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.
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

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).
Industrial Waste Volume and Effective Resource Utilization Ratio

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, the recycling rate has remained almost flat since 2010. It has also been pointed out that further reduction 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.

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.

**Industrial Waste Volume and Effective Resource Utilization Ratio**

<table>
<thead>
<tr>
<th>Year (FY)</th>
<th>Industrial waste volume</th>
<th>Effective resource utilization ratio (%)</th>
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<tbody>
<tr>
<td>2000</td>
<td>6,151</td>
<td>71</td>
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<tr>
<td>2014</td>
<td>4,000</td>
<td>60</td>
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<tr>
<td>2016</td>
<td>3,898</td>
<td>50</td>
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</table>

Data is reviewed annually.

Effective utilization rate (including heat recovery):
\[ \text{Effective use of resources in the same FY} \geq \frac{\text{Amount of industrial waste}}{100} \times 65\% \]

**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.

<table>
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<tr>
<th>FY2021 results</th>
<th>Relative to FY2000</th>
<th>Relative to FY2020</th>
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<tbody>
<tr>
<td>Industrial waste volume</td>
<td>37% decrease</td>
<td>4% increase</td>
</tr>
<tr>
<td>Effective resource utilization ratio</td>
<td>28% increase</td>
<td>marginal change</td>
</tr>
<tr>
<td>Final disposal by JCIA members</td>
<td>70% decrease</td>
<td>11% increase</td>
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</table>
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 ongoing efforts to reduce emissions.

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

\(*3\) 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\(^*{1}\) and is working to further reduce their emissions. There were 15,800 metric tons of substance emissions surveyed by JCIA voluntarily\(^*{1}\) 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.

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, xylene 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.

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 CO\(_2\) 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.

Breakdown of Environmental Investment in FY2021

- **Soil and ground water pollution countermeasures**: 3.0%
- **Promotion of greenerification**: 0.5%
- **Measures to prevent noise, vibration, and offensive odor**: 2.9%
- **Measures to reduce emissions of harmful substances**: 6.9%
- **Atmospheric pollution countermeasures**: 11%
- **Industrial waste and recycling measures**: 14%
- **Energy-saving and CO\(_2\) reduction measures**: 39%
- **Other**: 5.2%

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

**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.

**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.

**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.

**Breakdown of Occurrence of Occupational Accidents**

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.

**Lost Time Injury Rate (LTIR) Trends**

Lost Time Injury Rate (LTIR) is calculated as follows:

\[
LTIR = \frac{\text{Number of lost time injuries}}{\text{Total working hours (per one million hours)}}
\]

**Lost Time Injury Severity Rate* Trends**

Lost Time Injury Severity Rate is calculated as follows:

\[
\text{Lost Time Injury Severity Rate} = \frac{\text{Number of work days lost}}{\text{Total work hours (per thousand hours)}}
\]

**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**

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

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<thead>
<tr>
<th>Areas of implementation in FY2021</th>
<th>Okayama, Western Yamaguchi, Iwakuni &amp; Otake, Sakai &amp; Senboku, Kawasaki, Oita (All were document-based meetings.)</th>
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<tbody>
<tr>
<td>Areas of implementation in FY2020</td>
<td>Eastern Yamaguchi, Aichi, Chiba, Hyogo (All were document-based meetings.)</td>
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5 Members’ Self-Assessment

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

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<td>2 Identification of striking environmental aspects, identification of dangerous and harmful factors, etc.</td>
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<td>16 Revisions by management</td>
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6 Responsible Care Verification

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):

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.