



**UNITED SEMICONDUCTOR JAPAN
Environmental Report 2022**

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- UNITED SEMICONDUCTOR JAPAN Environmental Report 2022 describes the results of activities undertaken by United Semiconductor Japan Co., Ltd. (USJC) based on our environmental policy and initiatives.
 - The report covers our activities in 2021 (January 1 to December 31, 2021), and also includes some activities undertaken prior to January 1, 2021.

President's Message



President and CEO: Michiari Kawano

Contributing to the Sustainable Development Goals (SDGs) by Enabling a Smart Society with Our Customers

Sustainable Development Goals (SDGs) were adopted by United Nations in 2015. To achieve the 17 targets of SDGs by 2030, business sectors are expected to play a big role in innovation to solve the global environmental issues, such as water, energy, sustainable production and consumption and climate change.

Since starting operations in 1984, Mie Plant has endeavored to continue business in harmony with society and the environment together with our employees through activities to prevent global warming, reduce chemical substances and waste.

USJC aim to realize a smart society with our customers, contribute to the innovation which solves social and environmental issues in order to achieve SDGs by providing customers with technology platforms based on our expertise for semiconductors embedded in "Automobile" and "IoT".

In addition, we contribute to realize a decarbonized society in 2050 in regional cooperation with Mie Prefecture and Kuwana City, where our manufacturing base is located.



Corporate Profile

- Location
 - Principal Office: 2000, Mizono, Tado-cho, Kuwana, Mie, Japan
 - Headquarters: CONCURRED Yokohama, 3-1 Kinkocho, Kanagawa-ku, Yokohama, Kanagawa, Japan
- President and CEO: Michiari Kawano
- Date of Establishment: December 1, 2014
- Business Description: Semiconductor manufacturing
- Employees: 1,057 (April 1, 2022)
- Mie Plant: 2000, Mizono, Tado-cho, Kuwana, Mie, Japan

Headquarters



Mie Plant



Environmental Policy

USJC is constantly thinking about the role we should play in our business activities to realize a sustainable society, and we effort to reduce the environmental impact. We have established an environmental policy and set " Important Themes" to prioritize our efforts toward realization.

■ Environmental Policy

We contribute to the realization of a sustainable society that balances both economic growth and environmental conservation with our customers, through the state-of-the-art semiconductor manufacturing technology with our expertise.

● Operational Principles

We work to reduce the environmental impact of the semiconductor manufacturing lifecycle with the following principles.

We aim to achieve both economic growth and global environmental conservation with our customers and contribute to the realization of a sustainable society.

1. Conform to environmental regulations around the world and keep our promises to customers.
2. Effectively and continually improve our environmental management system, and work hard to improve our environmental performance.
3. Develop products with outstanding environmental characteristics.
4. Promote sustainable use of energy, water, and resources in the semiconductor manufacturing life cycle, as well as mitigate climate change and adapt to it in the international environmental protection framework.
5. Manage and reduce chemical substances appropriately and promote waste control and recycling to prevent environmental pollution.
6. Improve employee's environmental conscious through environmental and social contribution and biodiversity preservation activities.
7. Disclose environmental information and maintain ongoing communication with stakeholders.

● Priority Items

USJC will implement the following priority items in compliance with USJC Environmental policies.

◆Contribution to the realization of a smart society by providing semiconductor manufacturing technology

We will contribute to the realization of a smart society and promote reduction of environmental impact by providing customers with environment-friendly technologies, prototype services.

◆Reduction of environmental impact in our foundry business

We will reduce environmental impact by promoting energy-saving policies, yield improvement, improvement of operational efficiency, management and reduction of chemical substances, and recycling of waste.

◆Improvement of each employee's environmental consciousness

We will contribute to the community's environmental society, promote biodiversity conservation activities, and improve each employee's environmental consciousness.

Environmental Activity Plan

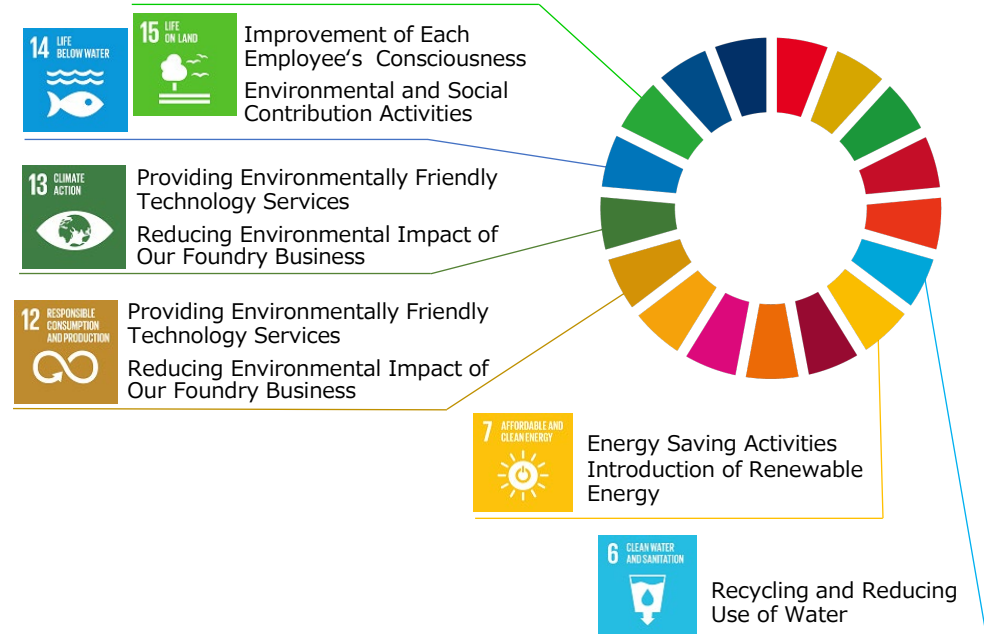
■ Environmental Management System

USJC is implementing an environmental action plan based on an environmental management system that conforms to ISO 14001:2015, and are working to continuously reduce our environmental impact.

Our environmental activities aim to contribute to realize a smart society by providing environmentally friendly technology services to our customers, and to realize a decarbonized society and the SDGs by addressing priority items.

Scope of Environmental Management System

- Mie Plant: Manufacture of LSI
- Headquarters: Customer engineering, Design Support, Business Control of LSI



■ Environmental Targets

We have set environmental targets to be achieved by 2025 and aim to contribute to the SDGs through our environmental activities.

Environmental Targets Items		CY2025 Annual Targets	
1	Promoting activities related to technologies contributing to realize a smart society		Implementing 2 promotion activities
2	Reducing CO ₂ emissions per unit of energy consumption (RV: Results in 2020)		Decrease 24% compared with RV
3	Reducing water consumption per unit (RV: Results in CY2020)		Decrease 5% compared with RV
4	Reducing the amount of waste per unit (RV: Results in CY2019)		Decrease 12% compared with RV
5	Implementing environmental and social contribution activities		More than 7 times

Data on Environmental Impacts of Business Activities

■ CY2021 Key Performance

United Semiconductor Japan

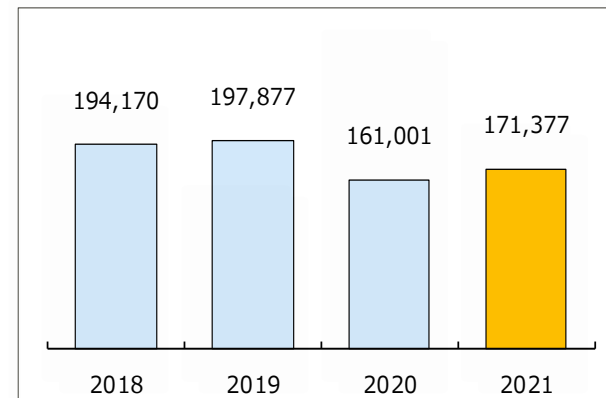
INPUT

OUTPUT

City Gas: 1,899 TCM
 LNG : 109 tons
 Purchased Electricity : 341,233 MWh
 Purchased Water : 4,256 TCM
 Chemical Substances PRTR : 177 tons

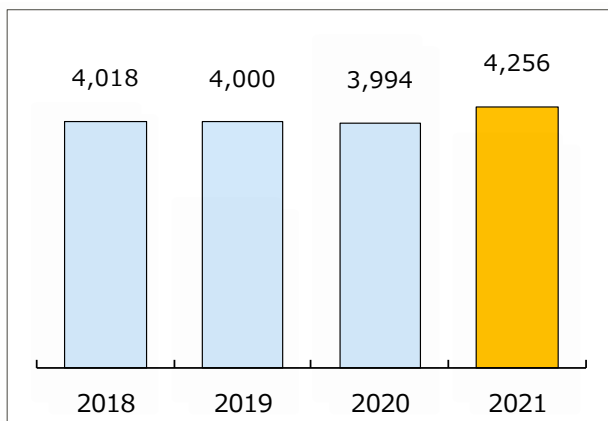
GHG emissions -Scope1-: 41,714 tons
 GHG emissions -Scope2-: 129,663 tons
 Amount of Waste Generated: 4,365 tons
 Discharged Water: 4,033 TCM
 Chemical Substances PRTR: 0.006 tons

● GHG Emissions (Scope1,Scope2*)
 Unit : Tons-CO₂

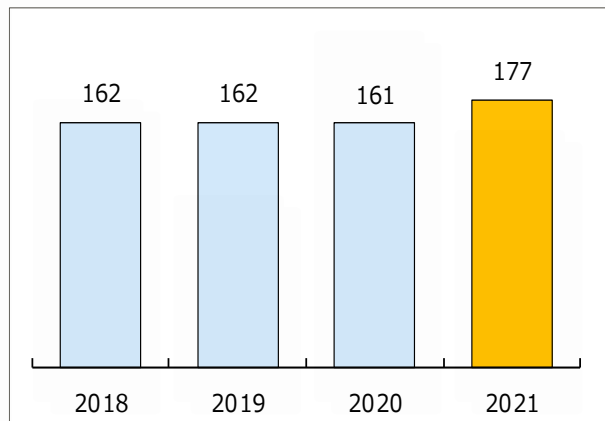


*) The CO2 conversion factor for power consumption was calculated as 0.570 t-CO₂/MWh until 2019, and the emission factor by electric utility is used since 2020.

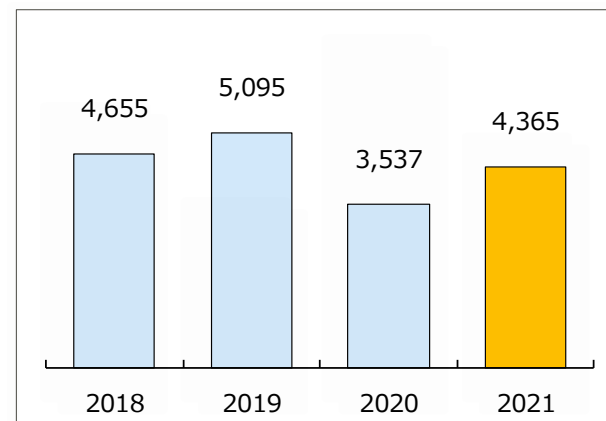
● Water Usage (Purchased volume)
 Unit : TCM



● PRTR Chemical Substances Usage
 Unit : Tons



● Industrial Waste
 Unit : Tons



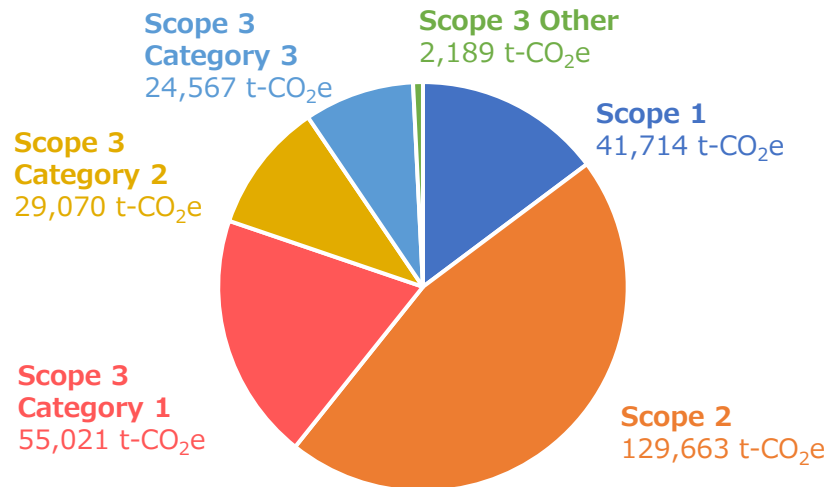
Data on Environmental Impacts of Business Activities

■ Greenhouse Gas (GHG) Emissions in 2021

USJC has started calculating our GHG emissions in 2020 in accordance with ISO14064-1:2018 and our carbon footprint (CFP) in accordance with ISO14067:2018 since 2020. We will use this information to proactively engage in decarbonization with our customers.

- Calculation period: January 1, 2021 - December 31, 2021
- Total GHG emissions: 282,225 t-CO₂e
- CFP: 766.3 kg-CO₂e per sheet
[GHG emissions per wafer manufactured by USJC]

We have been verified and certified to meet ISO 14064- 1:2018 and ISO 14067:2018 standards by DNV Business Assurance Japan K.K. for GHG and DNV Business Assurance K.K. for CFP.



■ Breakdown

Category of Emission	GHG Emissions (t-CO ₂ e)	Percentage (%)
Scope1 Direct GHG Emissions	41,714	14.8
Scope2 Indirect GHG Emissions from Supplied Energy	129,663	45.9
Scope3 Indirect GHG Emissions Other than Scope 1 or Scope 2	110,848	39.3
Total Amounts of Emissions	282,225	100.0

Breakdown of Scope3		GHG Emissions (t-CO ₂ e)	Percentage (%)
Category1	Purchased Products and Services	55,021	49.6
Category2	Capital Goods	29,070	26.2
Category3	Fuel- and Energy Activities not included in Scope 1 or Scope 2	24,567	22.2
Category4	Transportation, Distribution (Upstream)	375	0.3
Category5	Waste Generated in Operations	336	0.3
Category6	Business Travel	23	0.0
Category7	Employee Commuting	1,364	1.2
Category9	Transportation, Distribution (Downstream)	91	0.1

Data on Environmental Impacts of Business Activities

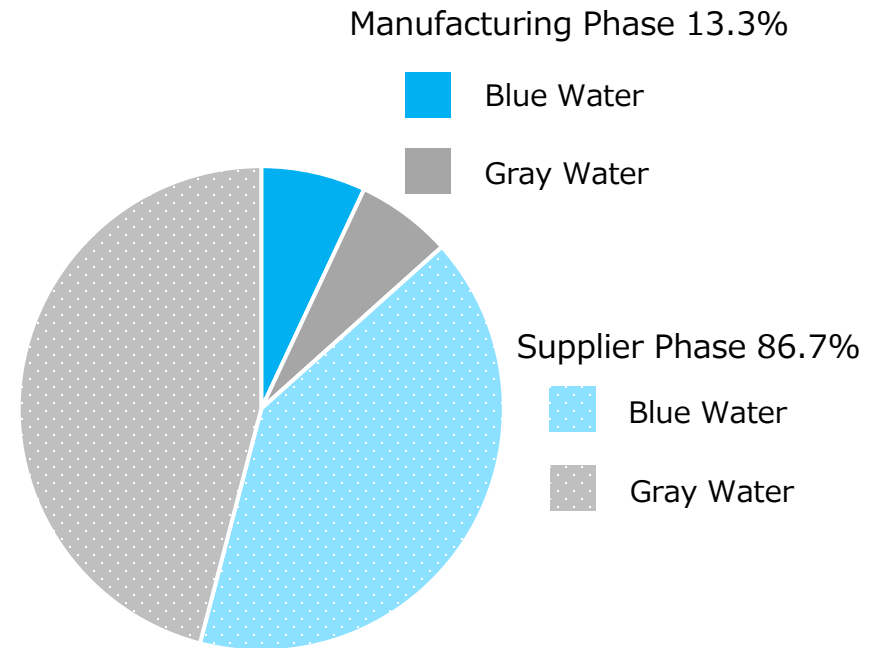
Water Footprint in 2021

USJC has started calculating our water footprint (WFP) in accordance with ISO 14046:2014 since 2021.

We will use this information as our customers, and we work toward sound use and conservation of water resources proactively by visualizing the amount of water used in our supply chain.

- Comprehensiveness: Non-Comprehensive Water Footprint
- Calculation Period: January 1, 2021 - December 31, 2021

We have been verified and certified for our calculation to meet ISO 14046- 1:2018 standards by third-party DNV Business Assurance K.K..











Breakdown

Usage Phase	Green Water (%)	Blue Water (%)	Gray Water (%)	Total (%)
Supplier Phase	0.1	40.8	45.8	86.7
Manufacturing Phase	0.0	6.9	6.4	13.3
Total Volume Usage	0.1	47.7	52.2	100

Citing the Calculation Methodology of The Water Footprint Assessment Manual (2011)

- Green Water : Rainwater withdrawal
- Blue Water : Water withdrawal other than rainwater
- Gray Water : Amount of wastewater discharged when the pollution concentration of wastewater is diluted until it becomes equal to the environmental standard of the discharge water body (Indicators used: BOD, COD, total nitrogen, total phosphorus, SS)

Environmental Targets and Results

	Environmental Targets (CY2021-CY2025)	Contribution to SDGs	Targets CY2021	Results CY2021	Achievement Status
1	Promoting activities related to technology provision contributing to realize a smart society. (Target: Implement 2 activities each year)	 	2 promotion activities	2 promotion activities	Achieved
2	Reducing CO2 emissions per unit of energy consumption in 2025 (RV: Results in CY2020, TA: Decrease 24% compared with RV)	 	Decrease 20% compared with RV	Decrease 26% compared with RV	Achieved
3	Reducing water consumption per unit in 2025 (RV: Results in CY2020, TA: Decrease 5% compared with RV)		Decrease 1% compared with RV	Decrease 11% compared with RV	Achieved
4	Reducing the amount of waste per unit in 2025 (RV: Results in CY2019, TA: Decrease 12% compared with RV)		Decrease 10% compared with RV	Decrease 13% compared with RV	Achieved
5	Implementing Environmental and social contribution activities (TA: Implement more than 7 activities each year)	 	7 times	7 times	Achieved

Providing Ultra-Low Power Consumption Technology

In order to achieve the ultra-low power consumption that is essential for mobile and wearable devices, USJC developed technology for ultra-low voltage and ultra-low leak transistors. As a result, we have achieved approximately 50% reduction in power consumption at the same operating speed in comparison with conventional products.

With this technology, we provides low power solutions that meet the various needs of our customers. USJC is the first in the world to manufacture such ultra-low voltage and ultra-low leak transistors and is the only foundry mass-producing such products.



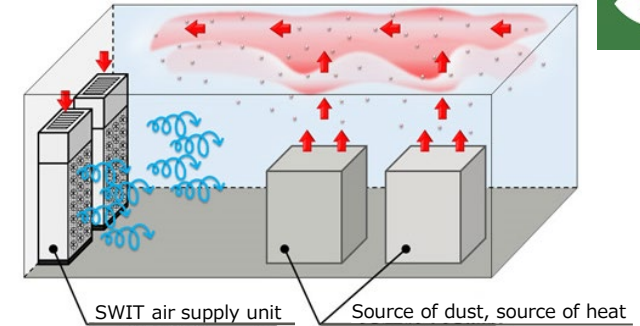
Initiatives for Environmental Targets

■ Reduce CO₂ emissions from energy consumption

USJC is continuing its efforts to use energy more efficiently.

The production lines of USJC is energy-saving plant used the most advanced technology available when they were constructed.

When the plant was expanded in 2015, we employed a swirling induction type HVAC system (SWIT) in the wafer fabrication clean room of the semiconductor front-end process for the first time in the world. We make efforts to manufacture high-quality products with less environmental impact than conventional air conditioning systems. We also continue to promote reduction measures by planning and executing efficient energy use to contribute to global warming prevention every year.



Overview of SWIT system



■ Introduction of High-efficiency centrifugal chiller with new refrigerant

When we replaced the chiller in the plant area starting in CY2020, we selected High-efficiency turbo centrifugal chiller that would help us address climate change that would be effective in both saving energy and reducing the load of refrigerant Freon as a measure to address climate change issues.

In 2021, we replaced one existing chiller with a High-efficiency centrifugal chiller that uses a non-Freon refrigerant, resulting in a 12% reduction in CO₂ emissions from energy use (CO₂ reduction:160 t-CO₂/year) compared to the previous unit. We selected R-514A as the refrigerant and the Global Warming Potential (GWP) can be reduced from 1430 times the CO₂ emissions to less than 2 times.

This shows our contribution to the countermeasures against global warming.

We will continue to save energy and combat global warming by introducing high-efficiency chiller that uses non-CFC refrigerants which is not regulated by the revised CFC law until 2030.

Chiller refrigerant comparison

	Existing	New
Refrigerant	R-134a	R-514A
Pressure	High	Low
Classification	Freon	Non-Freon
GWP※	1430	<2

※Global warming potential



Centrifugal chiller with Non-Freon refrigerant



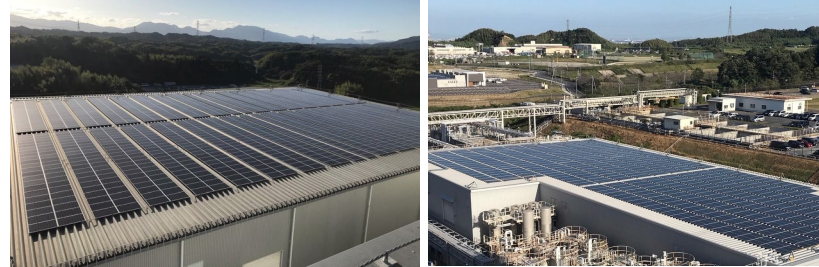
Initiatives for Environmental Targets

■ Efforts to improve the ratio of renewable energy

USJC will increase the ratio of renewable energy such as solar power among the electricity used in our plant with the aim of contributing to a decarbonized society.

In 2021, solar panels at Mie Plant generated 957 MWh of electricity.

We will continue to systematically install solar panels on our site.



Solar power panel installed in Mie Plant



■ Implement measures for efficient use of water

We have been actively working to plan and implement water efficiency measures since FY2013.

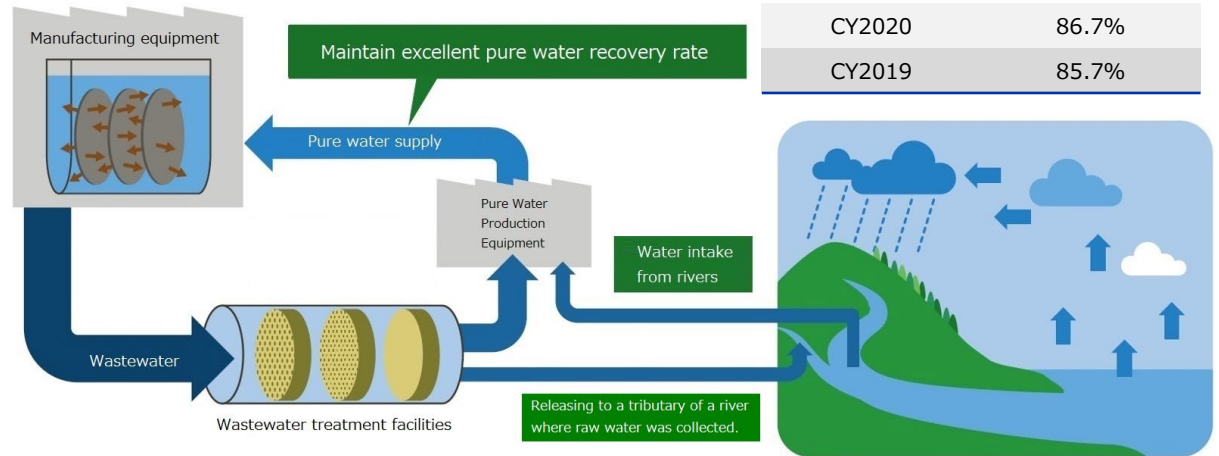
Water resources cycle

On production lines, we work to conserve water resources by recovering process effluent after pure water use, and recycling effluent into pure water again.

Acid-alkaline and hydrofluoric acid effluent are collected, recycled, and reused to replenish circulating water in exhaust-gas treatment equipment, as washing water, and so on.

We are working to realize water resources cycle by returning clean water, properly treated with water treatment systems based on the latest technology, to the rivers joining main rivers from which industrial water is drawn.

We will actively strive to improve its water recycling rate and achieve even more effective use of water resources.



Overview of water resources cycle



Initiatives for Environmental Targets

■ Reduce industrial waste generation

USJC actively implements 3R (Reduce, Reuse, and Recycle) to reduce environmental burden.

We have also installed stirred type crystallizers developed for high concentration fluorine-containing effluent treatment and formed particulate fluorite from recovered high concentration hydrofluoric acid effluent. Through installation of such equipment and sales to chemical manufacturing companies, the company has achieved a mechanism for sourcing recycled hydrofluoric acid. We are also working on the effective use of resources by collecting waste sulfuric acid used at plants and selling it for reuse in wastewater treatment.

Additionally, separating the collected waste oil and waste solvents in a proper way, implementing reusing renewable fuels as raw materials and using fuel sources in place of fossil fuels will be expected to contribute to the establishment of a Sound Material-Cycle Society.

As a result of these initiatives, we have reduced our waste generation in 2021 by approximately 730 tons compared to 2019.



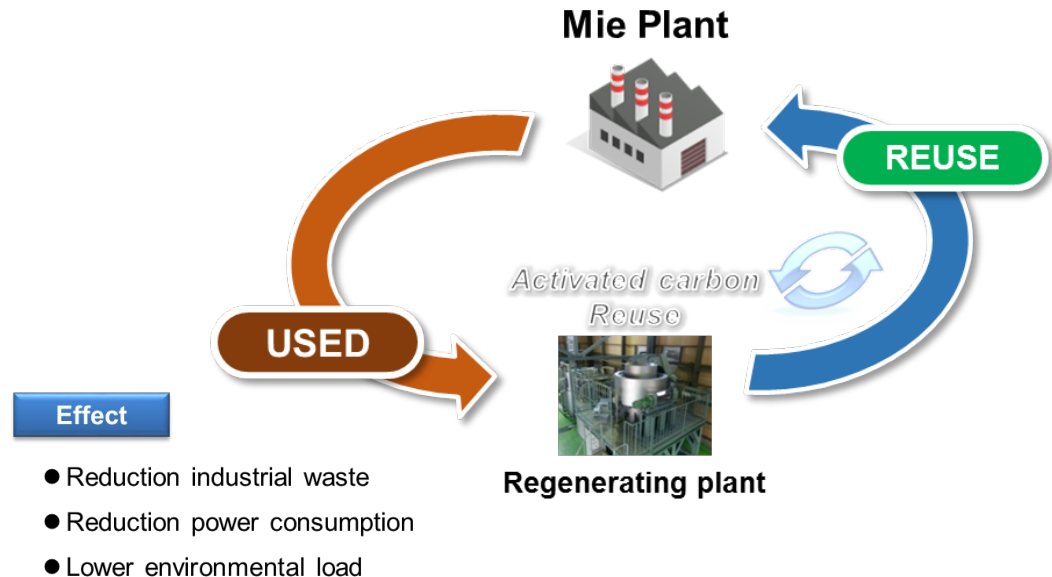
■ The world's first challenge of waste reduction through regeneration of activated carbon technologies.

We have been working on the world's first activated carbon regeneration technology. In 2018, we started actual operation optimized based on the results of the verification test and continue stable operation.

The technology applies the force of a supercritical fluid to high-performance activated carbon used at the exhaust processor and has proven to be more successful at prolonging the lifetime of activated carbon compared to the conventional method.

As a result, we reduced the amount of activated carbon waste to a half of the previous level in 2021.

We continuously will take the initiatives to reuse and make efforts to eliminate the waste.



Overview of the reuse of activated carbon

Initiatives for Environmental Targets

■ Implement Regional Contribution activities

USJC works to improve the individual environmental consciousness of our employees through various activities, to help them become good environmental citizens, promote the biodiversity conservation, and make environmental and social contributions in their local communities.

■ Kuwana City Adopt Program

As initiatives for Environmental Targets, we carries out clean-up activities in the area surrounding the plant, including the neighborhood park, four times every year.

CY 2021 Total Number of Participants: 148

Note: The Adopt Program provides cleaning and beautification activities for roads, parks, and other public spaces by specifying locations for volunteer citizens and businesses.

■ Clean-up Volunteer Activity

We participate in a “River and Sea Cleanup Campaign” every October, an external event sponsored by Ministry of Land, Infrastructure, Transport and Tourism (MLIT) at Ibi River relevant to the Mie Fab. We call on employees and their families to participate as volunteers in the event and actively join in.

Note: Cancelled in 2021 to prevent COVID-19 infection.

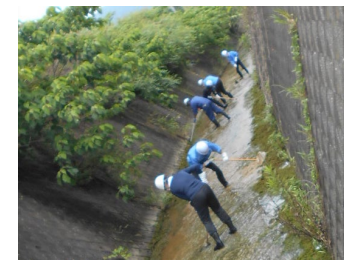
We also cleanup the Oku-Osugidani River once a year where we discharge factory wastewater.



ADOPT PROGRAM



River and Sea Cleanup Campaign



Clean up of the Oku-Osugidani River

Initiatives for Environmental Targets

■ Implement Regional Contribution activities

■ Kanagawa Kintaro☆Book Kifu

Since 2021, we have participated in regional contribution activities "Kanagawa Kintaro Book Kifu" in Kanagawa Prefecture, where the head office is located.

USJC asked employees to donate items such as books, comics, CDs, DVDs and games and endowed 136 items which was valued at some price.

Profits from the donation will be used by the "Kanagawa Trust Green Fund (Kanagawa Prefecture's green space protection activity)" to pass on Kanagawa's precious green nature to the next generation.



Collected books, etc.



■ Activities to Provide Killifish

Every May, we provide neighboring elementary schools with medaka fish (killifish) that have been bred in the Mie Plant for monitoring discharged water.

This is useful for science classes in which 5th grade children raise and observe killifish.



Killifish



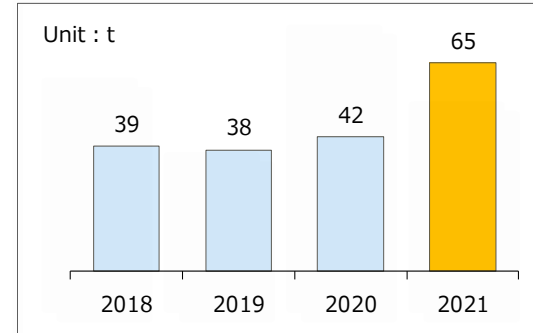
Activities on reduction of environmental burden

■ Reduce discharges of VOCs

USJC sets up exhaust-gas treatment equipment for emission prevention of acid and alkaline gas, takes measures to remove organic exhaust-gas (VOCs) by adsorption systems using activated charcoal, and works to reduce the effects on the environment. In 2021, VOCs emissions increased by approximately 1.5 times compared to the previous year due to increased plant operations.

Since VOCs emissions are expected to increase in the future due to high operations, we are planning to add an activated carbon adsorption facility for VOCs in 2023 to reduce emissions.

VOCs emissions

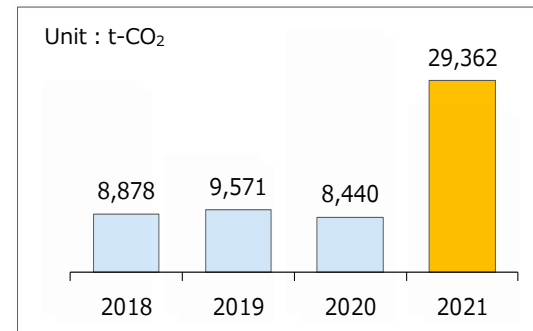


■ Reduce PFCs emissions

We have been making effort to reduce GHG emissions other than CO₂ (PFC, HFC, NF₃, SF₆). On production lines, catalytic decomposition systems have been installed on all equipment producing GHG, and we aggressively promotes GHG emission reduction.

The calculation method has been changed from the IPCC Guidelines 2006 Revision to the 2019 Revision starting with the 2021 results. As a result, more of by-product PFCs generation and emissions were included in the calculation.

PFCs emissions



■ Activities on forest conservation

We have been using FSC forest certification paper in our offices since the purchase in 2019 and cooperating in sustainable forest conservation. FSC certification clarifies that products from well-managed forests suitable for environmental, social and economic benefits are certified with the FSC logo. As more products with this logo enter the market and purchased, it is expected that properly managed forests will be protected, and timber can be consumed while preventing deforestation.

FSC logo is one of the environmental labels used as a guideline for green procurement.



Activities on reduction of environmental burden

■ Reducing CO₂ emissions by cutting down shipments by air through logistics management.

By strengthening time management and shipping by land instead of air, CO₂ emissions from logistics have been reduced. Through this activity, USJC will contribute to the reduction of CO₂ in customer's product life cycle.



■ Reducing the number of engineering lots by TCAD

We use a simulation tool, Technology CAD (TCAD), to reduce environmental burden of technology development. TCAD narrows down experimental conditions and analyze failures, resulting in a decrease in the number of experimental lots. This leads to a decrease in the use of energy, chemicals, and gases for prototyping, contributing to a reduction of environmental burden of Mie Plant.



■ Collaboration with Suppliers in Environmental Activities

Recent global trends in reducing environmental burden and the needs of external stakeholders require us to cooperate with suppliers in environmental activities. We have built long term relationships with local onsite gas manufacturers since FY2018 and has been working and exchanging opinions with them to (1) reduce CO₂ emissions, (2) conserve biodiversity and (3) conserve water resources.



■ Alien Species Extermination Activities

Every May, as an alien species extermination activity, we get rid of a specific alien species plant "Lance-leaved coreopsis", which is spreading around the site. We will continue to promote activities aimed at complete extermination around the site.



Lance-leaved coreopsis



Before Extermination



After Extermination

Efforts to Control Chemical Substances

USJC has been working to respond appropriately to regulations of each country on chemical substances contained in products, and has developed a system for issuing non-use certificates of specified chemical substances in response to customer requests.

We are also working to establish a Hazardous Substance Process Management (HSPM) system.

In May 2020, we completely abolished for all products the use of chemicals containing PFOA, which is a persistent organic fluorine compound that may have an adverse effect on the ecosystem.



Efforts to Enhance Safety and Security in Plant

Since the days of FSL Mie Plant, we have been making ongoing efforts to reduce impacts on aquatic environments, such as contamination of effluent quality with hazardous substances, COD, nitrogen, or phosphorus, through appropriate operation management including adoption of a water-treatment system using the latest technologies.

As for monitoring of effluent quality, we continuously monitor killifish and their breeding in discharged water for biodiversity conservation. The Killifish have bred repeatedly since FY 2012, the year following the start of monitoring.

We set up a new aquarium for monitoring killifish in June 2013 and donates the killifish for educational purposes to local elementary schools as part of its regional contribution activities. As other efforts to enhance safety and security in the plant, we implemented environmental analysis and confirms compliance with environmental regulations.

As part of safety risk management, we also hold safety promotion liaison conferences with partner companies annually in conjunction with an online meeting as COVID-19 infection measures. We continuously cooperate with partner companies and meets customer's expectations as a safe and secure factory.



Aquarium for monitoring killifish Breeding



Killifish



Regular environmental analyses



Safety promotion liaison conference with partner companies

Compliance with Environmental Laws and Regulations

■ Legal Compliance

USJC maintains the management condition of legal compliance through established quarterly survey and confirmation procedures. We also works to take actions at early stages by gathering the latest information regarding amendments of laws and trends in new regulation.

【Compliance】

- USJC reaffirmed compliance through an internal audit based on its environmental management system and verified that there were no problems.
- There was no occurrence of accidents or exceeding of regulatory value according to the results of environment analyses related to wastewater and exhaust gas in 2021.
- Regarding the soil contamination reported to Mie Prefecture and Kuwana City in May 2008, we continue purification work by pumping up contaminated water and monitoring the surrounding environment. We submitted the results to Mie Prefecture and Kuwana City in January, 2021 as a regular report required once a year.
- Since some deficiencies were found in the notification of Mie Plant regarding the Water Pollution Control Law, we reported them to Mie Prefecture in December 2021 and submitted the necessary notification. We will make every effort to prevent recurrence.
- We confirmed that there were no problems related to other regulations or requirements.

Environmental Audit

USJC underwent ISO14001:2015 audit by Japan Environmental Certification Organization (JACO), and acquired ISO14001:2015 certification in March 2019.

In addition, we strive to maintain and improve our environmental management system through an environmental audit every year by internal auditors trained within our company.

To make audits effective, auditor education programs are implemented each year to help improve the competency of its internal auditors. We enhances its auditing system through audits for company-wide legal compliance by auditors with external credentials.

Regarding the matters pointed out in CY2021 internal audit, corrective actions were taken, including measures to prevent any recurrence, and this information is being effectively used for continuous system improvement.

Environmental Education and Enlightenment Activities

■ Environment Exhibition

We hold an Environmental Month event to raise employee awareness of the environment in every June along with National Environment Month. Through environmental education and photo exhibitions, we strive to raise awareness of employees for contribution to the SDGs, global warming issues, and biodiversity conservation.

■ Environmental Photo Contest

As an opportunity for raising awareness of biodiversity, every year we ask employees to submit photos relating to biodiversity, and a biodiversity photo exhibition is held to display the most outstanding works. Through these efforts, we will continue to strive to raise awareness among employees so that they will be more interested in protecting the natural environment.

First Prize in 2021



Prize for Excellence in Quality



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