

Environmental Preservation

Topics Promoting diversification of biomass fuels

Green Power Ichihara Co., Ltd. introduces pruned pear tree branches for the first time in Japan.

At Chiba Works, our subsidiary Green Power Ichihara Co., Ltd. operates a biomass power generation facility that is fueled mainly by wood chips from construction and demolition waste generated in the Kanto district. With an electricity-generating capacity of 49,900kW and transfer capability at 43,800kW, it is one of the largest biomass power generation facilities in Japan.

The construction and demolition waste as the main fuel of the facility is mostly from demolished wooden buildings. The amount of such waste available is susceptible to economic fluctuations. Accordingly, ensuring a stable fuel supply had been an issue for the facility. In an effort to achieve a diversification of fuels, Green Power Ichihara has added timber from forest thinning and imported palm kernel shells (PKS) to the construction and demolition waste as the main fuel.

Moreover, noting that the volume of production of pears in Chiba Prefecture, where the company is located, has been largest in Japan since 2016, the company began to use pruned branches of pear trees as a fuel by drying them. In a Japan



Power generation facility at Chiba Works of MES (Ichihara City, Chiba Prefecture)

first, it has turned pruned pear tree branches into a biomass fuel. Green Power Ichihara purchases pruned branches collected from pear farmers in Ichikawa City and Funabashi City. This allows the farmer to reduce the cost of disposing of the huge quantity of pruned branches generated every year. We will continue to promote a diversification of fuels that are not susceptible to economic trends, aiming for stable operation.

Topics Power generation is now possible with a small garbage incinerator, something that used to be difficult.

Small-scale power generation enabled by infrastructure improvement work for a general waste treatment facility

In May 2017, our subsidiaries Mitsui Zosen Environment Engineering Corporation (MKE) and Mitsui Zosen Machinery & Service, Inc. (MZM) announced that a small-scale steam power generation facility began operating following infrastructure improvement work to extend the service life of Karatsu-shi Seisou Center (Karatsu City Garbage Center), an order for which was received from the government of Karatsu City, in Saga Prefecture. In this project, MKE added exhaust heat boilers, and a small-scale steam power generation facility, which uses micro steam turbines manufactured by MZM, commenced operation.

This small steam power generation facility, developed by taking advantage of the easing of regulations related to power generation, has enabled the generation of electricity with a small-scale garbage incinerator, something that used to be difficult. It is also a groundbreaking system that provides a number of benefits, including a smaller scope of construction work, shorter construction period, the removal of the need to add workers, including qualified persons, and quick start-up and shutdown.



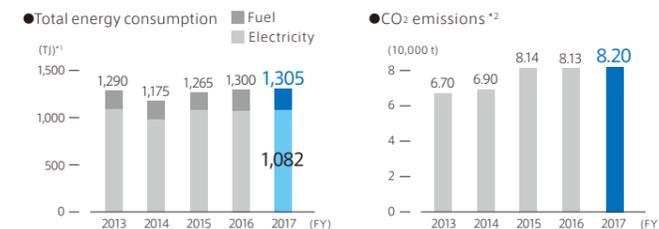
The small-scale steam power generation facility at Karatsu-shi Seisou Center

The introduction of this small steam power generator will enable Karatsu-shi Seisou Center (50 tons/day x 3 furnaces) to reduce CO₂ emissions by more than 40%. Accordingly, the project was subsidized under the Ministry of the Environment's subsidy program for projects to curb CO₂ emissions (program for promoting the introduction of advanced equipment). Making use of the engineering prowess of the MES Group, MKE and MZM will continue to pursue small-scale steam power generation with general waste treatment facilities.

Environmental management data (non-consolidated)

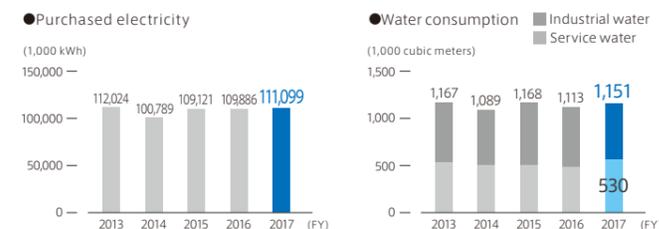
Efforts to conserve energy and reduce CO₂ emissions

MES continues its efforts to reduce CO₂ emissions through activities such as switching the fuel for in-house power generation from heavy oil to natural gas. The graphs on the right show our total energy consumption, CO₂ emissions, and purchased electricity over the past five years. Corresponding with an increase in the manufacturing of ships and diesel engines, our mainstay products, total energy consumption for fiscal 2017 increased slightly year on year. As a result, CO₂ emissions rose approximately 1% from the fiscal 2016 level.



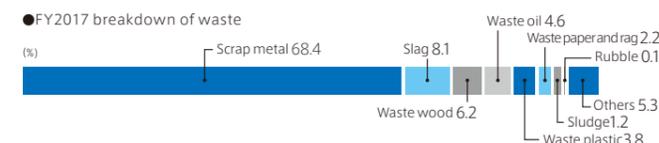
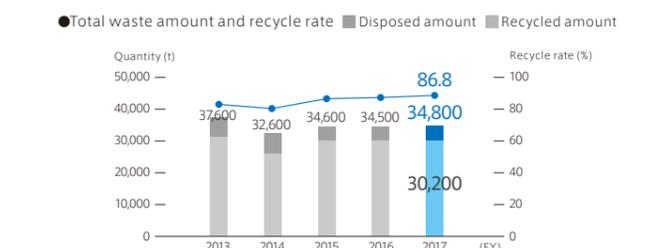
Effective use of aquatic resources

The graph on the right shows the use of water by MES over the last five years. MES uses both service water (clean water) and industrial water (intermediate water). We strived to save water once again during fiscal 2017, but the amount of service and industrial water used was up approximately 1% from the previous year.



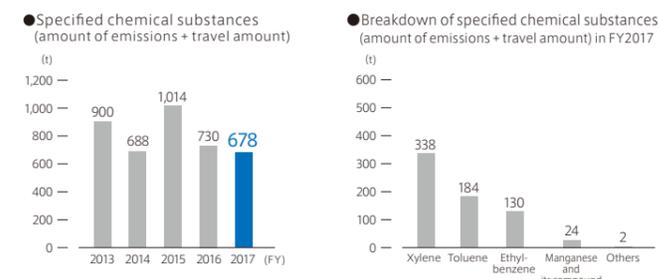
Initiatives for reducing waste

The unlawful dumping of industrial waste has become a major social problem. As a producer of industrial waste, MES makes every effort to fulfill its responsibilities in this area. One of these efforts is our strict management of manifest. This is accomplished through periodic on-site inspections of disposal companies. Even more important is our effort to reduce the amount of waste itself. To achieve this objective, we work hard to recycle and thoroughly classify our waste. The graphs on the right show the waste amount and recycle rates over the past five years, and a breakdown of waste for fiscal 2017. We worked to limit waste, but fiscal 2017 saw an approximately 0.9% increase in waste from the previous fiscal year. In addition, the recycle rate decreased by approximately 0.2% to 86.8% because of the increased amount of waste oil and waste plastic that we generated. We will continue our efforts to reduce waste and improve our recycle rate. In addition, we will continue to properly dispose of our waste through strict management.



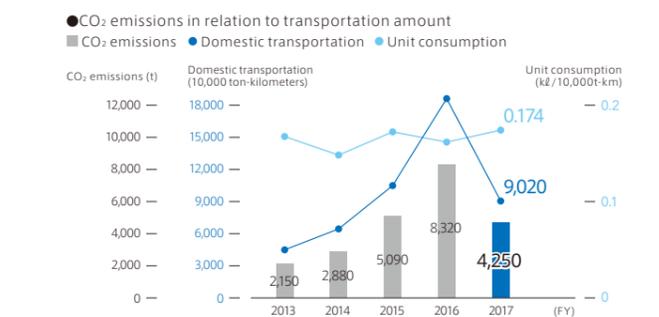
Proper management of specific chemical substances (PRTR substances)

The majority of chemical substances used by MES are the solvents and pigments contained in paint. The changes in the output and travel amount of specific chemical substances over the past five years are shown in the graph on the right. The other chart describes the breakdown of chemical substances used by MES for fiscal 2017. In May 2004, a partial revision to the Air Pollution Control Act was officially announced. By maintaining strict control of usage levels and by using low-emission airtight containers, MES continues its efforts to conform to the objectives of this law.



Promoting environmentally friendly transportation

As a cargo owner, MES is actively tackling the issue of energy conservation in the field of transportation as well. One way in which we are doing this is by increasing the transportation loading rates. We also aggregate aspects such as shipping dates and destinations to reduce the number of dedicated ships and expand the use of consolidated shipments. All of these activities are aimed at reducing both CO₂ emissions and energy consumption. The graph on the right shows MES's CO₂ emissions over the past five years, as well as domestic transportation (ten thousand tons-kilo) and unit consumption (= amount of energy consumed for transportation per amount transported). Domestic transportation in fiscal 2017 decreased by approximately 50% from the previous fiscal year, while energy use per transportation increased by approximately 6% year on year.



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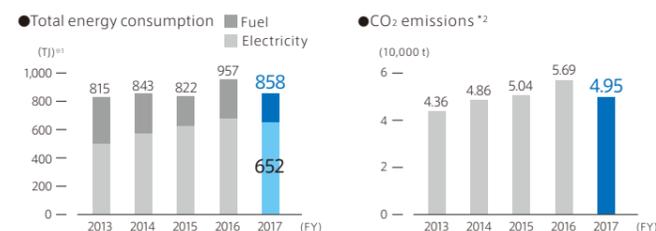
(As of March 31, 2017)

Environmental management data of subsidiaries (Domestic factories of MES subsidiaries in Japan)

Energy conservation and CO₂ emissions

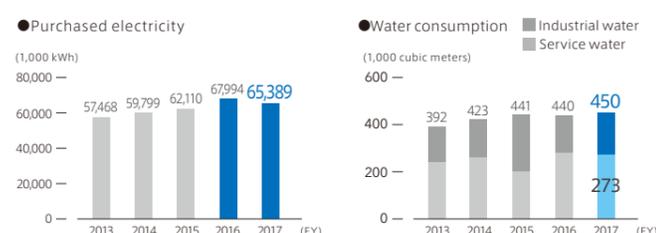
The total volume of subsidiary energy consumption for fiscal 2017 was down approximately 10% from fiscal 2016. During that same period, the amount of electricity purchased by subsidiaries decreased by no more than approximately 4% from the previous fiscal year.

CO₂ emissions in fiscal 2017 were down approximately 13% due to a decrease in energy consumption and CO₂ emission coefficient of electricity.



Effective use of aquatic resources

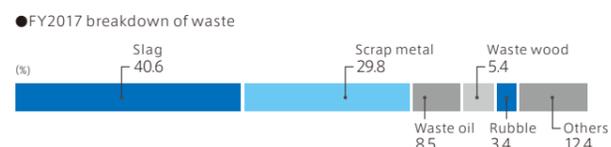
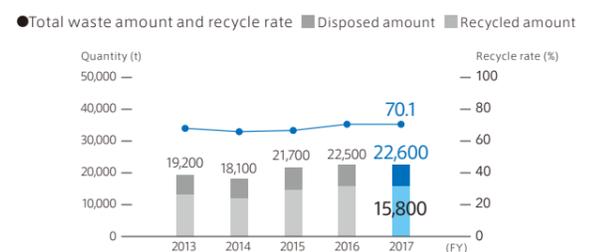
Water consumption has been increasing since fiscal 2013. In fiscal 2017, it was up approximately 2% from the previous fiscal year.



*1 TJ: Tera Joule (=10¹²J) *2 CO₂ emissions were calculated by following the Guidelines for Calculating Corporate Greenhouse Gases Emissions issued by the Ministry of the Environment. CO₂ emissions from electric power were calculated by using the adjusted CO₂ emission coefficient for designated electric enterprises that was also published by the Ministry of the Environment.

Data related to waste

Compared to fiscal 2016, the amount of waste for fiscal 2017 increased by approximately 0.3%. Domestic subsidiaries include those involved in iron casting, steel casting manufacturing, and ship repair operations that differ from operations conducted by MES. As such, the breakdown of waste from our subsidiaries also differed from MES. Approximately 40% of the waste produced by domestic subsidiaries was slag (fiscal 2017). Due to the progress in the recycling of slag, the recycle rate increased 0.2% from fiscal 2016, to approximately 70%.



Environmental accounting (non-consolidated)

MES spent a total of 4,010 million yen on investments and costs related to environmental preservation efforts. A detailed breakdown of these expenditures is shown on the right. The categories for environmental preservation costs are based on the Environmental Conservation Cost Categories shown in the Environmental Accounting Guidelines 2005. These expenditures included a total of 370 million yen spent on investment, consisting of 340 million yen spent on research and development, 20 million yen spent on pollution prevention cost such as exhaust gas measures, and 10 million yen spent on energy conservation of global environment conservation. Total non-investment costs came to 3,640 million yen, which included 2,490 million yen spent on the research and development of environmentally friendly energy-saving products, 680 million yen as the cost for preservation of the global environment, including energy conservation, 210 million yen allocated to resource circulation costs such as waste treatment, and 180 million yen for pollution prevention costs.

Environmental preservation cost (= sum of investment and cost: 4,014 million yen) (JPY million)			
Categories corresponding to business activities	Investment	Cost	Major initiatives and effects
1. Business Area Cost			
(1) Pollution prevention cost	19.4	177.8	Exhaust gas measures, wastewater treatment, dust control and other pollution control
(2) Global environmental conservation cost	9.5	683.6	Energy saving
(3) Resource circulation cost	0.0	210.7	Waste treatment
2. Upstream / downstream cost			
—			
3. Administration cost			
—			
4. Research & development cost			
—			
5. Social activity cost			
—			
6. Environmental remediation cost			
—			
Total	370.6	3,643.4	

Work Environment

Efforts to prevent labor accidents

Based on the MES Occupational Safety and Health Management System Manual, we maintain our basic policy on occupational safety and health for the overall company declared by the employer (president). Based on this basic policy, we have developed and introduced the Company-Wide Occupational Safety and Health Management Plan. We also hold labor and management councils and conferences to discuss measures and to promote the plan. We also inform employees of the plan and collect their opinions through the safety and health committee of each works, workplace, etc. We provide training relating to programs in a company-wide manner or at each work or workplace, and also provide special training to young employees as necessary.

We also receive flash report of labor accident from subsidiaries and share the information to improve the safety level of the overall Group. Depending on the result of labor accidents, the safety and health inspection patrol may be conducted by the Company-Wide General Safety and Health Manager and the director in charge of the Environmental & Safety Control Department.

Company-Wide Occupational Safety and Health Management Plan

- Basic policy
Regarding corporate behaviors relating to safety and health, we will achieve the followings by instilling a safety culture in each workplace and fostering human assets:
 - (1) Safety first principle, for manufacturing and engineering practices as top priority to safety
 - (2) Creating a comfortable workplace by proactively working on physical and mental health management
- High-priority issues
 - (1) Safety
 - 1) 2S3tei ("seiri" for orderly, "seiton" for tidy, "teiichi" for designated position, "teihin" for designated tools, and "teiryō" for discipline, and habit
 - 2) Transmission of the philosophy for safety
 - 3) Mutual warning and 3-nai management (3-nai literally means "3 don'ts," that is, "Don't allow unsafe behaviors," "Don't compromise by making excuses," and "Don't leave unsafe conditions unimproved.")
 - 4) With self checking with finger pointing
Particular emphasis shall be placed on the following:
 - i. Enhancing facilities for, and contents of, experiential safety training
 - ii. Assigning supervisors to positions exclusively for ensuring safety for a certain period
 - iii. Enhancing risk notice meetings before the starting of work
 - (2) Health
 - 1) Reinforcing the mental health care system
 - 2) Strengthening measures against overwork
 - (3) Each line manager shall set an example by declaring safety and health and implementing the workplace safety and health management plan and promoting the PDCA of the activities.

Specific measures in 2016

- Concerning the Team Safety II activity, the president's prize were awarded two times during the year.
- Safety and health inspections are conducted by the central labor-management council every year at each work.
Depending on the result of injuries of the previous year, intensive inspections were conducted at works with poor result.
- Safety and health inspection patrol of works were conducted by the president during the Safety and Health Promotion Months (July to August).
Proposals for improvements were solicited during the period, and remarkable proposals were awarded by the president.
- The safety and health slogan for the year was solicited from the employees.

Aiming to create workplaces that enable employees to enjoy working energetically — A message from the director in charge of the Environmental & Safety Control Department



Director and Managing Executive Officer Akira Nishihata

Under the company philosophy of "To continue our role as a trusted company, and as a trusted member of society" the company's corporate code of conduct is to provide a safe, comfortable and healthy workplace for its employees.

In the field of safety, we have established the safety first policy, under which we make daily efforts to establish manufacturing and engineering practices that give top priority to safety, by positioning initiatives for preventing labor accidents as the most important tasks. In the field of health, we work together with the health insurance association to promote the data health plan aggressively, hold a range of seminars for preventing lifestyle-related diseases, provide individual employees with specific health guidance and instructions for preventing any increase in the severity of diseases, and take other measures.

Recent years have seen an accelerating trend of companies seeking to promote good health among their employees. It is now commonly recognized that health-oriented management contributes to corporate growth and sustainability.

At MES, the Environmental & Safety Control Department, which was established in 2003, is responsible for the environmental management, safety and health control, and the medical office's tasks, in an integrated manner. By working together with the safety and health section in the general affairs department of each facility, we strengthen the system for collaboration among the employer (MES), the insurer (health insurance association), and medical institutions. We aggressively pursue health-oriented management by establishing a system that enables a quantitative understanding of employees' health issues, responses to them, and achievements made through the responses.

In 2017, when we celebrate our 100th anniversary, we will make efforts to create workplaces that permit all employees to communicate with each other and enjoy working actively in a comfortable environment.