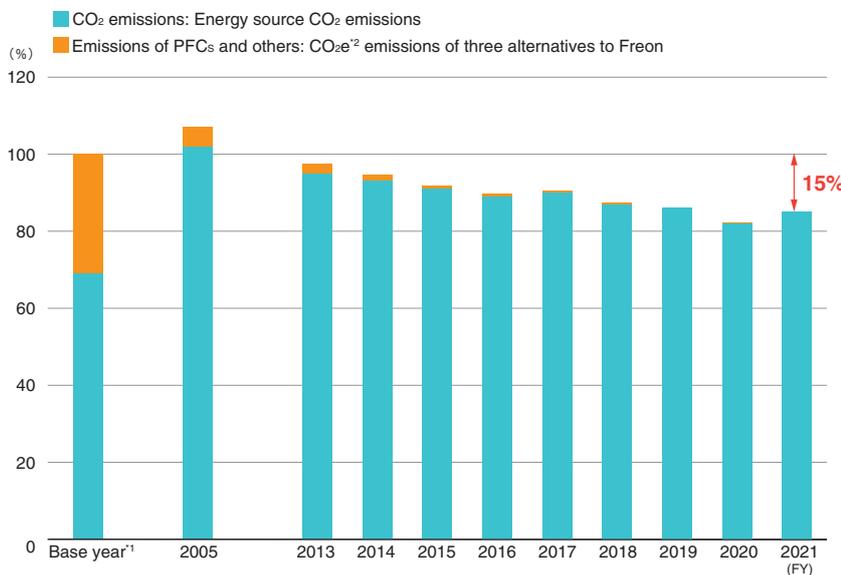
CO₂ Emissions Index



CO₂ Emissions Index

CO₂ emissions of JCIA members have been decreasing with each passing year since the “Commitment to a Low Carbon Society” activities began in FY2013, with emissions dropping by 11.8 million metric tons (17.2%) last fiscal year compared to the reference year of FY2005. In FY2018, JCIA announced a new target of reducing the absolute quantity of CO₂ emissions before FY2030, by 6.79 million metric tons compared to FY2013. Although emissions in FY2021 were higher than in FY2020, when emissions fell significantly due to the impact of stagnant economic activity caused by the COVID-19 pandemic, JCIA members reduced CO₂ emissions by 1.82 million tons from FY2018, resulting in a total reduction of 6.88 million tons. As a result, JCIA also achieved its target for 2030 ahead of schedule in 2021.

Emissions of CO₂ and Three Alternatives to Freon



Emissions of CO₂ and Three Alternatives to Freon

When the reductions of CO₂ emissions and emissions from the manufacture of three alternatives to Freon (PFCs, SF₆, NF₃) are combined, emissions in 2021 were down 15% from the base years.

From 2021 onward, the global warming potential is based on the IPCC Fifth Report (AR5).

¹ Base years: The base year for CO₂ emissions is FY1990; the base year for estimated emissions associated with manufacturing of PFCs and others is 1995 (calendar year)
² CO₂e (CO₂ equivalent): Corresponding value of CO₂ emissions

1 – 2 Environmental Protection (Industrial Waste Reduction)

Voluntary Action Plan for Establishing a Sound Material-Cycle Society for FY2021 and Beyond

Since FY2016, JCIA has been working to achieve the target of reducing final disposal volume by about 70% in FY2020 compared to FY2000^{*1} in accordance with the Keidanren voluntary Action Plan for Establishing a Sound Material-Cycle Society and we have been promoting efforts to achieve this goal. On the other hand, the recycling rate of industrial waste has already reached close to 100%, and some waste is difficult to recycle. As a result, the recycling rate has remained almost flat since 2010. It has also been pointed out that further reduc-

Therefore, JCIA has set the following new targets for FY2025:

▶ **Reduce final landfill volume of industrial waste to 170,000 tons/year or less; and**

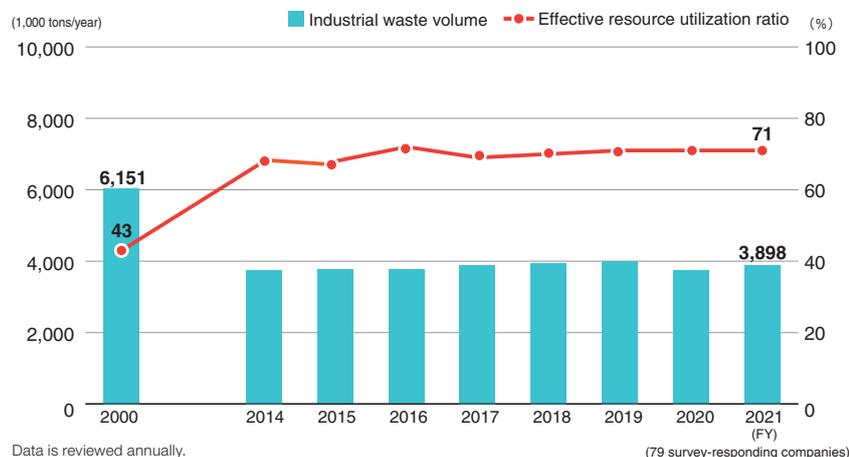
▶ **Maintain the recycling rate at 65% or higher,** and continues to work toward maintaining the current level.

tion of the final disposal volume may run counter to the realization of a low-carbon society, for example, by increasing energy consumption. Even under these circumstances, Keidanren will continue its efforts to reduce the volume of final disposal of industrial waste, the most representative indicator for industry in the formation of a Sound Material-Cycle Society, by setting a reduction target for industry as a whole, based on the idea of not increasing the volume of final disposal from the current level.

*1 Final disposal amount reduction rate (vs. FY2000):

$$\frac{\text{FY2000 final disposal amount} - \text{FY2020 final disposal amount}}{\text{FY2000 final disposal amount}} \approx 70\%$$

Industrial Waste Volume and Effective Resource Utilization Ratio



Data is reviewed annually.

(79 survey-responding companies)

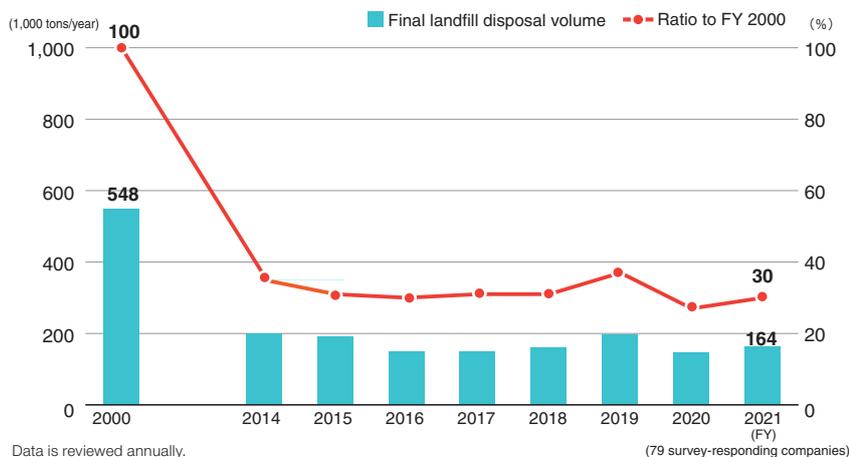
*2 Effective utilization rate (including heat recovery):

$$\frac{\text{Effective use of resources in the same FY}}{\text{Amount of industrial waste}} \geq 65\%$$

Industrial Waste Volume and Effective Resource Utilization Ratio^{*2}

Industrial waste volume in FY2021 was 3.898 million metric tons, down 37% from the base year of FY2000. We are also making positive efforts to encourage sorting and reuse. In addition, the effective utilization rate of resources including heat recovery, which had been 43% in FY2000, improved to 71% in FY2021 by not only strengthening recycling with thorough sorting of the materials but also aggressively switching from simple incineration to heat recovery for items that are difficult to recycle. As a result, JCIA members achieved a level that greatly exceeds the chemical industry's specific target of increasing the ratio to 65% or more by FY2025^{*2} in the Keidanren Voluntary Action Plan for Establishing a Sound Material-Cycle Society ahead of schedule.

Final Landfill Disposal Volume



Data is reviewed annually.

(79 survey-responding companies)

| | FY2021 results | |
|--------------------------------------|--------------------|--------------------|
| | Relative to FY2000 | Relative to FY2020 |
| Industrial waste volume | 37% decrease | 4% increase |
| Effective resource utilization ratio | 28% increase | marginal change |
| Final disposal by JCIA members | 70% decrease | 11% increase |

Final Landfill Disposal Volume

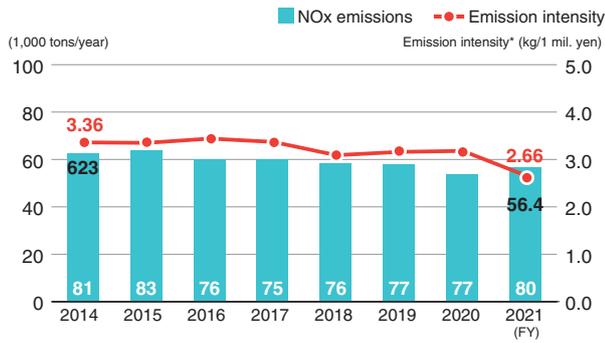
The final landfill disposal of FY2021 was 164,000 tons, which is about an 17,000-ton increase from FY2020, which ended in a 70% reduction from the base year FY2000. In FY2019, domestic disposal volume temporarily increased due to import restrictions on waste plastics enforced in Asian countries. In FY2020, there was a significant decrease due to the reduced economic activity caused by COVID-19. In FY2021, the trend returned to flat to slightly decreasing seen up to 2018 prior to the pandemic. Not only did JCIA members achieve the target for the chemical industry, namely reduce final landfill volume of industrial waste to 170,000 tons/year or less by FY2025, as per the Keidanren Voluntary Action Plan for Establishing a Sound Material-Cycle Society, but the reduction also helped lower waste incineration volume. In addition to reducing the final landfill disposal volume, member companies are strengthening their traceability concerning proper disposal of waste, through confirming the issuance, recovery and verification of industrial waste manifests, and the regular inspection of final disposal sites of contractors.

1 – 3 Environmental Protection (Prevention of Atmospheric Pollution and Water Pollution)

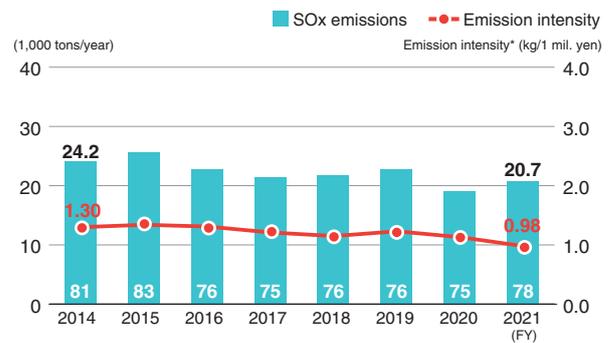
Prevention of Atmospheric Pollution and Water Pollution

JCIA members in Japan have significantly reduced their emissions of air and water pollutants compared to around 2000. In recent years, the rate of emissions reduction has slowed, but emissions intensity has been declining. JCIA members comply both with regulatory standards and agreements with municipalities. They also set their own voluntary management criteria, which are more rigorous than government standards, to intensify their on-going efforts to reduce emissions.

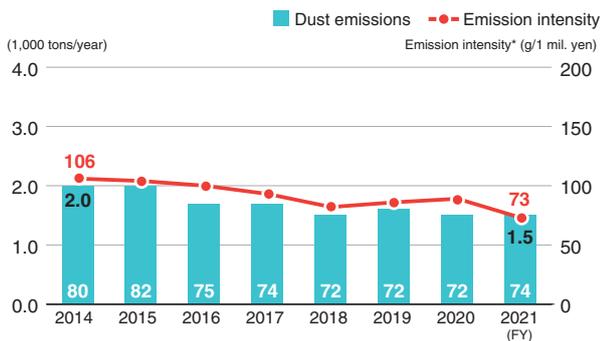
NOx Emissions



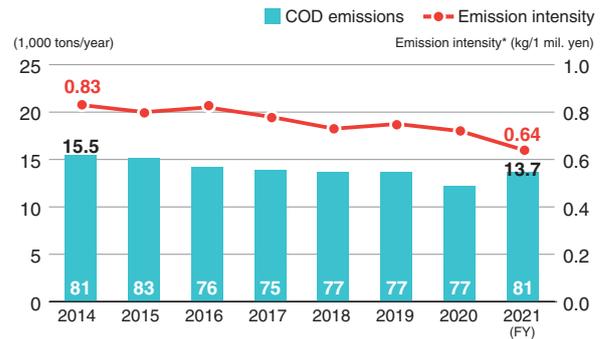
SOx Emissions



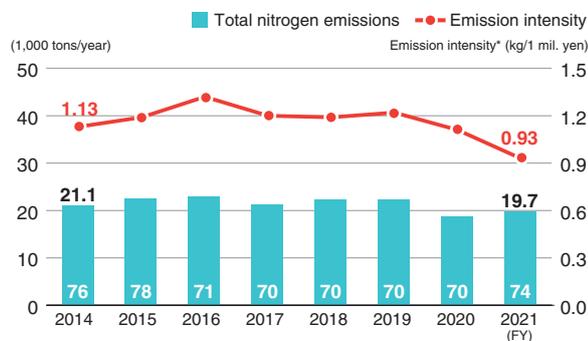
Dust Emissions



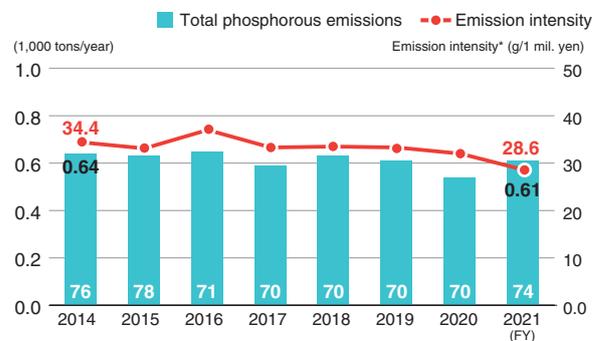
COD Emissions



Total Nitrogen Emissions



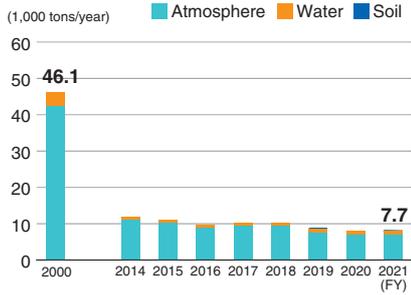
Total Phosphorous Emissions



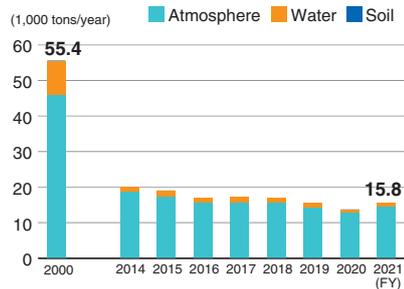
*Emission intensity: Emissions per ¥1 million sales. The figures in the bars indicate the number of companies that submitted data.

1 – 4 Environmental Protection (Reduction of Chemical Emissions)

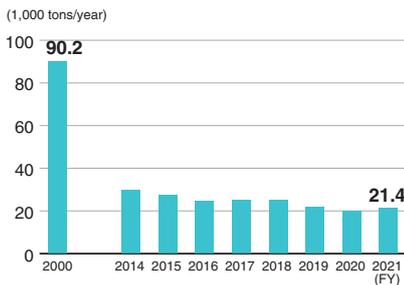
Emissions of PRTR Substances



Emissions of Voluntary Surveyed Substances



VOC Emissions



Emissions of PRTR^{*1} Substances

JCIA members' emissions of PRTR designated substances in FY2021 was 7,700 metric tons, a reduction of approximately 83% compared to FY2000 and 54% compared to FY2010. These emissions have been declining every year since FY2014 and JCIA members achieved their voluntary target^{*3} for FY2025. The breakdown of emissions is as follows: 91% into the atmosphere, 9% into water, and less than 0.1% into soil.

^{*1} PRTR (Pollutant Release and Transfer Register): The PRTR system is designed to identify, collect and disseminate data on the amounts and sources of a variety of toxic chemicals released to the environment or transferred outside of facilities in the form of waste.

PRTR Law: Act on Confirmation, etc. of Release Amounts of Specific Chemical Substances in the Environment and Promotion of Improvements to the Management Thereof

Emissions of Voluntary Surveyed Substances

JCIA has independently established voluntary survey substances^(†) and is working to further reduce their emissions. There were 15,800 metric tons of substance emissions surveyed by JCIA voluntarily^(†) in 2021, representing a 71% reduction compared to FY2000 and a 36% reduction compared to FY2010. JCIA members have continued to reduce the amount since FY2014 and achieved their voluntary target for FY2025^{*3}. The breakdown of emissions was 92% into the atmosphere and 8% into water. No emissions into the soil were reported.

(†) Change in the number of substances voluntarily surveyed by JCIA:

From FY2000 to 2009: 126 substances
From FY2010 to 2012: 106 substances
From FY2013 to the current: 90 substances

VOC^{*2} Emissions

JCIA members are making tremendous efforts to install equipment and improve the processes for controlling VOC emissions. In FY2021, VOC emissions amounted to 21,400 metric tons, a 76% reduction compared to FY2000 and a 37% reduction compared to FY2010. Thus, JCIA members have achieved significant reductions along with their voluntary target for FY2025^{*3}.

^{*2} VOC (volatile organic compound): VOC is a collective term for a wide variety of volatile organic compounds that turn into gas and enter the atmosphere, including toluene, xylenes and ethyl acetate.

^{*3} FY2025 voluntary target: Reduce PRTR/VOC emissions to no worse than FY2010 levels in FY2020 and beyond. As for highly toxic substances, reduction efforts should be continued individually.

1 – 5 Environmental Protection (Investment in Environmental Measures)

Investment in Environmental Measures

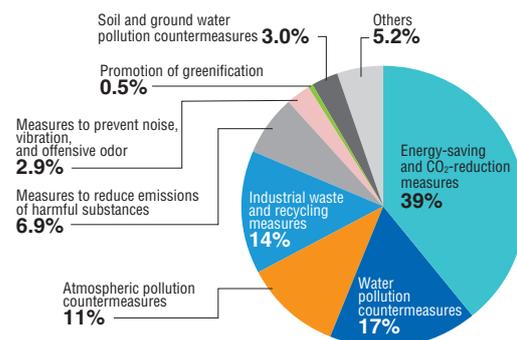
In FY2021, the sum of investments by JCIA members in the installation and maintenance of environment-friendly equipment, such as energy-saving and CO₂ reduction equipment, and investments in the development of environment-friendly products and technologies amounted to ¥76.9 billion. This represents a ratio of investment to sales of 0.36%. While it is estimated that the decrease in investment amount was due to the fact that many construction projects were forced to be canceled or postponed due to the COVID-19 pandemic in 2020, the ratio of investment to sales in 2021 remains about the same as in previous years. The planned investments in environmental protection measures by JCIA members have been steadily improving their environmental performance.

Investment in Environmental Measures



^{*}Emission intensity: Emissions per ¥1 million sales. The figures in the bars indicate the number of companies that submitted data.

Breakdown of Environmental Investment in FY2021

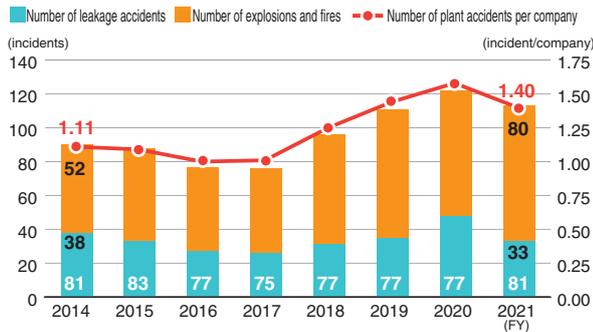


2 – Process Safety and Disaster Prevention (Efforts to Prevent Plant Accidents)

Accident Occurrences

In FY2021, the total number of accidents at plants (113) and the number of accidents at plants per company (1.40) was lower than the previous year for the first time in four years, but remains high compared to high compared to levels several years ago.

Accident Occurrences



The figures at the bottom of the bars indicate the number of companies that submitted data.

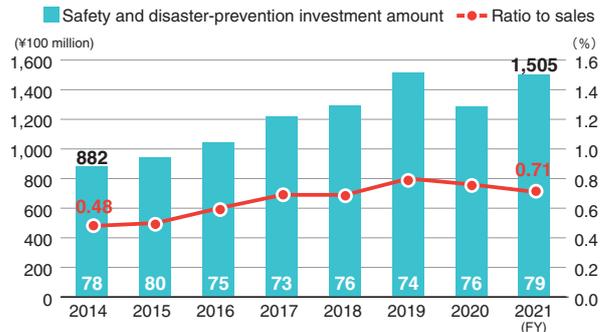
Breakdown of Safety and Disaster-Prevention Investment Amount

The breakdown of investment costs for safety and disaster-preventive maintenance in FY2021 shows that the maintenance for aging facilities accounts for nearly 60% of this investment. This trend indicates that countermeasures for the aging facilities has been a major investment item over the past several years.

Investment in Safety, Security, and Disaster-Prevention Measures

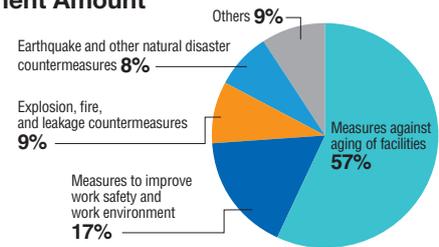
JCIA member's investment in safety and disaster-preventive maintenance for FY2021 was 150.5 billion yen, a 17% increase compared with FY2020, with the ratio of investment to sales standing at 0.71%, down 0.05% compared with FY2020. The amount of investment recovered to the pre-COVID-19 level, but the investment ratio declined slightly.

Investment in Safety, Security, and Disaster-Prevention Measures



The figures at the bottom of the bars indicate the number of companies that submitted data.

Breakdown of Safety and Disaster-Prevention Investment Amount



3 – Industrial Health and Safety

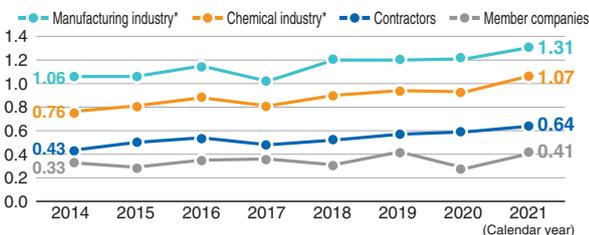
Occurrence of Occupational Accidents

Lost Time Injury Rate (LTIR) Trends

$$LTIR^{*1} = \frac{\text{Number of lost time injuries}}{\text{Total working hours (per one million hours)}}$$

*1 LTIR: Indicator that shows the frequency of lost time injuries

LTIR Trends



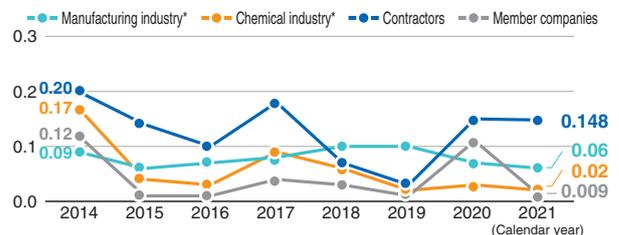
Frequency rates for JCIA members and their subcontractors in 2021 are below those for the manufacturing and chemical industries as a whole, but are trending upward overall.

Lost Time Injury Severity Rate* Trends

$$\text{Lost Time Injury Severity Rate}^{*2} = \frac{\text{Number of work days lost}}{\text{Total work hours (per thousand hours)}}$$

*2 Lost Time Injury Severity Rate: Indicator that shows the severity of occupational accidents

Overall Severity Rates



In 2021, as in 2020, there were two fatal accidents at subcontractors, so the intensity rate was significantly worse than in 2019, when there were zero fatal accidents. It was also much higher than in the manufacturing industry and the chemical industry as a whole.

Number of Fatalities from Occupational Accidents

| | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 |
|-------------------------|------|------|------|------|------|------|------|------|
| Member companies | 5 | 0 | 0 | 1 | 1 | 0 | 2 | 0 |
| Contractors | 4 | 1 | 1 | 3 | 1 | 0 | 2 | 2 |
| Chemical industry* | 11 | 22 | 12 | 12 | 18 | 12 | 10 | 12 |
| Manufacturing industry* | 180 | 160 | 177 | 102 | 183 | 141 | 136 | 137 |

* Data publicly announced by Ministry of Health, Labour and Welfare (MHLW)

Number of Fatalities from Occupational Accidents

In 2021, there were no fatalities due to work-related accidents at JCIA members, but two fatalities occurred at subcontractors.

4 – Social (Regional) Dialogue

Implementation of Regional Dialogue Meetings

| | |
|-----------------------------------|---|
| Areas of implementation in FY2021 | Okayama, Western Yamaguchi, Iwakuni & Otake, Sakai & Senboku, Kawasaki, Oita (All were document-based meetings.) |
| Areas of implementation in FY2020 | Eastern Yamaguchi, Aichi, Chiba, Hyogo (All were document-based meetings.) |

5 – Members' Self-Assessment

Details of Self-Assessment Scores (Average scores reported by JCIA members)

Pink cells are new items from this fiscal year.

| Assessed item Code | Important items | | | | | | |
|---|-----------------|-----|-----|-----|-----|-----|-----|
| | MS | EP | PS | OSH | DS | CPS | SD |
| 1 Policy | 4.6 | 4.5 | 4.5 | 4.5 | 4.0 | 4.4 | 4.3 |
| 2 Identification of striking environmental aspects, identification of dangerous and harmful factors, etc. | 4.5 | 4.5 | 4.6 | 4.6 | 3.8 | 4.5 | - |
| 3 Legal and other requirements | 4.6 | - | - | - | - | - | 3.5 |
| 4 Objectives | 4.7 | 4.3 | 4.2 | 4.3 | 3.8 | 4.0 | 3.7 |
| 5 Plans | 4.6 | 4.1 | 4.5 | 4.6 | 3.9 | 4.0 | 3.7 |
| 6 Organization | 4.3 | - | - | - | - | - | - |
| 7 Education and training | 4.2 | 4.1 | 4.4 | 4.4 | 3.9 | 4.1 | 3.5 |
| 8 Communication | 4.3 | 3.9 | 4.1 | 4.6 | 4.0 | 4.1 | 3.9 |
| 9 Response to emergency situations | 4.2 | - | 4.1 | - | 3.5 | - | - |
| 10 Documentation and document management | 4.3 | - | - | - | - | - | - |
| 11 Operation management | 4.3 | 3.8 | 4.1 | 4.0 | 4.0 | 3.5 | 3.3 |
| 12 Inspection and monitoring | 4.4 | 4.5 | 4.4 | 4.4 | 3.7 | 4.3 | 3.5 |
| 13 Corrections and preventive measures | 4.4 | 4.5 | 4.5 | 4.6 | 4.0 | 4.4 | 3.7 |
| 14 Collection of information and management of records | 4.4 | - | - | - | - | - | - |
| 15 Auditing | 4.5 | - | - | - | - | - | - |
| 16 Revisions by management | 4.6 | - | - | - | - | - | - |
| (Overall assessment) | 4.4 | 4.3 | 4.4 | 4.5 | 3.9 | 4.2 | 3.9 |

| Abbreviation | Code |
|--------------|--|
| MS | Management system |
| EP | Environmental protection |
| PS | Process safety and disaster prevention |
| OSH | Occupational health and safety |
| DS | Distribution safety |
| CPS | Chemicals and product safety |
| SD | Social dialogue |

| Self-assessment score | Classification |
|-------------------------|-------------------------|
| 4.5 points or over | Very satisfactory |
| 3.5 to under 4.5 points | Just about satisfactory |
| 2.5 to under 3.5 points | Somewhat unsatisfactory |
| Under 2.5 points | Unsatisfactory |

Implementation of Regional Dialogue Meetings

JCIA's Responsible Care Committee convened meetings and maintained dialogue with regional communities once every two years until 2018 in each area where there is a concentration of JCIA member sites, especially chemical complexes. Due to the impact of COVID-19, many of the regional dialogue meetings have been postponed since 2019. In 2021, those scheduled in Yokkaichi, Osaka, Toyama & Takaoka, Northern Niigata were postponed.

Details of Self-Assessment Scores (Average scores reported by JCIA members)

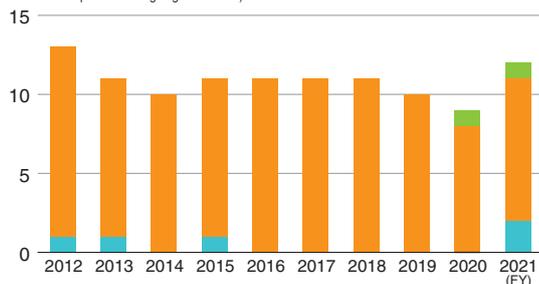
As JCIA revised its RC code for the first time in 20 years this year, the evaluation items and contents of the self-assessment were also revised.

On a scale of 5, scores in the 4-point range were recorded for all important items in the categories of management system, process safety and disaster prevention, and occupational health and safety, showing that the PDCA cycle is being implemented at a high rate in these categories. In the category of environmental protection, many of JCIA members need to enhance communication and operation management. For logistics safety, issues remain in the identification of striking environmental aspects, objectives, plans, education and training, and response to emergency situations, and inspection/monitoring, but the rest were in the 4-point range. Regarding chemical and product safety, improvement is needed in terms of operation management. Regarding social dialogue, there are still many issues to be addressed in all items except for the policy. The overall low score for social dialogue may be due to the impact of COVID-19 and the inability to create sufficient opportunities for dialogue.

6 – Responsible Care Verification

Companies Undergoing RC Verification

Verification of actions (Blue) Verification of reports (Orange) Verification of GHG* (Green)
(Number of companies undergoing verification)



* GHG: Greenhouse Gas

Companies Undergoing Responsible Care (RC) Verification

In FY2021, 11 JCIA members underwent RC verification (nine companies for verification of reports, two companies for verification of actions, and one company for GHG verification). The total number of JCIA members that have undergone RC verification is 249 (200 companies for verification of reports, 47 companies for verification of actions, and two companies for GHG verification).

Verification of reports (Nine companies):

Sanyo Chemical Industries, Ltd., Asahi Kasei Corporation, JSR Corporation, Shin-Etsu Chemical Co., Ltd., Sumitomo Seika Chemicals Company Ltd., Nippon Soda Co., Ltd., and Tokyo Ohka Kogyo Co., Ltd., Nihon Nohyaku Co., Ltd., Nippon Nyukazai Co., Ltd.

Verification of actions (Two companies):

Sanyo Chemical Industries, Ltd., Nissan Chemical Corporation.

GHG verification (One company): Earth Corporation.

Please refer to the publications posted on the JCIA website regarding other information such as the aggregate results of the JCIA member questionnaire.



Access Information

Kayabacho St. (Tokyo Metro Hibiya Line, Tozai Line)
 Approximately 3 minutes on foot from Exit 1 or Exit 3
 Hatchobori St. (JR Keiyo Line)

Contact

General Affairs Department

TEL 03-3297-2550
 FAX 03-3297-2610

International Affairs Department

TEL 03-3297-2576
 FAX 03-3297-2612

Labor Department

TEL 03-3297-2563
 FAX 03-3297-2606

Environment and Safety Department

TEL 03-3297-2568
 FAX 03-3297-2606

Responsible Care Department

TEL 03-3297-2583
 FAX 03-3297-2615

Dream Chemistry 21 Committee

TEL 03-3297-2555
 FAX 03-3297-2615

Public Relations Department

TEL 03-3297-2555
 FAX 03-3297-2615

Department of Business/Economic Information

TEL 03-3297-2559
 FAX 03-3297-2606

Technical Affairs Department

TEL 03-3297-2578
 FAX 03-3297-2606

Chemicals Management Department

TEL 03-3297-2567
 FAX 03-3297-2612

Chemical Products PL Consulting Center

TEL 03-3297-2602
 FAX 03-3297-2604

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Japan Chemical Industry Association

7F Sumitomo Fudosan Rokko Building, 1-4-1 Shinkawa, Chuo-ku, Tokyo 104-0033
 TEL 03-3297-2555 FAX 03-3297-2615



<https://www.nikkakyo.org/>

