

MIE FUJITSU
SEMICONDUCTOR
Environmental
Report
2018



shaping tomorrow with you

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■ The 2018 Environmental Report of Mie Fujitsu Semiconductor Limited describes the results of activities carried out by Mie Fujitsu Semiconductor Limited based on specific approaches and efforts relating to environmental aspects of the Fujitsu Semiconductor Group, which handles the semiconductor business of the Fujitsu Group.

■ The report period covers activities in FY 2017 (April 1, 2017 to March 31, 2018). However, the report also includes some material on activities prior to April 1, 2017.

■ Information in this report generally refers to Mie Fujitsu Semiconductor. However, some data on environmental burdens includes impact data from the Mie Fab of Fujitsu Semiconductor.

President's Message



President and CEO: Michiari Kawano

Contributing to the Sustainable Development Goals (SDGs) with Ultra-Low Power Consumption Technology

"The 2030 Agenda for Sustainable Development" was adopted at the United Nations in 2015. As an Action Plan for human, earth and prosperity, the Agenda encourages all the nations to save the earth while seeking prosperity with the 17 Sustainable Development Goals (SDGs). SDGs demonstrate various fields on environment of the earth such as water, energy, sustainable production and consumption, and climate change. Companies are expected to come up with new innovation to solve the problem.

In the future, growth is expected in the automotive field, where the number of semiconductors installed per vehicle is expected to increase dramatically, and in IoT where all sorts of things will be connected to the network. We think we can contribute to innovation to resolve social and environmental problem by providing technology platform with our expertise for customers in automotive and IoT market.

Since starting operation in 1984, the Mie Fab, the manufacturing base of Mie Fujitsu Semiconductor (MIFS), has continuously made efforts to reduce environmental impacts through activities such as promoting measures to counteract global warming, reducing chemical substances used in products, reducing waste, and so on. In addition, we work to contribute to the Sustainable Development Goals (SDGs) by offering products that have an ultra-low power consumption design, one of our areas of expertise.

We will continue to promote activities to reduce environmental impacts on our customers and the Earth under Fujitsu and Fujitsu Semiconductor Group's Environmental Policy.

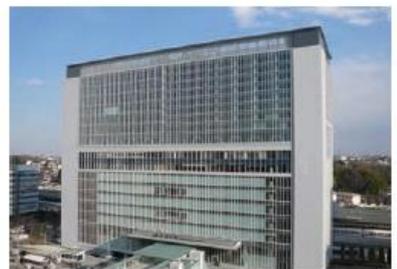
Corporate Profile

MIFS works to ensure the stable supply of its semiconductor devices with superior environmental performance and to reduce environmental burden in its business activities.

It pursues its environmental policy to contribute to the achievement of a prosperous low-carbon future.

- Location
 - Principal Office: 2000, Mizono, Tado-cho, Kuwana, Mie, Japan
 - Head Office: Shin-Yokohama Chuo Building, 2-100-45 Shin-Yokohama, Kohoku-ku, Yokohama, Kanagawa, Japan
- President and CEO: Michiari Kawano
- Date of Establishment: December 1, 2014
- Business Description: Semiconductor manufacturing
- Employees: 968 (April 1, 2018)
- Manufacturing Fab
 - Mie Fab: 2000, Mizono, Tado-cho, Kuwana Mie, Japan
- Business Office
 - Shin-Yokohama Design Center: Shin-Yokohama TECH Building 3-9-18 Shin-Yokohama, Kohoku-Ku, Yokohama, Kanagawa, Japan
 - Nagoya Design Center: Nagoya Prime Central Tower 2-27-8 Meieki, Nishi-ku, Nagoya, Aichi, Japan

Head Office



Mie Fab



Environmental Policy

Fujitsu Group obtained global integrated certification under the ISO 14001 international standard for environmental management systems in 2005. All group companies, in Japan and abroad, conduct environmental practice based on the same management system.

Fujitsu Semiconductor Group advances environmental management involving the entire group based on its Environmental Policy enacted under the Fujitsu Group Environmental Policy. It also developed the "Fujitsu Semiconductor Group Environmental Targets and Goals" to set clear numerical targets to achieve based on the Fujitsu Group Midterm Environmental Vision "FUJITSU Climate and Energy Vision" and "Environmental Action Plan."

MIFS pursues environmental activities as a member of the Environmental Management Organization under the Fujitsu Semiconductor Group Environmental Policy, and also seeks improvement in a planned and consistent way toward achieving goals related to "Contribution to Society," "Our Own Business Activities" and "Ongoing Management Targets," as roles which MIFS ought to fulfill in the Fujitsu Semiconductor Group.

■ Mie Fujitsu Semiconductor Scope of Environmental Management System

- Mie Fab: Manufacturing LSI
- Head Office: Business Management and Marketing of LSI
- Shin-Yokohama Design Center: Design Support
- Nagoya Design Center: Design Support

■ Environmental Policy

As a Member of the Fujitsu Semiconductor Group, MIFS identifies important themes as priority issues and actively promotes Environmental Action under the Fujitsu Semiconductor Group Environmental Policy.



Fujitsu Group Environmental Policy

■ Philosophy

The Fujitsu Group recognizes that conservation of the global environment is a vitally important business issue. By utilizing our technological expertise and creative talents in the ICT industry, we seek to contribute to the promotion of sustainable development. In addition, we not only observe all environmental regulations in our business operations, we also actively pursue environmental conservation activities on our own initiative. Through our individual and collective actions, we continuously strive to safeguard a rich natural environment for future generations.

■ Principles

- We help customers and society reduce the environmental impact of their business activities and improve environmental efficiency with advanced technologies, ICT products and solutions.
- We proactively promote environmentally conscious business activities to help the environment and economy coexist harmoniously.
- We strive to reduce the environmental impact of our ICT products and solutions throughout their entire lifecycle.
- We are committed to conserving energy and natural resources, and practice the 3Rs approach (reduce, reuse and recycle) to create best-of-breed eco-friendly products and solutions.
- We seek to reduce risks to human health and the environment from the use of chemical substances and waste.
- We disclose environment-related information on our business activities, ICT products and solutions, and we utilize the resulting feedbacks to critique ourselves in order to further improve our environmental programs.
- We encourage our employees to work on global environmental conservation such as tackling climate change and preservation of biodiversity through their business and civic activities to be role models in society.

Fujitsu Semiconductor Group's Environmental Policy

■ Philosophy

With our customers, we contribute to the conservation of a rich global environment, using state-of-the-art technology to provide semiconductor devices with superior environmental characteristics.

■ Operational Principles

By applying the following principles, we work to prevent pollution of the global environment and reduce the environmental burden of our products throughout their lifecycles, including development, procurement, manufacture, sales, usage, and disposal:

1. We develop products with outstanding environmental characteristics.
2. We promote proper management of chemical substances contained in products, packaging materials, etc.
3. We promote measures to counteract global warming, effective utilization of water and resources, and proper management of wastes.
4. We promote proper management of chemical substances to prevent pollution of the global environment.
5. We conform to environmental regulations around the world and keep our promises to customers.
6. We promote activities to make environmental and social contributions, and to preserve biodiversity.
7. We effectively and continually improve our environmental management system, and work hard to improve our environmental performance.

Mie Fujitsu Semiconductor Limited Important Themes

Mie Fujitsu Semiconductor Limited will implement the following important themes in compliance with Fujitsu Semiconductor Group's environmental policies.

- Reduction of environmental impact with the use of ultra-low power consumption technology
We will actively contribute to reducing environmental impact on our customers and the Earth by offering products manufactured to use ultra-low power consumption technology.
- Reduction of environmental impact in our foundry business
We will achieve reduction in environmental impact in the following areas by promoting energy-saving policies, improvements in production efficiency, and appropriate recycling of our waste:
 - Greenhouse gas (CO₂, PFCs) emissions
 - VOC (Volatile Organic Compound) emissions
 - Generation 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 Activities (of MIFS)

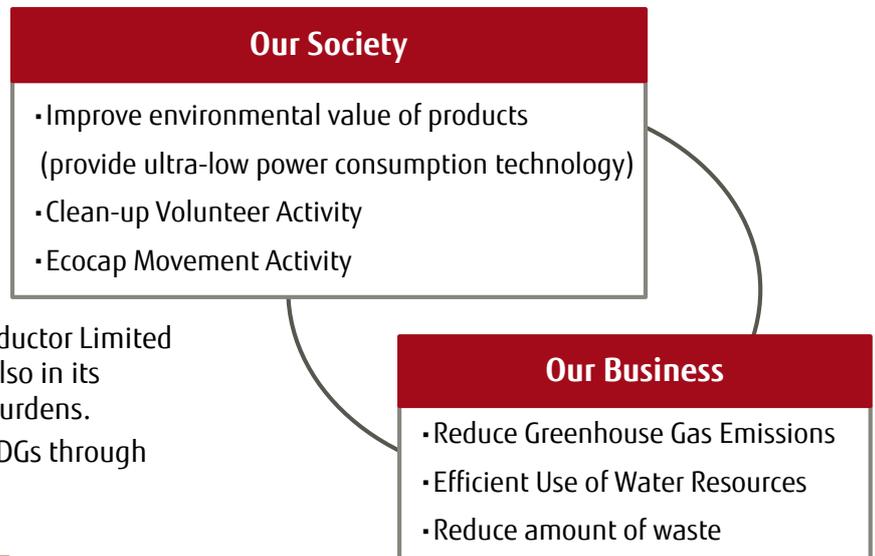
Activity Plan Based on Fujitsu Group Environmental Action Plan Stage VIII

Since fiscal 2016, we have been working on the activity targets regarding "Our Society" and "Our Business" stated in Fujitsu Group Environmental Action Plan Stage VIII.

The Fujitsu Group Environmental Action Plan Stage VIII enhances the activities of Stage VII, "Contribution to Society" and "Our Own Business Activities". We will contribute to reduction of the environmental impact on society by providing our customers with our expertise in ultra-low power consumption technology.

Additionally, MIFS includes "Fujitsu Semiconductor Limited (FSL) Mie Fab" in the hub organization and also in its previous numerical value as environmental burdens.

Furthermore, we will contribute to achieve SDGs through environmental activities.



Targets and Results in FY 2017

Environmental Targets (FY2016-FY2018)	Our target SDGs	FY 2017 Targets	FY 2017 Results	Achievement Status
1 Reduce CO ₂ emissions from energy consumption (RV: results for FY2013, TA: Compared with RV, 15% decrease)		209,027 tons (Compared with RV, 9% decrease)	185,544 tons (Compared with RV, 19% decrease)	Achieved
2 Take measures to reduce water use for FY2016-2018 (TA: Take measures to reduce by 28,620 m ³)		Take measures to reduce by 19,260 m ³	Take measures to reduce by 27,900 m ³	Achieved
3 Reduce amount of waste generated (RV: Average results for FY2012-2014, TA: Compared to RV, 2% decrease)		5,783 tons (Compared with RV, 7% increase)	4,870 tons (Compared with RV, 10% decrease)	Achieved
4 Implement Regional Contribution activities		7 times	7 times	Achieved
5 Promote development of ultra-low power consumption technology		Implement 2 promotion activities	Implement 2 promotion activities	Achieved

Note) Effective from Stage VIII, the method of calculating CO₂ emissions from energy consumption has been changed so as to use the coefficients designated in guidelines for calculating emissions in the Act on the Promotion of Global Warming Countermeasures.

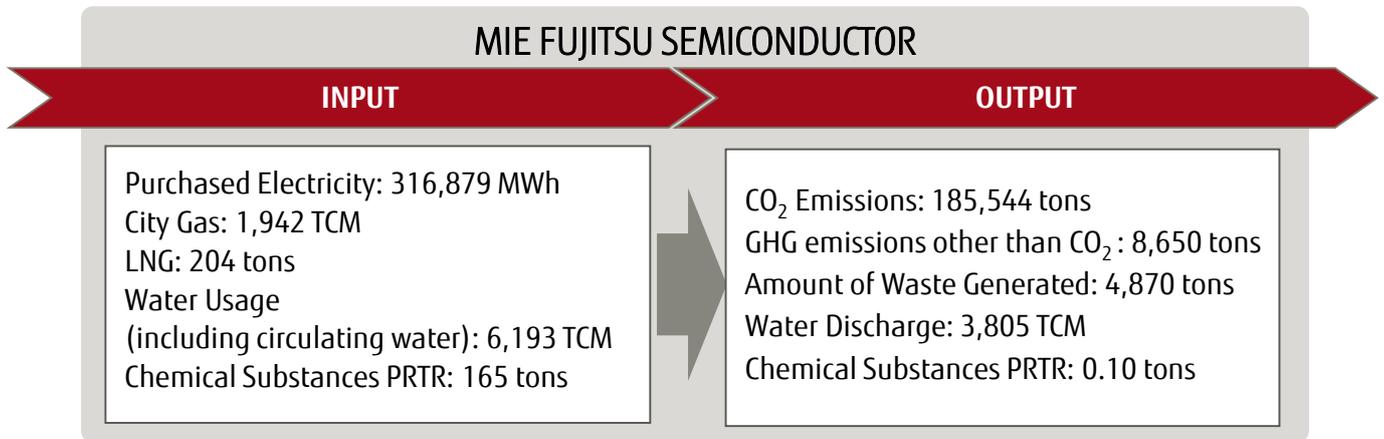
Providing ultra-low power consumption technology

In order to achieve the ultra-low power consumption that is essential for mobile and wearable devices, MIFS developed technology for ultra-low voltage and ultra-low leak transistors. As a result, MIFS has achieved approximately 50% reduction in power consumption at the same operating speed in comparison with conventional products. With this technology, MIFS provides low power solutions that meet the various needs of our customers. MIFS 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.

Environmental Activities (of MIFS)

Data on Environmental Impacts of Business Activities

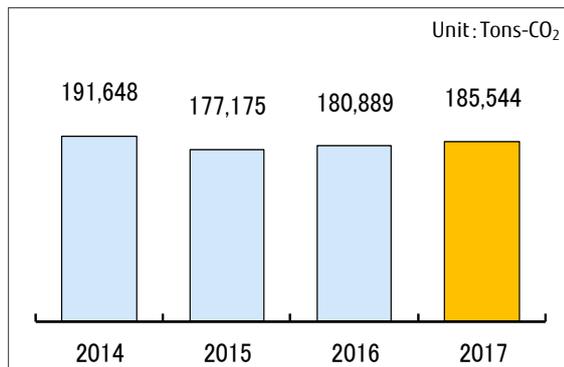
■ FY 2017 Key Performance



■ Change of Environmental Burdens over time

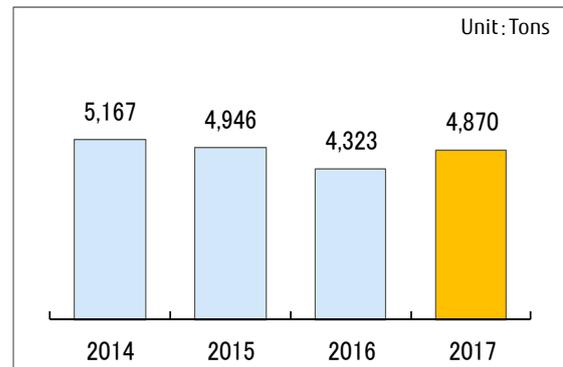
Along with the plant expansion started in FY 2015, figures of INPUT have been increasing since FY 2016, we strive to manage effective utilization of resources and reduce figures of OUTPUT.

● CO₂ Emissions from energy consumption*

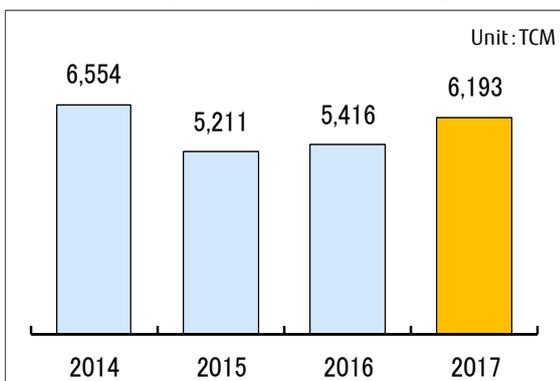


*: MWh power consumption = 0.570 Tons-CO₂

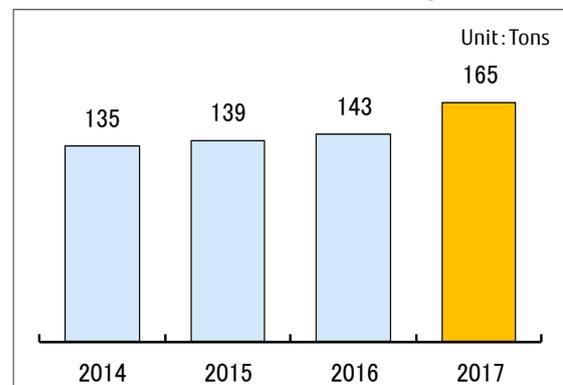
● Industrial Waste



● Water Usage (including circulating water)



● PRTR Chemical Substances Usage



Note: Numerical data refers to data of MIFS Mie Fab (including FSL Mie Fab). The data for the Head Office (Shin-Yokohama) is included in that of Fujitsu Electronics Inc. (FEI) as a contractor of the rental office building, and the data for the Shin-Yokohama Design Center is included in that of FSL. Thus these are not included in the data on this report.

Initiatives for Environmental Targets

■ Target 1: Reduce CO₂ emissions from energy consumption

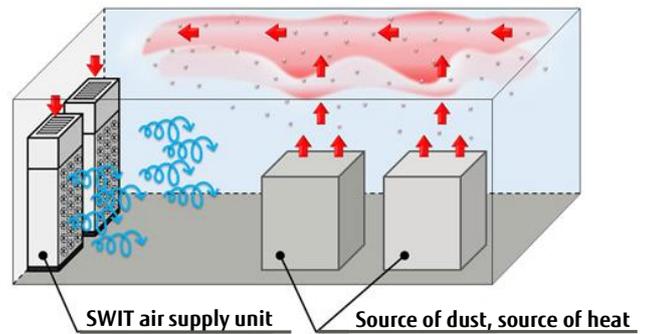
MIFS is continuing its efforts to make energy use more efficient.

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

When the plant was expanded in 2015, it employed a swirling induction type HVAC system (SWIT) in the wafer fabrication cleanrooms for the semiconductor process, a world first, and strong efforts are being made to realize high-quality product manufacturing with a smaller environmental footprint than conventional air-conditioning systems.

MIFS also pursues ongoing reduction measures by planning and executing efficient energy use to contribute to global warming prevention every year.

Furthermore, MIFS will adopt the most advanced technology for energy efficiency, and work toward factories that even more energy efficient.



Overview of SWIT system

■ Introduction of High-efficiency centrifugal chiller with new refrigerant

When we replaced the chiller for office area in FY 2017, we selected the chiller that would help us address climate change in order to use power efficiently and reduce the environmental load of refrigerant.

With its highly efficient variable speed drive, the new centrifugal chiller reduced CO₂ emission through energy usage by 70% (2,743 t-CO₂/year) compared to the previous unit.

Moreover, the unit employs a new type of refrigerant – hydrofluoroolefin (HFO) – that features a Global Warming Potential (GWP) of 1, which is a stark contrast to the 1,300 GWP of conventional refrigerants. This shows our contribution to the countermeasures against global warming.

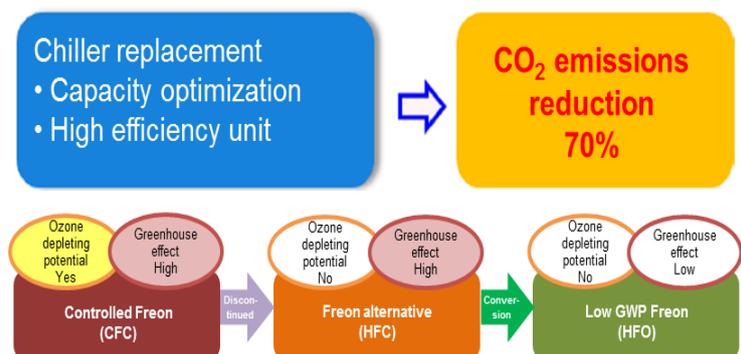
We will continue to seek out and introduce eco-friendly equipment.



Centrifugal chiller with new refrigerant

[Comparison of refrigerant]

	Existing refrigeration unit HFC (Conventional refrigerant)	New refrigeration unit HFO (New refrigerant)
GWP	1,300	1
Atmospheric lifetime	13.8 years	26 days
Fluorocarbons Emission Control Law	Applicable	Not applicable
High Pressure Gas Safety Law	Special handling required	Special handling not required
Rated COP (200Rt type)	6.1	6.3



Initiatives for Environmental Targets

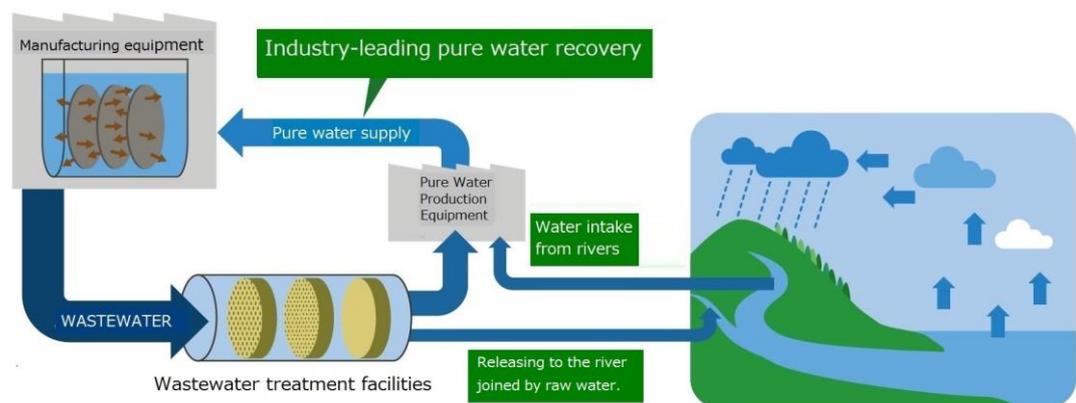
■ Target 2: Implement measures for efficient use of water

MIFS has been actively working to plan and implement water efficiency measures since FY 2013.

On production lines, MIFS works 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.

MIFS is 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.

Going forward MIFS will actively strive to improve its water recycling rate, and achieve even more effective use of water resources.



Overview of water resources cycle

■ Target 3: Reduce industrial waste generation

To reduce environmental burden, MIFS actively implements 3R (Reduce, Reuse, and Recycle).

MIFS has 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.

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 make a contribution to the establishment of a Sound Material-Cycle Society.



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

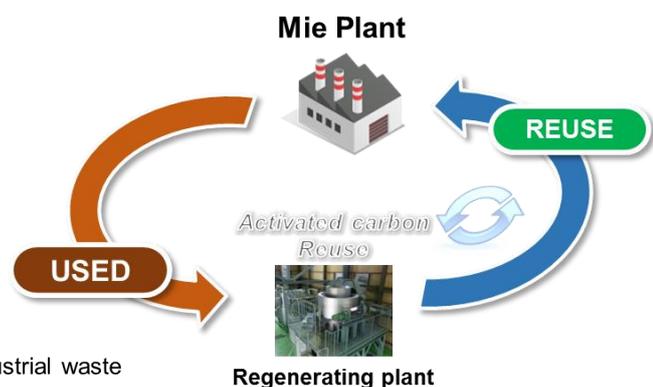
In FY 2017, the world's first challenge was made to eliminate waste through regeneration of activated carbon technologies

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.

Activated carbon waste disposal is expected to reduce by 75%.

Effect

- Reduction industrial waste
- Reduction power consumption
- Lower environmental load



Overview of the reuse of activated carbon

Going forward, we will take the initiatives to reuse, and make efforts to eliminate the waste.

Environmental Activities (of MIFS)

■ Target 4: Implement Regional Contribution activities

MIFS works to improve the individual environmental consciousness of our employees, 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

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

(FY 2017 Total Number of Participants: 108)

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



ADOPT PROGRAM

■ Clean-up Volunteer Activity

MIFS participates in a "River and Sea Cleanup Campaign" every October, an external event sponsored by Ministry of Land, Infrastructure, Transport and Tourism, (MLIT) at Ibigawa, a river relevant to the Mie Fab.

MIFS calls on employees and their families to participate as volunteers in the event and actively joins in.



River and Sea Cleanup Campaign

■ Ecocap Movement Activity

MIFS sympathizes with the Ecocap Movement, which collects and recycles caps from plastic bottles as resources and uses the proceeds to purchase vaccines for children around the world. MIFS collects and donates caps to the Ecocap Movement organization.



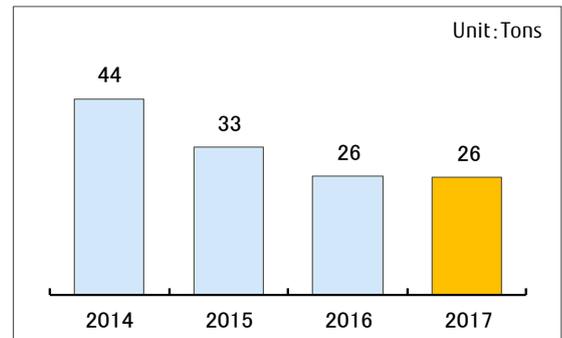
Activities on reduction of environmental burden

Reduce discharges of VOCs

MIFS 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.



VOCs emission

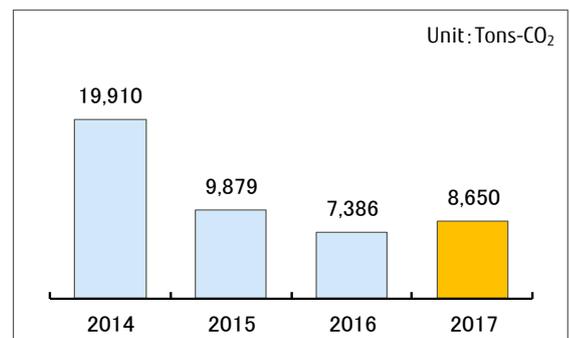


Reduce PFCs emissions

MIFS has made continuing effort to reduce GHG emissions other than CO₂ (PFC, HFC, NF₃, SF₆) since the days of FSL Mie Fab. On production lines, catalytic decomposition systems have been installed on all equipment producing GHG, and MIFS aggressively promotes GHG emission reduction. Moreover, MIFS implements appropriate operation management regarding systems to maintain their performance.



PFCs emission



Our activities

We are positively promoting activities to alleviate the environmental burden in each work site. In regard to activities that were conducted in FY 2017, 5 examples are introduced below.



Reducing CO₂ emissions

We attempt to transport products to domestic destinations by land as much as possible instead of air flight to reduce CO₂ emissions.

Activities on reduction of environmental burden

■ Our activities

■ Reducing the time of investigation and restoration in system malfunction

System malfunctions directly affect fab operation and make the waste of energy. We are working on that problem by controlling system malfunction, minimizing its influences and improving skills to deal with it.

■ Eliminating operational errors by FEMA

Operation errors make a bad effects on energy-savings. We are engaged in activities to reduce and eliminate the operational errors that have the highest risk first based on FEFA (Failure Mode and Effect Analysis)

■ Reducing the number of engineering lots by TCAD

We are using a simulation tool of "Technology CAD (TCAD)" for technology development. TCAD can narrow down experiment items and analyze failures. It can contribute to reduction of environmental impacts by reducing the number of engineering lots.

■ Optimizing recipe on dicing process (*)

In 2017, we succeeded in reducing the time of dicing process by 30% with optimization of recipe. As a result, we could save energy.

*Dicing is the process by which die are separated from a wafer of semiconductor.

■ Efforts to Control Chemical Substances

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

Additionally, Fujitsu Semiconductor Group achieved the objective of total elimination of chemicals containing PFOS, suspected of damaging ecosystems, at all Group factories by FY 2009.

As for PFOA, an alternative to PFOS, it is also suspected of damaging ecosystems, so we are evaluating other alternatives.

Efforts to Enhance Safety and Security in Plant

Since the days of FSL Mie Fab, MIFS has 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, MIFS continuously monitors killifish and their breeding in discharged water for biodiversity conservation. The Killifish have bred repeatedly since FY 2012, the year after launch. MIFS set up a new aquarium for monitoring killifish in June 2013, and donates bred killifish for educational purposes to local elementary schools as a part of its regional contribution activities.

As other efforts to enhance safety and security in the plant, MIFS conducts environmental analyses and confirms compliance with environmental regulations. As part of its safety risk management, MIFS also holds safety promotion liaison conferences with partner companies every year. MIFS continuously cooperates 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

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

【Compliance】

- MIFS 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 FY 2017.
- Regarding arsenic contamination in soil occurring to premises of FSL Mie Fab, which has already been reported in Oct, 2016. Soil purification has been completed appropriately, and reported to Mie Prefecture.
- Regarding environmental issues of soil contamination annual reported to Mie Prefecture and Kuwana City in May 2008, MIFS monitors the surrounding environment and operating procedures by pumping up contaminated water on an ongoing basis, and submitted results in December.
- MIFS confirmed that there were no problems related to other regulations or requirements.

Environmental Audit

■ Environmental Audit

MIFS, as a member of Fujitsu Semiconductor Group, conducts environmental audits under the Fujitsu Group Integrated Environmental Management System. To make audits effective, auditor education programs are implemented each year to help improve the competency of its internal auditors. MIFS also enhances its auditing system through audits for company-wide legal compliance by auditors with external credentials.

Regarding the matters pointed out in the FY 2017 internal audit, corrective action was taken, including measures to prevent any recurrence, and this information is being effectively used for continuous system improvement.

Also, in order to maintain integrated ISO 14001 certification of the Fujitsu Group, we undergo ISO 14001 audits by the Japan Audit and Certification Organization for Environment and Quality (JACO) in Japan, and DNV GL Business Assurance Japan k.k. overseas.

Environmental Education and Enlightenment Activities

■ Environment Exhibition

MIFS has continued effort to enlighten employees by raising environmental consciousness around the time of National Environment Month every June through environmental events. MIFS also holds Environment Exhibitions every year and works to raise consciousness of issues such as global warming, biodiversity conservation, and so on.

■ Environmental Photo Contest

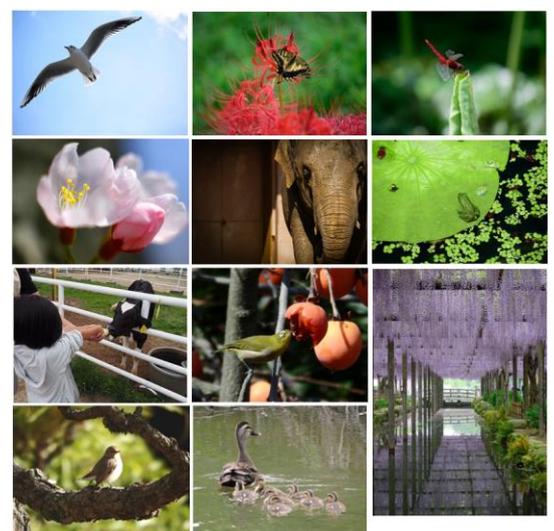
As an opportunity for raising awareness of biodiversity, every year MIFS asks employees to submit photos relating to biodiversity, and a biodiversity photo exhibition is held to display the most outstanding works.



First Prize



Prize for Excellence in Quality



Some Entries in the FY 2017 Environmental Photo Contest

MIE FUJITSU SEMICONDUCTOR LIMITED

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Publishing supervisor: President Michiari Kawano
Editing supervisor: Hiroyuki Oikawa
Issued date: September 2018
Report covered period: April 2017 to March 2018



URL: <http://www.fujitsu.com/jp/group/mifs/en/about/environment/>