

for a greener tomorrow



# Environment

Basic Policy and Approach to Environmental Management

# 2015

# Contents

Basic Policy and Approach to Environmental Management	1
Group Environmental Policy	2
Environmental Statement: Eco Changes	3
Environmental Vision 2021	6
Aiming to Become a Global Leading Green Company	10
Environmental Management	11
Environmental Management Structure	12
Environmental Audits	15
Training of Environmental Personnel	17
Environmental Risk Management	19
Environmental Plan	21
8th Environmental Plan (Fiscal 2016-2018)	22
7th Environmental Plan (Fiscal 2013-2015)	27
Evolution of the Environmental Plan (1st through 8th)	31
Product Environmental Data	33
Product Development	34
Factor X	35
Energy & Electric Systems	36
Ozone Generator	37
Super High-Efficiency Transformers	38
Super High-Efficiency Transformers - Detailed environmental data: RA-TS	40

# Contents

Space-saving Elevator System	42
Space-saving Elevator System - Detailed environmental data: P9-CO-60, 6stop	43
Escalator	45
Escalator - Detailed environmental data: ZJ-S	46
Industrial Automation Systems	48
Electronic Hybrid Functional Control Panel	49
Computerized Numerical Controller	50
Computerized Numerical Controller - Detailed environmental data: M700VS Series	51
Wire Electric Discharge Machine	53
Wire Electric Discharge Machine - Detailed environmental data: NA1200	55
Wire Electric Discharge Machine - Detailed environmental data: NA2400	56
Electronic Multi-Measuring Instrument	57
Electronic Multi-Measuring Instrument - Detailed environmental data: ME110SSR / ME110SSR-4APH / ME110SSR-4A2P / ME110SSR-C	58
Energy Measuring Unit	60
Energy Measuring Unit - Detailed environmental data: EMU2-HM1-B	61
Laser Processing Machine	63
Laser Processing Machine - Detailed environmental data: eX Series	64
EPS Motor	66
Spindle Motor	67
Spindle Motor - Detailed environmental data: SJ-D	68

# Contents

---

Three-Phase Motor	70
Three-Phase Motor - Detailed environmental data: SF-PR Series	71
Information & Communication Systems	73
Optical Network Unit	74
Optical Network Unit - Detailed environmental data: GE-PON ONU	75
Mitsubishi Logistics Information System: Dr. Logis	77
Integrated Environmental Information System	78
Environmentally Resistant Wide-Area Optical Ethernet Switch	79
WDM Optical Transmission Equipment	80
WDM Optical Transmission Equipment - Detailed environmental data: MF-800GWR	81
Information Equipment Recycling Service	83
Electronic Devices	85
DIIPM Module	86
DIIPM Module - Detailed environmental data: PS219B4	87
Laminated Bus Bar	89
Laminated Bus Bar - Detailed environmental data: Laminated bus bar	90
Contact Image Sensor	92
Contact Image Sensor - Detailed environmental data: UD2F200AX	93

# Contents

Home Appliances	95
LED Lighting	96
LED Lighting - Detailed environmental data: EL-D1411N/3W	97
Jet Towel Hand Dryers	99
Jet Towel Hand Dryers - Detailed environmental data: JT-SB116KN	100
Room Air Conditioners	102
Room Air Conditioners - Detailed environmental data: MSZ-ZW403S	103
Refrigerator	105
Refrigerator - Detailed environmental data: MR-JX60W	106
Photovoltaic Module	108
Photovoltaic Module - Detailed environmental data: PV-TJ235GA6	110
Photovoltaic Inverter	112
Photovoltaic Inverter - Detailed environmental data: PV-PNS04ATL-GER	113
Eco Cute for Household Use	115
Eco Cute for Household Use - Detailed environmental data: SRT-HP46W7	116
Eco Cute for Commercial Applications	117
Eco Cute for Commercial Applications - Detailed environmental data: QAHV-N560B	118
Ventilator	120
Ventilator - Detailed environmental data: V-08PD7 / V-08PX7	121
Energy Recovery Ventilator for Commercial Use	123

# Contents

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Lossnay Central Ventilator System	124
Lossnay Central Ventilator System - Detailed environmental data: VL-20ZMH3-L/-R	126
Procurement	128
Creating a Society in Tune with Nature	129
Group Biodiversity Action Guidelines	130
Mitsubishi Electric Outdoor Classroom	133
Observing and Investigating Biodiversity at Business Sites	136
Biodiversity-Conscious Procurement	139
Guideline Comparison Tables	140
GRI Guideline Comparison Table	141
Japan MOE Guideline Comparison Table	151
ESG Survey Index	156

# Environment – Basic Policy and Approach to Environmental Management

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## ▶ Group Environmental Policy

Learn more about our environmental policy, which forms the basis of the Mitsubishi Electric Group's environmental management system.

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## ▶ Environmental Statement: Eco Changes

Read about the Mitsubishi Electric Group's environmental statement, launched globally in July 2010.

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## ▶ Environmental Vision 2021

Find out about Mitsubishi Electric's long-range vision, with specific targets to be achieved by the year 2021, the centennial of the company's founding.

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## ▶ Aiming to Become a Global Leading Green Company

Read about the Mitsubishi Electric Group's efforts to become a global, leading green company through its energy- and resource-efficient manufacturing and environment-related businesses.

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## ▶ Environmental Management

- ▶ Important Issues in Environmental Management  
\* To Environmental Report 2015
  - ▶ Environmental Management Structure
  - ▶ Environmental Audits
  - ▶ Training of Environmental Personnel
  - ▶ Environmental Risk Management
- 

## ▶ Environmental Plan

- ▶ 8th Environmental Plan (Fiscal 2016-2018)
  - ▶ 7th Environmental Plan (Fiscal 2013-2015)
  - ▶ Evolution of the Environmental Plan (1st through 8th)
- 

## ▶ Product Environmental Data

- ▶ Product Development
  - ▶ Factor X
  - ▶ Energy & Electric Systems
  - ▶ Industrial Automation Systems
  - ▶ Information & Communication Systems
  - ▶ Electronic Devices
  - ▶ Home Appliances
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## ▶ Procurement

Minimizing environmental risks through the Green Accreditation system based on the Green Procurement Standards Guide.

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## ▶ Creating a Society in Tune with Nature

- ▶ Group Biodiversity Action Guidelines
- ▶ Mitsubishi Electric Outdoor Classroom
- ▶ "Satoyama" Woodland Preservation Project \*  
To CSR Activities
- ▶ Observing and Investigating Biodiversity at Business Sites
- ▶ Biodiversity-Conscious Procurement

# Environment – Group Environmental Policy

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## Mitsubishi Electric Group Environmental Policy

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The Mitsubishi Electric Group recognizes that our planet needs to be protected for future generations. Limiting our impact on the environment is thus one of our top management priorities. While respecting social norms, we shall endeavor in our business activities to realize a sustainable society through technology and action.

We will apply our technological expertise and new innovations to reduce the environmental impact of our business and to help preserve biodiversity. The Mitsubishi Electric Group will also strive to make positive contributions through the continuous improvement of our products and services, focusing on size and weight reduction, high performance, resource savings and energy efficiency.

We encourage employees and their families to take part in environmental activities with their communities, and thereby foster environmental awareness. As a responsible corporate citizen, we will also inform the public about our environmental initiatives to promote mutual understanding.

In addition to abiding by the law and respecting social norms, we shall remain sensitive to societal changes and make environmental consideration a permanent part of our activities.

As represented by our corporate statement "Changes for the Better", our ultimate aim is to improve the quality of people's lives while making positive contributions to the Earth's environment.

April 1, 2014  
President & CEO  
Masaki Sakuyama





## Environment – Environmental Statement: Eco Changes

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Eco Changes is the Mitsubishi Electric Group's environmental statement, and expresses the Group's stance on environmental management. Through a wide range of businesses for homes, offices, factories, infrastructure and even outer space, we are helping contribute to the realization of a sustainable society. In line with the Mitsubishi Electric Group's corporate statement, "Changes for the Better," which reflects our drive to always seek improvement and make changes accordingly, Eco Changes represents our efforts to work together with our customers to change the global environment for the better.

Determining how to build a sustainable society with issues such as global warming, resource depletion and energy challenges in mind is a high priority. As a company, we pursue a balance of a comfortable society for people and an environmentally responsible modern civilization based on contributions to environmental concern and steady improvement. Eco Changes does not represent mere words or image-building; rather, through its business activities, the Mitsubishi Electric Group will enact Eco Changes around the world in pursuit of environmental consideration and environmental contribution that are grounded in reality. Eco Changes was announced in June 2009 in Japan, in June 2010 overseas and in April 2012 in China.

## Eco Changes Logo Design Concept

The logo's vivid green sphere represents the world of changes for the better, from in the home to outer space. The "movement" design expresses the improvements made by employees, and the taking of immediate action along with our customers to bring positive changes to society.

## Environmental Changes for the Better

Stronger and more self-sustaining Eco Changes should be stimulated outside of Japan, especially in countries where fostering manufacturing businesses as well as infrastructure improvement are essential for economic growth while decreasing burden on the environment. As a company that experienced the challenge of balancing economic development with environmental protection during Japan's phenomenal industrialization from the mid 1950s to early 1970s, Mitsubishi Electric responded by innovating new technologies designed specifically to help foster sustainable business. With its accumulated knowhow to date and mission to make environmental contribution a priority in all countries in which the company operates, Mitsubishi Electric is aiming to contribute "Environmental Changes for the Better" to society while minimizing environmental impact.

Mitsubishi Electric established a sales company in India in September 2010, in Indonesia in December 2012 and in Turkey in January 2013, Mitsubishi Electric Turkey A.Ş. Eco Changes symbolizes our mission in those countries.



International exhibition in India highlights Mitsubishi Electric's Eco Changes concept for responsible manufacturing and business. Together with local employees the company declared the spirit of Eco Changes and celebrated the opening of a new sales outlet.

## News Releases

June 30, 2010

- ▶ Mitsubishi Electric Introduces "Eco Changes" Statement Outside Japan (PDF 28KB) 



Learn more about Eco Changes and the activities related to it.

# Environment – Environmental Vision 2021

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Environmental Vision 2021 is the long-term environmental management vision of the Mitsubishi Electric Group. With the guideline of making positive contributions to the earth and its people through technology and action, the Company is working toward the realization of a sustainable society utilizing wide-ranging and sophisticated technologies as well as the promotion of proactive and ongoing actions by our employees. The Vision sets 2021 as its target year, coinciding with the 100th anniversary of Mitsubishi Electric's founding.



## Creating a Low-Carbon Society

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To help create a low-carbon society, we will:

- Work to create and popularize innovative energy-saving products to achieve the goal of reducing CO<sub>2</sub> emissions from product usage by 30% compared to fiscal 2001
- Strive to reduce CO<sub>2</sub> emissions from product production by 30% (520,000 tons) across the entire Mitsubishi Electric Group as a prerequisite for sustainable growth
- Reduce CO<sub>2</sub> emissions from power generation and contribute to the creation of a low-carbon society by supplying the power industry with products and systems that do not emit CO<sub>2</sub>, including solar power and nuclear power systems

## Creating a Recycling-Based Society

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To help create a recycling-based society, we will:

- Develop sustainable resource cycles by reducing waste output, reusing resources and recycling resources to give them new life
- Strive for zero waste output from production processes

## Respecting Biodiversity: Ensuring Harmony with Nature and Fostering Environmental Awareness

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To help ensure harmony with nature and cultivate greater environmental awareness, we will:

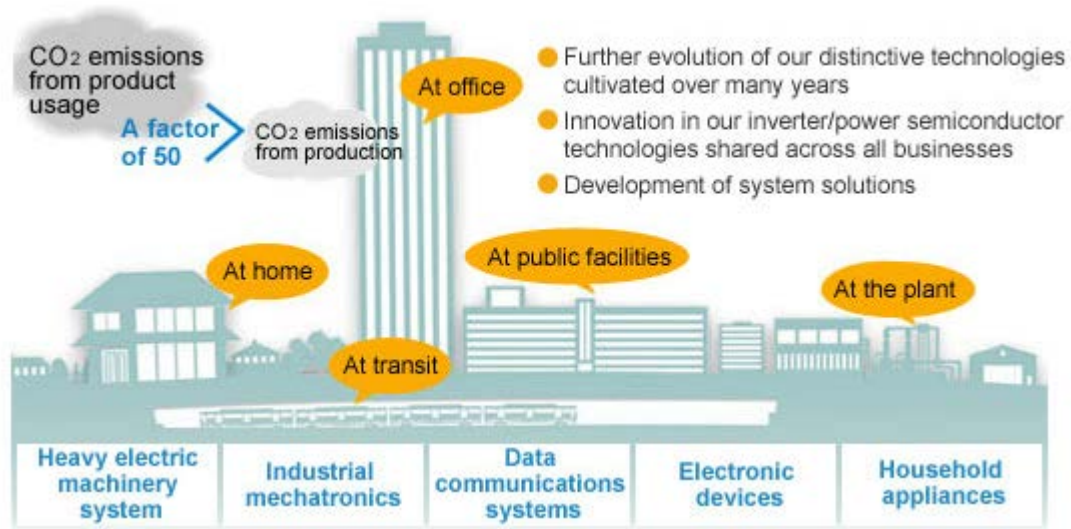
- Strive to respect biodiversity in our business activities
- Teach employees the importance of maintaining harmony with nature by providing opportunities for nature observation and direct participation in conservation activities to inculcate autonomous actions for the sake of the environment
- Engage in nature conservation activities to restore damaged woodland environments



## Efforts Focused on the creation of a Low-Carbon Society

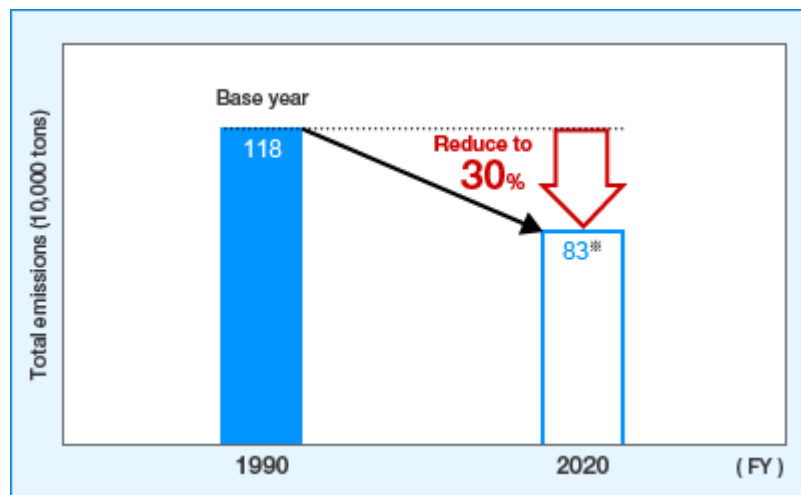
### Aiming to Reduce CO2 Emissions from Product Usage by 30%

Contributing to the creation of a low-carbon society through the provision of a wide variety of energy-saving products.



### Aiming to Reduce Total CO2 Emissions from Production by 30%

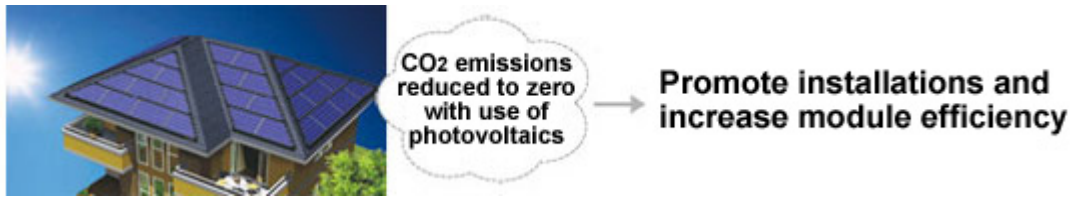
Raising the efficiency and performance of air conditioning, lighting and other utility equipment, as well as improving production lines to reduce the amount of CO<sub>2</sub> emitted during production and contributing to the creation of a low-carbon society.



\* Mitsubishi Electric envisaged a fiscal 2021 total CO<sub>2</sub> emissions target of 830,000 tons based on a CO<sub>2</sub> emissions intensity of 0.33kg-CO<sub>2</sub>/kWh at the time its Environmental Vision 2021 was formulated. Taking into consideration changing electric power circumstances in Japan, total emissions were converted using an intensity of 0.42 at the time the 7th Environmental Plan was put in place. Under the framework of the 7th Environmental Plan, this also brings the target to 980,000 tons in the final fiscal year (2020).

## Helping to Reduce CO2 Emissions from Power Generation

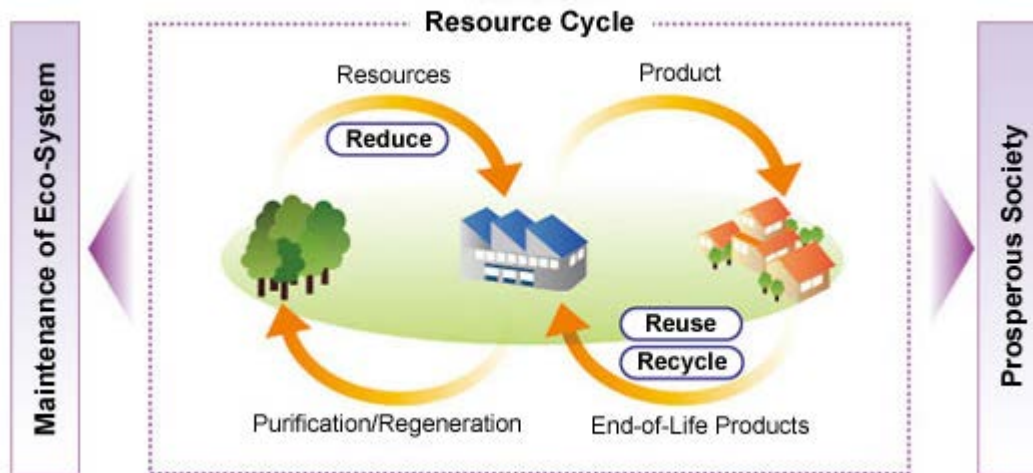
We will help reduce CO<sub>2</sub> emissions from power generation and contribute to the creation of a low-carbon society by supplying the power industry with products and systems that do not emit CO<sub>2</sub>, including photovoltaic power and nuclear power systems.



## Initiatives to Help Create a Recycling-Based Society

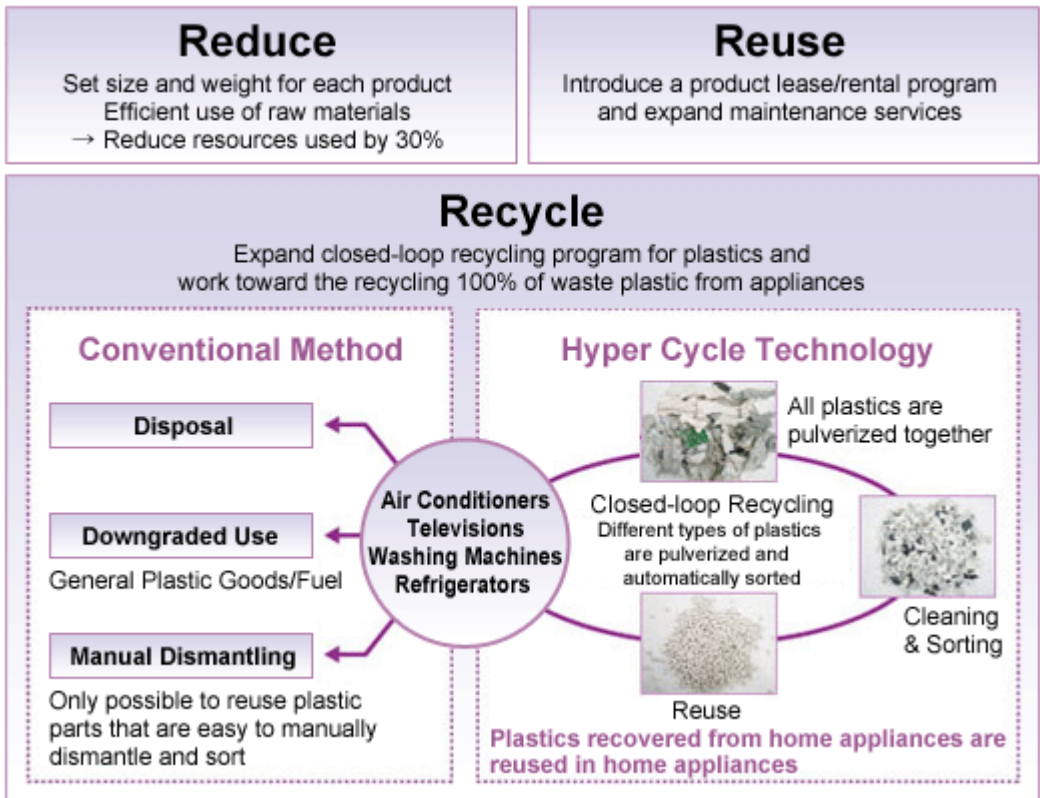
### Making Use of DfE and LCA Technologies to Promote the 3Rs

Creating products that contribute to the 3Rs (reduce, reuse and recycle) throughout the product lifecycle.



### Zero Emissions (Eliminating Waste that Heads Directly to Landfill)

Restricting the generation of waste and promoting the efficient reuse and resource reconversion of waste.



**Respecting Biodiversity:  
Ensuring Harmony with Nature and Fostering Environmental Awareness**

**Mitsubishi Electric Outdoor Classroom and Leadership Training**

We provide education for children and leadership training for 1,000 people in the promotion of nature observation and conservation.



**Forest Cultivation Activities and "Satoyama" Woodland Preservation Project**

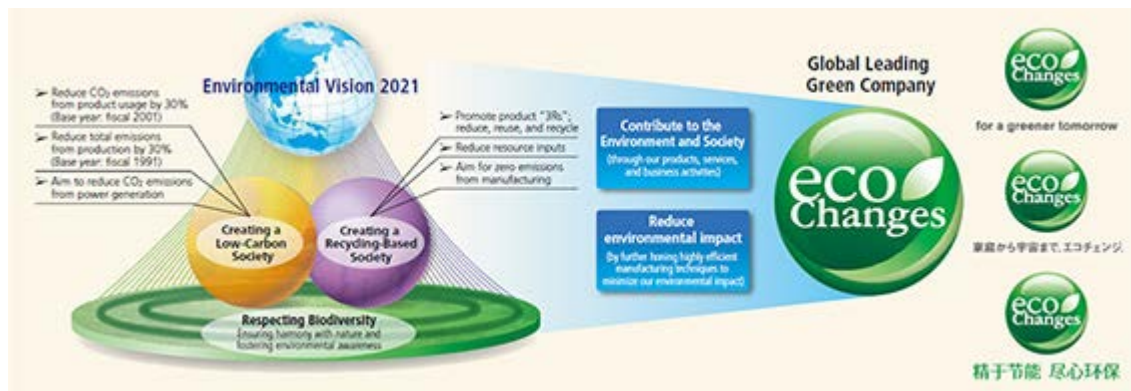
Forest cultivation activities aid in the creation of a low-carbon society, protects against natural disasters, and contributes to the preservation of biodiversity.

"Satoyama" Woodland Preservation Project involves local residents, employees, families, and nearly one million people from all over the world join forces to engage in this nature conservation activity.

# Environment – Aiming to Become a Global Leading Green Company

Mitsubishi Electric is aiming to grow as a global leading green company that contributes to creating a more affluent society. Based on our growth strategies and Environmental Vision 2021, we are working to realize a sustainable society in which people around the world live contentedly and in comfort, and where diverse forms of life coexist.

Specifically, our actions are based on three pillars set forth in Environmental Vision 2021: "creating a low-carbon society," "creating a recycling-based society" and "respecting biodiversity." In all business areas, we see it as our mission to promote the development of innovative products and services high in energy- and resource-efficiency, and to distribute them throughout society, while at the same time reducing the environmental impact of our activities. Accordingly, initiatives based on the three pillars are implemented for material procurement, manufacturing, distribution, and all other business activities. We are also expanding initiatives like these at the global level, which is the practical application of Eco Changes, our environmental statement, thereby affirming our commitment to contributing further to the realization of a more affluent society.



➕ ZOOM

Mitsubishi Electric is aiming to be a global leading green company that contributes to the creation of a more affluent society. We will continue to put Eco Changes into practice as a way of changing our own actions and changing society to be more eco-conscious.

➤ **Environmental Statement: Eco Changes**

➤ **Environmental Vision 2021**

➤ **From the President**



# Environment – Environmental Management

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## ▶ Important Issues in Environmental Management

Read about the Mitsubishi Electric Group's importance evaluations and management approach for each environmental aspect.

\*To Environmental Report 2015

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## ▶ Environmental Management Structure

Overview of the systems used to promote environmental management within the entire Mitsubishi Electric Group.

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## ▶ Environmental Audits

Overview of the Mitsubishi Electric Group's multifaceted audit system, which combines internal environmental audits, compliance audits by external certification bodies, and audits performed by the head office.

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## ▶ Training of Environmental Personnel

Report on Mitsubishi Electric's environmental education system, and the progress of educational and training activities for environmental personnel.

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## ▶ Environmental Risk Management

Report on initiatives to prevent environmental accidents, as well as on policies and conditions relating to responses to soil and water pollution, and to the management and disposal of PCBs.

# Environment – Environmental Management Structure

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## Global Environmental Management Promotion System

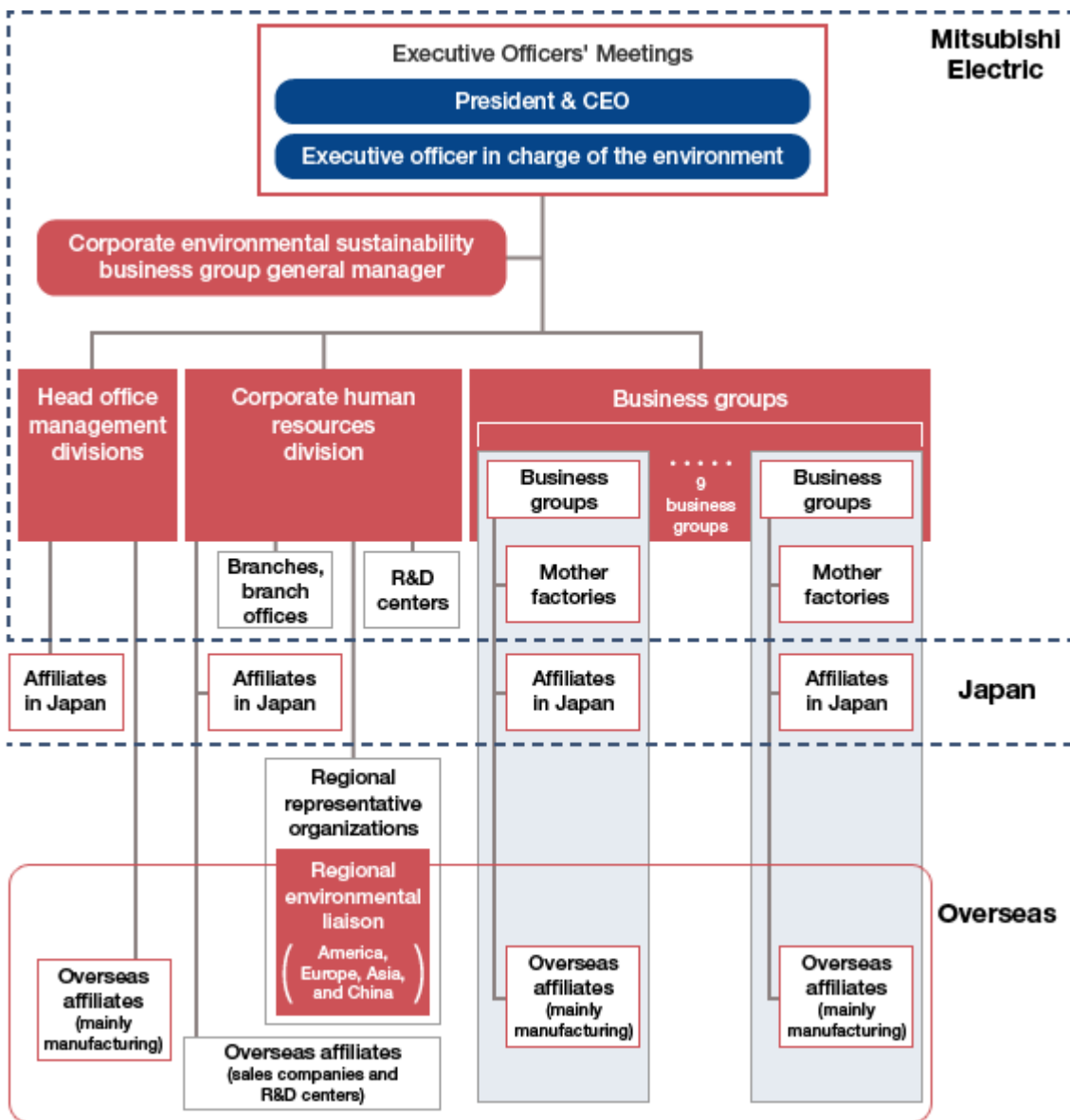
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In the Mitsubishi Electric Group, each organization developing global business has an environment management system (EMS), and overall Group operations are integrated. More specifically, when drawing up its own environmental action plan, each organization shares the Group's environmental plan (three-year plan) as a common objective to be achieved and sets its goals accordingly.

The EMS of the Mitsubishi Electric Group has the same organizational structure as that of the Company. Each business group responsible for business operations is responsible for promoting the EMS, and conducts and manages the environmental activities of its jurisdictional works, affiliates in Japan, and overseas affiliates. In the same way, other head office divisions excluding the business groups at the headquarters (e.g., head office management divisions and Corporate Human Resources Division) manage environmental activities at jurisdictional business sites and affiliate companies.

Additionally, overseas affiliates introduce, conduct, and manage their activities based on the same organizational structure and management system while focusing on their own regions of influence. Among the overseas affiliates in America, Europe, Asia, and China, there is a representative organization in each region that functions as the head office. A Regional Environment Liaison—a department for promoting environmental activities—has been established in each of these companies. This department is the driving force behind designing environmental activities for all of the affiliated companies in its jurisdictional region, and is involved in matters such as developing measures in common with the Group and supporting the ongoing activities of each affiliate company.

The members of the Executive Officers' Meetings, in which the President of Mitsubishi Electric serves as the chairman, draft the guidelines for the environmental management activities of the Mitsubishi Electric Group. This includes making decisions regarding environmental plans, checking on the progress of environmental activities, and appointing the Executive Officer in Charge of the Environment—responsible for promoting environmental management—and the General Manager of the Corporate Environmental Sustainability Business Group, who supports the Executive Officer. Furthermore, the head office management divisions, Corporate Human Resources Division, business groups, branches, and business sites including factories, R&D centers, and affiliated companies each have a person in charge of promoting environmental activities. This person is or is appointed by the head of each base and affiliate company to manage and monitor the environmental plan, including its execution and environmental performance, as part of his or her management and supervision responsibilities.



## Scope of environmental management

Mitsubishi Electric positions environmental management as an essential component of corporate governance. The scope of our environmental governance extends throughout the Company and our major affiliates.

### Major affiliates

- Consolidated companies: Companies with 50% or more of shares owned by Mitsubishi Electric (voting rights ratio), and companies that Mitsubishi Electric has management hegemony over.
- Non-consolidated companies: Companies judged to require integrated environmental management by Mitsubishi Electric.
- 191 companies overall, including 112 in Japan and 79 overseas.

## Verification of Activity Results Using a Management Cycle

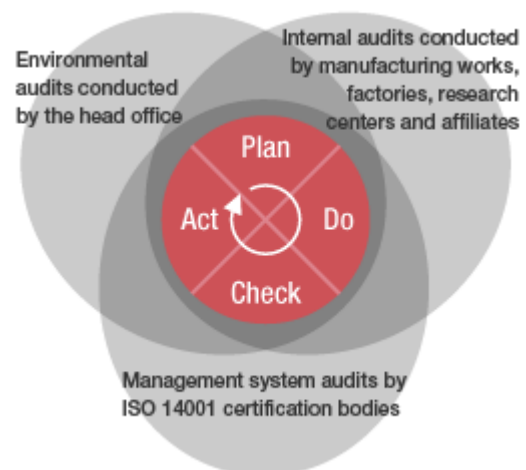
### Continual verification of activity results



# Environment – Environmental Audits

## Three Types of Environmental Audits

The Mitsubishi Electric Group combines three types of audits to verify the environmental activities of each site using a multifaceted approach. The first type is environmental audits conducted by the head office on works, R&D centers and affiliated companies. The second is management system evaluations conducted by ISO certification bodies on ISO 14001 certified sites. The third is internal environmental audits conducted by the head office, works, R&D centers and affiliated companies themselves.



From within these three types, the internal environmental audits and environmental audits target a wide range of fields, including compliance with environmental laws, precautions against environmental accidents such as toxic substance leakages, and the implementation of environmental plans. Accordingly, properly conducted audits call for a high level of specialized knowledge and communication abilities. As such, we carry out ongoing education for the purpose of training and improving the skills of auditors. We also conduct cross-audits among sites, dispatch instructors to sites from the head office, draw up auditing guidelines, offer training courses over our intranet, and share relevant information across the Group. Through these three types of audits and the training of auditors who perform them, Mitsubishi Electric will continue to work to qualitatively improve our environmental management.

### Overview of the Three Types of Environmental Audits

	Internal environmental audits	Environmental audits	Management system evaluations
Implementing body	Works, factories, R&D centers, affiliated companies	Head office	ISO certification bodies
Auditing Standards	<ul style="list-style-type: none"> <li>• Laws and regulations</li> <li>• ISO standards</li> <li>• Site-specific regulations</li> <li>• Progress on the Environmental Plan</li> </ul>	<ul style="list-style-type: none"> <li>• Laws and regulations</li> <li>• Company regulations related to the environment</li> <li>• Environmental Plan</li> </ul>	<ul style="list-style-type: none"> <li>• ISO standards</li> </ul>
Frequency	Once a year or once every half year	Every three years	Once a year

## Environmental Audits and Surveys by the Head Office

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Environmental audits by the head office involve interviewing the management of our branches, factories, R&D centers, and affiliated companies. These audits look into the implementation status of the Environmental Plan on paper and on-site, covering areas that include the status of legal compliance and environmental risk management (including disaster prevention and safety measures), the use of internal environmental audits, and the handling of chemical substances.

The results of audits are reported to the President by the Executive Officer in Charge of the Environment, and prompt remedial measures are taken in the event non-conformance is discovered. The results of audits and case studies summarizing improvement measures are also conveyed throughout the Mitsubishi Electric Group via the Environmental Managers' Conference, helping to improve the content of activities at all offices.

In fiscal 2015, we performed environmental audits at 25 sites in Japan: 10 at factories, 9 at head office divisions, 2 at branches, and 4 at affiliates in Japan, confirming compliance with environmental laws, risks associated with environment-related equipment, and environmental response systems. We also took prompt remedial measures for any non-conformance discovered.

We carry out an "Environmental Survey" at our overseas affiliated manufacturing companies with the objective of confirming their progress under the environmental action plan, their implementation status of the environmental management system, and their execution status of environmental management duties. Then, we link our findings to improvement measures. In fiscal 2015, we conducted the Environmental Survey, identified issues, and highlighted latent risks in order to improve operations at a total of five sites in the UK, Malaysia, the Philippines, India, and Taiwan.

# Environment – Training of Environmental Personnel

## Improving the Level of Environmental Activities through Environmental Education

Employees who carry out environmental activities in each organization are one of the most important elements of the Mitsubishi Electric Group's goal of becoming a global, leading green company.

In light of this, the Mitsubishi Electric Group has organized its educational framework in order to raise the level of awareness and action of all employees regarding environmental activities. We are also focusing on developing key environmental personnel who will be responsible for environmental management duties at each business site. By raising the awareness level of each employee and nurturing environmental management experts, we aim to improve the level of the entire Group's environmental activities.

### Environmental Education System

Field Target	Basic education	Environmental management	Low-carbon society	Recycling-based society	Respecting biodiversity
General employees	Group e-learning				Outdoor classrooms Leader development courses
Employees of Environmental Management Division and employees of other related divisions		Key Environmental Personnel Training (domestic/overseas)			
		Environmental Section Manager Training			
	On-demand/intensive courses by field*				
Other (by occupational rank)	<ul style="list-style-type: none"> <li>• New employee training</li> <li>• Overseas expatriate training</li> <li>• Newly-appointed section manager training</li> </ul>				

\* Example of on-demand/intensive courses by field  
ISO14001 standard amendment trends/waste management basic course

## Securing Environmental Management Personnel Globally

Mitsubishi Electric holds Key Environmental Personnel Training, which seeks to develop human resources that will drive environmental management activities at each of its business sites. The program began in Japan in fiscal 2005, and is gradually being introduced overseas as an initiative to promote the development of environmental management experts on a global scale.

In fiscal 2015, we implemented training at our manufacturing bases in China and Thailand. In China, training covered strengthening wastewater management, emergency response plans presuming environmental risk, etc. In Thailand, discussions were held regarding local environmental regulations, latest government policy trends, and the PRTR system.



Key Environmental Personnel Training in China



Key Environmental Personnel Training in Thailand

## Developing Nature Protection Leaders

Mitsubishi Electric Outdoor Classrooms are held using the fields adjacent to business sites as the “classroom” and allowing both participants and employees who are training to become leaders to experience nature. Under the theme of harmony with nature, the objective of these classrooms is to develop the ability to take action toward improving the environment, and create leaders out of like-minded employees who will plan and execute such action.

In the leader development course, which is an employee training program, participants learn about the relationship between living creatures, safety management, child physiology, and communication skills through field study and classroom training. A total of 18 development courses have been held since fiscal 2007, with a total of 352 participants.



Classroom training combining lectures and group work



Utilizing knowledge and skill to teach children the importance of protecting nature.



# Environment – Environmental Risk Management

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## Preventing Environmental Incidents through Information-Sharing and Equipment Inspections

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Both within Japan and overseas, the Mitsubishi Electric Group strives to prevent environmental incidents, such as the leakage of substances that may result in water or soil pollution or have a negative impact upon the environment.

To achieve this, Mitsubishi Electric ensures that its employees are fully familiar with the relevant laws and regulations, revises company rules to reflect any updates to such laws and regulations, and ensures these updates are made known throughout the Group. Moreover, even in the case of problems such as a minor oversight occurring that does not result in a serious incident, Mitsubishi Electric shares the cause and countermeasures throughout the entire Group and strives to prevent it from reoccurring. In addition, periodic equipment inspections are carried out at each of the Group's bases and countermeasures are implemented if so required.

Until now, we have held an "Environmental Management Meeting" to inform environmental managers and the working-level people at Mitsubishi Electric and its Japanese affiliates about the occurrence of problems and the establishment and renewal of relevant laws; however, from fiscal year 2015, we have prepared a DVD for internal training as an alternative. By having Mitsubishi Electric employees in all locations view this DVD, we are firmly instilling an understanding of environmental management points across a wider range of occupational levels and improving the awareness of environmental risk management.

Furthermore, we have conducted an environmental survey for all major affiliated companies, both domestic and overseas, in an effort to uncover and prevent environmental risks.

## Responding to Groundwater and Soil Pollution

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As stated in our internal rules, Mitsubishi Electric and its Japanese and overseas affiliated bases (factories, affiliated companies, business sites, etc.) conduct assessments based on a survey method, complying with the relevant laws and regulations whenever required (e.g., land modifications, etc.), and implementing the necessary countermeasures or solutions depending on the state of pollution.

In FY2015, we assessed survey results and countermeasures regarding the condition of soil and groundwater due to land utilization for a total of 21 cases (Mitsubishi Electric: 17 cases, affiliate companies: 4 cases) and have confirmed that all cases were handled appropriately.

Regarding areas that were recognized as having groundwater or soil pollution problems in the past, we implemented purification countermeasures using methods compliant with laws and regulations, and continue to regularly report the results of our monitoring to relevant government organizations.

## Appropriate Storage and Processing of PCB Waste and Devices Containing PCBs

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Mitsubishi Electric conducts inspections at all bases that store PCB waste and/or use devices containing PCBs at least once a year to confirm the storage and usage status. Regarding the processing of PCB waste, in fiscal 2007 we entered into a contract with the Japan Environmental Storage & Safety Corporation (JESCO)— which was known as Japan Environmental Safety Corporation until December 2014—and have been carrying out systematic processing based on this ever since.

In FY2015, the processing of 525 units was completed, and we plan to continue processing in line with the agreed plan. Japanese affiliates are carrying out systematic processing as well.

Customers can confirm whether or not an electrical device manufactured by a company in the Mitsubishi Electric Group contains PCB by referring to a list available on the corporate website.

## Handling Transformers and Other Devices with Trace Amounts of PCB

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Regarding the possibility of trace amounts of PCBs contaminating transformers and other devices, Mitsubishi Electric has investigated scenarios including the possibilities of contamination during the manufacturing process, post-delivery contamination, and contamination via insulating oil. However, as it has not been possible to identify the cause, device, or date of manufacture, we have concluded that we cannot rule out the possibility of trace PCB contamination in electrical devices that were manufactured prior to 1989 and that use electrical insulating oil.

However, considering the increased quality control of insulating oil, we have determined that there has been no contamination by trace PCBs at the time of product shipment for devices manufactured from 1990 onward. Moving forward, we will continue to uphold stringent quality control for insulating oil, and provide technical information via the Mitsubishi Electric website, as well as respond to individual inquiries via an existing customer service desk.

Moreover, Mitsubishi Electric is a member of a PCB processing committee, The Japan Electrical Manufacturers' Association, and contributes by providing information as an industry group and investigating processing measures.

Mitsubishi Electric stores waste with trace amounts of PCB in facilities certified by Japan's Minister of the Environment.

## Environment – Environmental Plan

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Since fiscal 1994, the Mitsubishi Electric Group has prepared an environmental plan for environmental activities every three years, implementing initiatives designed to enhance environmental management. The environmental plan introduces specific activities required in order to achieve the goals set in the long-term environmental vision, Environmental Vision 2021.

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### ▶ **8th Environmental Plan (Fiscal 2016-2018)**

Introduction of the items in the 8th Environmental Plan implemented in April 2015 and the contents of major initiatives.

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### ▶ **7th Environmental Plan (Fiscal 2013-2015)**

Introduction of the details from the 7th Environmental Plan that ended in Fiscal 2015.

### ▶ **Evolution of the Environmental Plan (1st through 8th)**

Follow the evolution of our environmental plan, which is reformulated every three years.

# Environment – 8th Environmental Plan (Fiscal 2016–2018)

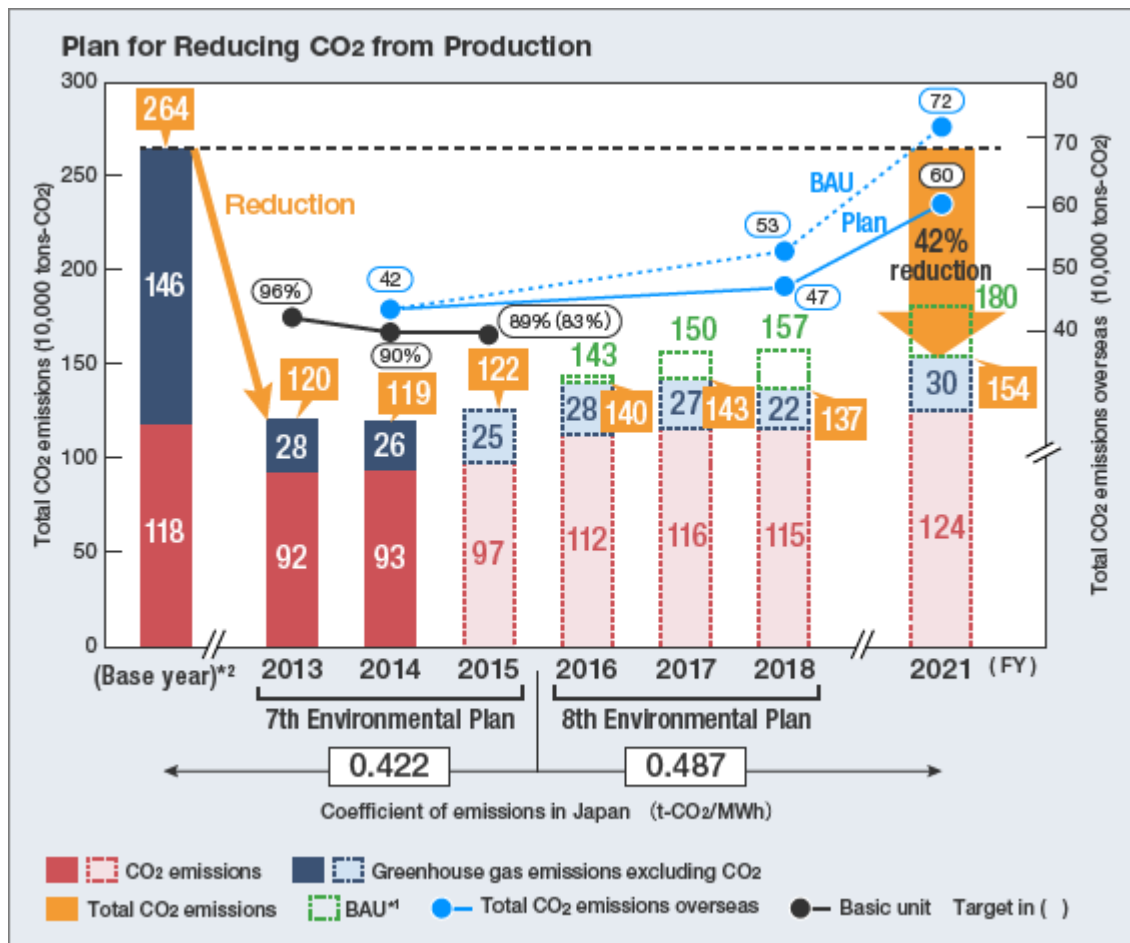
The 8th Environmental Plan focuses on "reducing all greenhouse gases" and "improving global-level environmental response" with the objective of realizing Environmental Vision 2021. The major initiatives being promoted are explained below.

## Initiatives toward Creating a Low-carbon Society

### Reducing CO<sub>2</sub> from production

In order to comprehensively evaluate and manage the impact on global warming, objectives targeted individually in the 7th Environmental Plan—, "reducing CO<sub>2</sub> from production" and "reducing non-CO<sub>2</sub> greenhouse gases (SF<sub>6</sub>, HFCs, and PFCs)" —have been combined.

Plan for Reducing CO<sub>2</sub> from Production



\*1 BAU: Emissions based on no reduction activities from fiscal 2014.

\*2 Base year:CO<sub>2</sub>:Mitsubishi Electric exclusively in fiscal 1991, affiliates in Japan in fiscal 2001, overseas affiliates in fiscal 2006.

Greenhouse gases excluding CO<sub>2</sub>: Mitsubishi Electric exclusively and affiliates in Japan in fiscal 2001, overseas affiliates in fiscal 2006

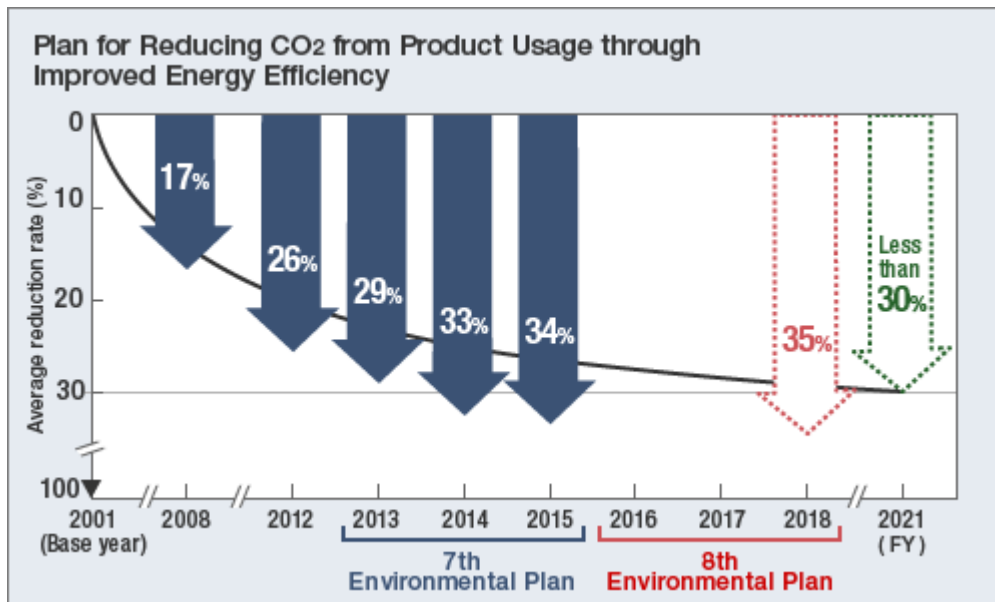
Measures for Reducing Greenhouse Gases Excluding CO<sub>2</sub>

Greenhouse Gases	Past Measures	2013	2014	2015	2016	2017	2018	2021	
SF6 (Sulfur hexafluoride)	Vacuum pump Abatement system Early gas-leakage detection	Japan: Expand introduction of abatement systems							
HFCs (Hydrofluorocarbons)	Recovery	Japan: Switch refrigerant (R410A→R32)							
		Overseas: Switch refrigerant (R410A→R32)							
		Japan: Finished construction of refrigerant recovery scheme	Overseas: Construct refrigerant recovery and disposal scheme						
		Overseas: Examine refrigerant regeneration scheme							
PFCs (Perfluorocarbons)	Abatement system	Japan: Expand introduction of abatement systems							

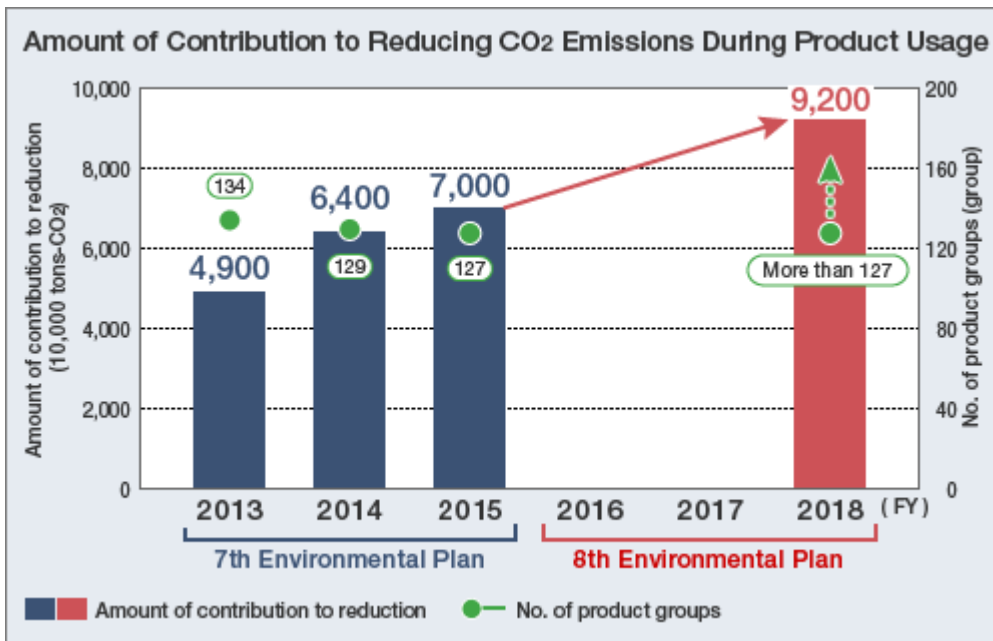
### Contribution to reducing CO2 from product usage

Continue the initiatives of the 7th Environmental Plan focusing on "reducing CO2 emissions from product usage by improving product performance" and "visualizing and expanding the contribution to reducing CO2 emissions during product usage."

Plan for Reducing CO2 from Product Usage through Improved Energy Efficiency



Amount of Contribution to Reducing CO2 Emissions During Product Usage

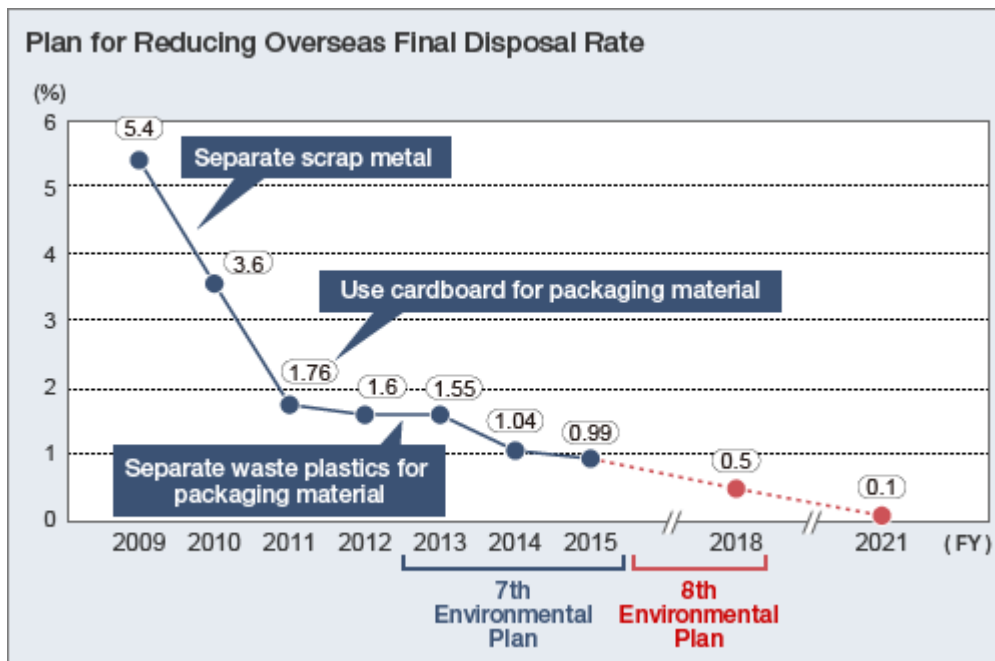


## Initiatives toward Creating a Recycling-based Society

### Promoting effective resource utilization at business sites

The values targeted for the final disposal rates of Mitsubishi Electric and its affiliates in Japan have been achieved to date, and those levels will be maintained. Overseas affiliates aim to improve performance in this area in all regions by strengthening the activities at each site, and also by selecting sites where important reinforcement measures will be introduced on the basis of priority.

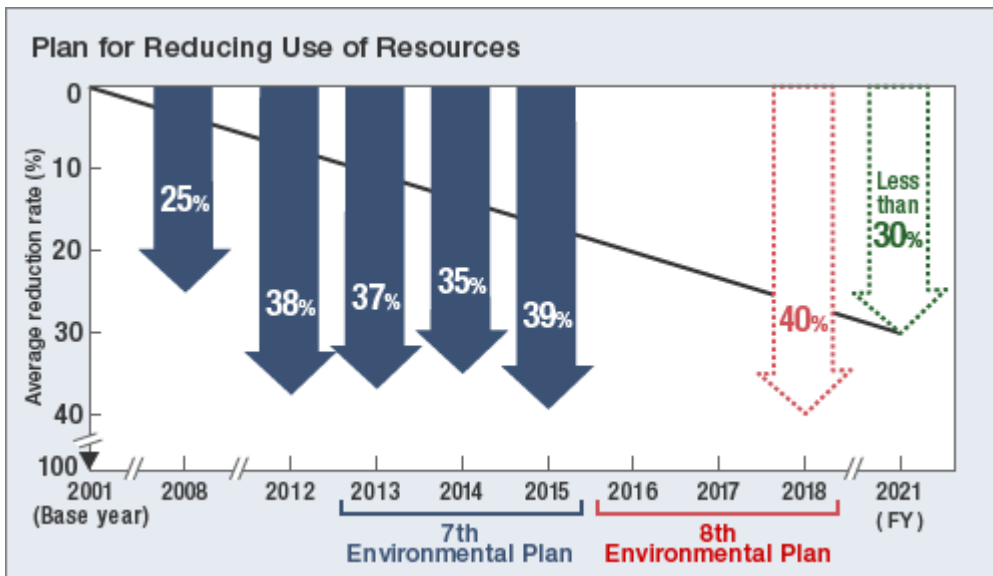
#### Plan for Reducing Overseas Final Disposal Rate



### Reducing resource inputs

Promotion includes the goal of reducing resource inputs during product development planning.

#### Plan for Reducing Use of Resources



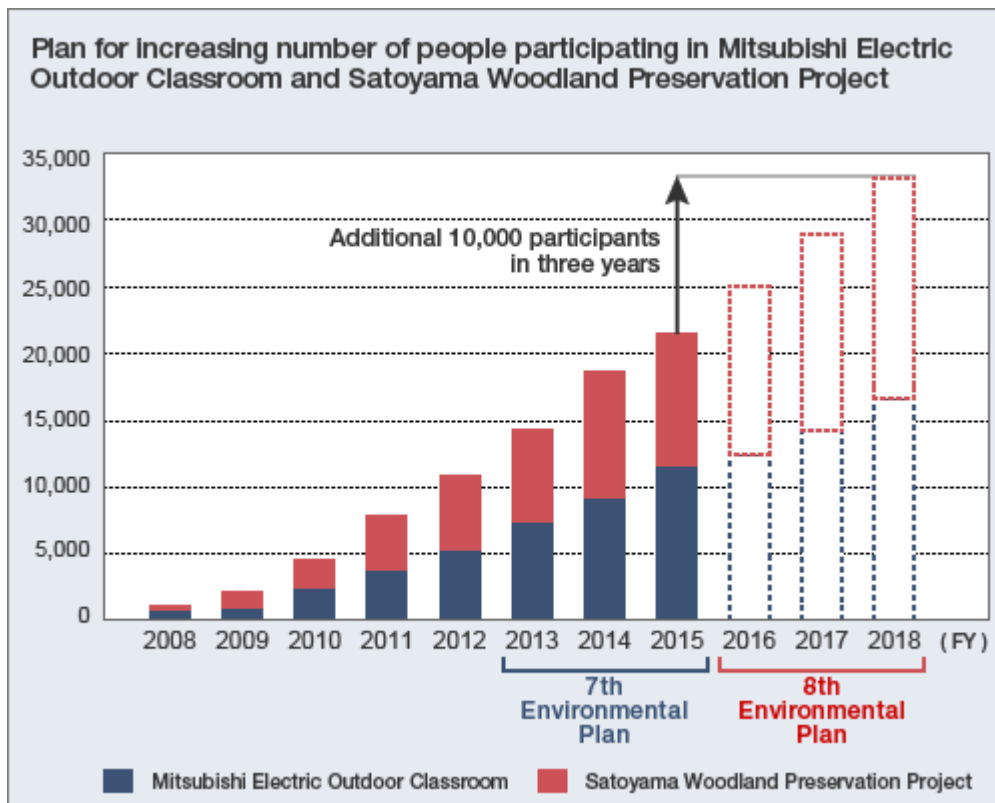
### Visualization of resource recycling business

A business scale that leads to improving resource efficiency, including product recycling and the renovation/maintenance of facilities, is being visualized. Cooperation will be enhanced by sharing case examples and technological information cross-sector throughout the Group, and environment-related business will be expanded.

### Initiatives to Create a Society in Tune with Nature

#### Fostering environmental awareness

Mitsubishi Electric Outdoor Classrooms and the Satoyama Woodland Preservation Project will continue to be held, with the aim of increasing the total number of participants to 10,000 in the three-year period; thereby bringing the cumulative total to more than 30,000. Additionally, the "Mitsubishi Electric Group's Environmental Management" e-learning program that started in fiscal 2015 will be expanded to enable use by affiliate companies in Japan and overseas affiliates.



### Preserving biodiversity at business sites

At all of our business sites in Japan, we promote preserving endemic species unique to the region. We also foster a better understanding between employees and local communities.

## Strengthening Our Environmental Management Foundation

### Compliance with environmental regulations

To ensure compliance with RoHS chemical substance regulations in Europe, we are stepping up efforts to develop alternative technologies via special interest groups and our website.

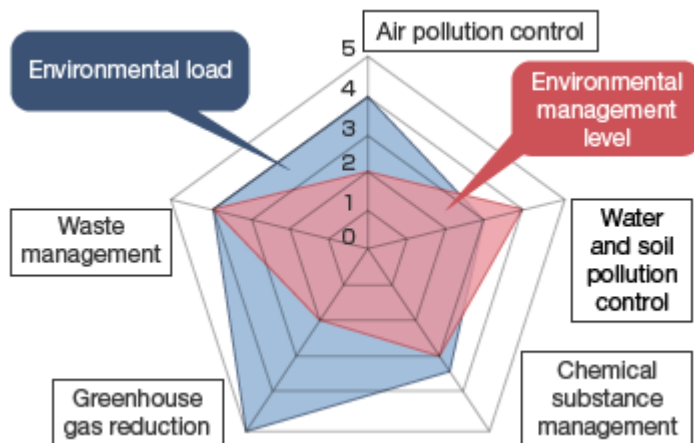
### Improving the level of environmental management at production bases

Regarding environmental risk and initiatives at manufacturing bases in Japan and overseas, an original index was formulated for the five fields of air pollution control, water and soil pollution control, chemical substance management, greenhouse gas reduction, and waste management in order to evaluate them. Additionally, looking to the overseas manufacturing bases that are prioritized to receive reinforcement measures first, plans are to reduce environmental risk and improve the level of environmental management.

Example of evaluation criteria for initiatives in five fields

	Air pollution control	Water and soil pollution control	Chemical substance management	Greenhouse gas reduction	Waste management
Environmental load	Amount of gas emissions, air pollution control-related facilities, etc.	Amount of water intake / wastewater, etc.	Amount of usage, etc.	Amount of greenhouse gas emission, etc.	Amount of waste, etc.
Evaluation criteria for initiatives	Analysis of gas emissions, anti-leak measures for liquid fuels, etc.	Wastewater analysis, facility inspections, emergency drills, etc.	Ascertain usage volumes, emergency drills, etc.	Set targets, etc.	Leak prevention, inspections of contractors, etc.

Image of visualization





# Environment – 7th Environmental Plan (Fiscal 2013–2015)

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## Background to the Formulation

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The 7th Environmental Plan (FY 2013–2015) was prepared based on factors such as the social demand for energy-saving products, and results and issues in the past.

The main focus of the 7th Environmental Plan is to strengthen measures for both production and product usage as a means to expand the amount of contribution toward reducing CO<sub>2</sub> emissions.

### News Release

Apr 17, 2012

- ▶ Mitsubishi Electric Launches Seventh Environmental Plan

## Items and Main Indicators of the 7th Environmental Plan

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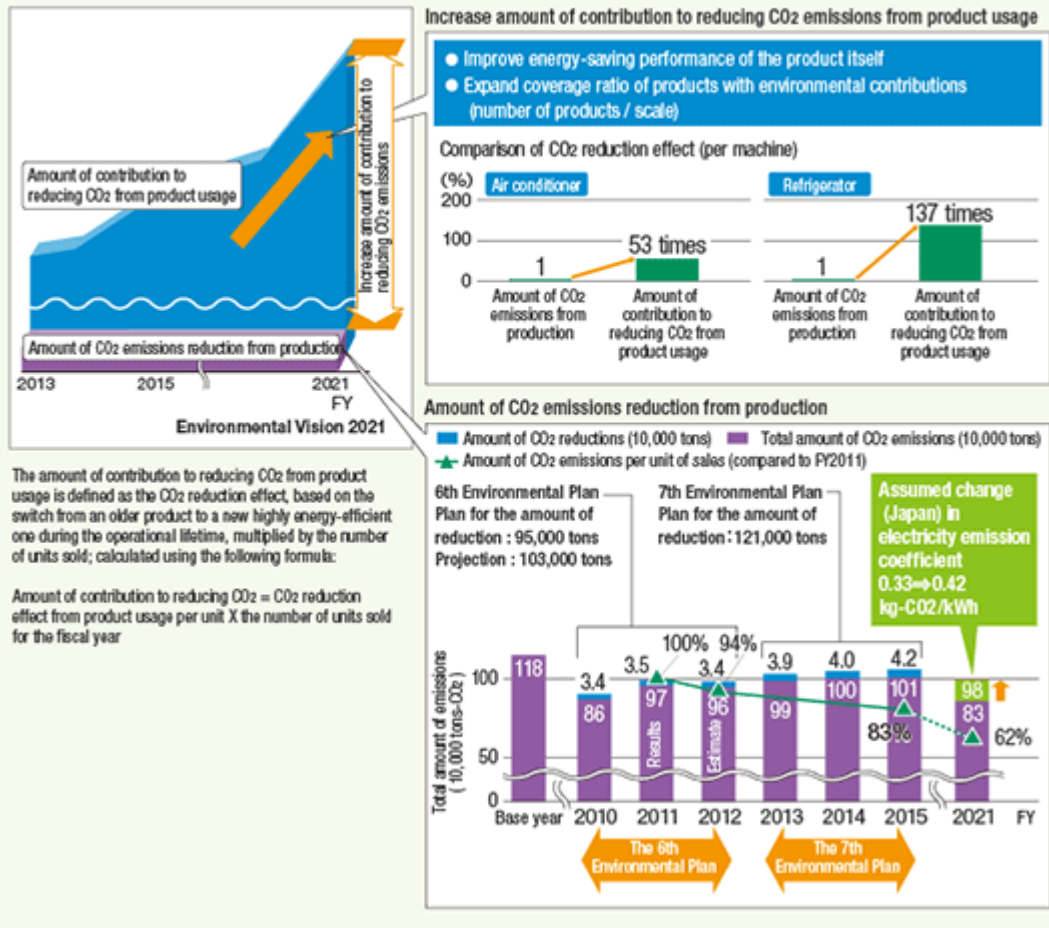
- ▶ 1. Initiatives toward Creating a Low-Carbon Society
- ▶ 2. Initiatives toward Creating a Recycling-Based Society
- ▶ 3. Strengthening Our Environmental Management Foundation and Expanding Environment-related Businesses

### 1. Initiatives Toward Creating a Low-Carbon Society

- Improve the energy-saving performance of products, and reduce CO<sub>2</sub> emissions by an average reduction rate of 27% in comparison to FY2001. (84 target products.)
- Improve the amount of CO<sub>2</sub> emissions per unit of sales from production to 83% in comparison to 2011. (Equivalent to 121,000 tons reduction in CO<sub>2</sub>.)
- Achieve a cumulative total of 14,100 kW in photovoltaic (PV) power generation for the entire Group in Japan by the end of 2015. (Install a further 6,400 kW of PV capacity.)
- Install a demand monitoring system at all of the Group's major sites (contract demand of 500 kW or more, with a group total of 68 sites) for centralized management of peak power usage, and promote energy conservation measures such as upgrading to highly efficient air conditioners in support of CO<sub>2</sub> reductions.
- Reduce non-CO<sub>2</sub> greenhouse gases (SF<sub>6</sub> PFC HFC\*) by 70% in comparison to FY2006. (CO<sub>2</sub> emission equivalent.)

\* SF<sub>6</sub>: sulfur hexafluoride; PFC: perfluorocarbons; HFC: hydrofluorocarbons

## Increase amount of contribution to reducing CO2 emissions from production and during product usage

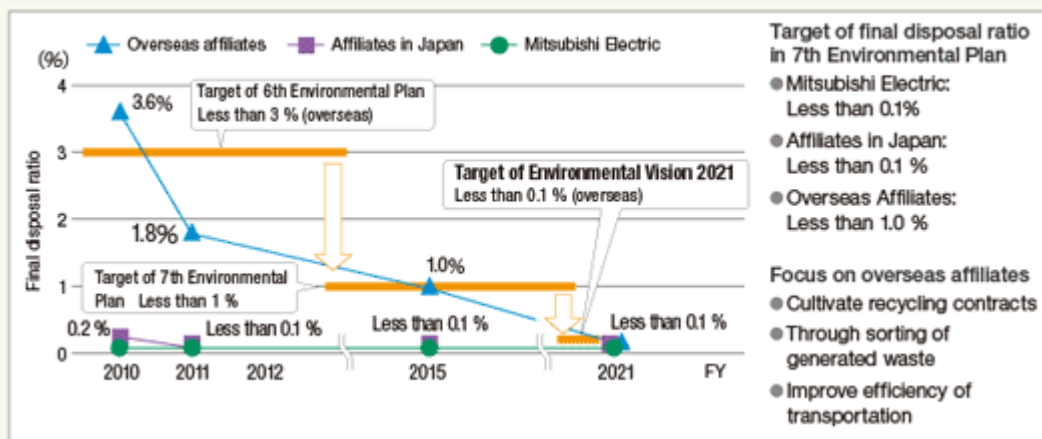


## 2. Initiatives Toward Creating a Recycling-Based Society

- Promote thorough analysis and separation of waste, and a reduction in the final disposal ratio at business sites. (Mitsubishi Electric: less than 0.1% (ongoing); affiliates in Japan: less than 0.1%; overseas affiliates: less than 1.0%.)
- Reduce input of resources by 39% compared to FY2001 through producing smaller and lighter weight products.
- Promote product 3Rs\* through recovery of rare earth magnets and by expanding applications for recycled materials.

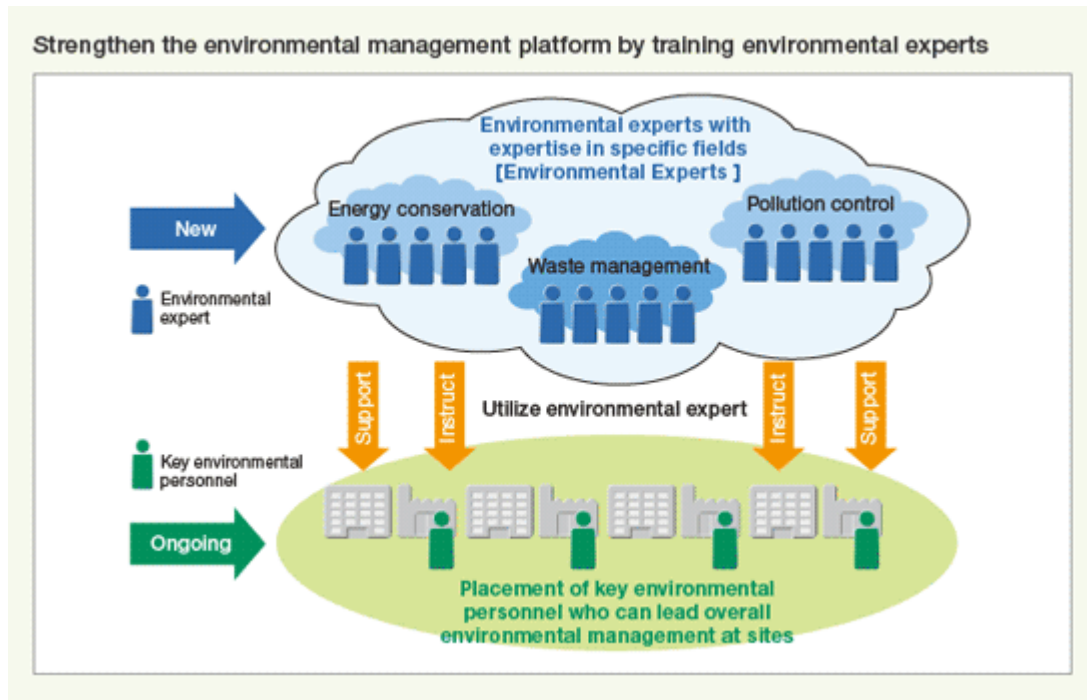
\* 3R: Reduce (reducing waste generation), Reuse (re-utilization), and Recycle (turning waste into resources)

### Promote effective resource utilization at sites



### 3. Strengthening Our Environmental Management Foundation and Expanding Environment-related Businesses

- Cultivate "Environmental Experts" with specialized expertise in energy conservation, waste management, and pollution control, capable of conducting Group-wide environmental training sessions, and strengthen environmental management platforms; conduct nature conservation activities through collaboration with local communities, and roll such activities out globally.
- Enhance compliance with regulations on chemical substances used in products, such as Europe's RoHSII and REACH.
- Expand environment-related businesses globally by creating products with highly innovative environmental features including the use of more recycled resources or enhanced energy efficiency, in field such as smart grids and smart communities.



## 7th Environmental Plan

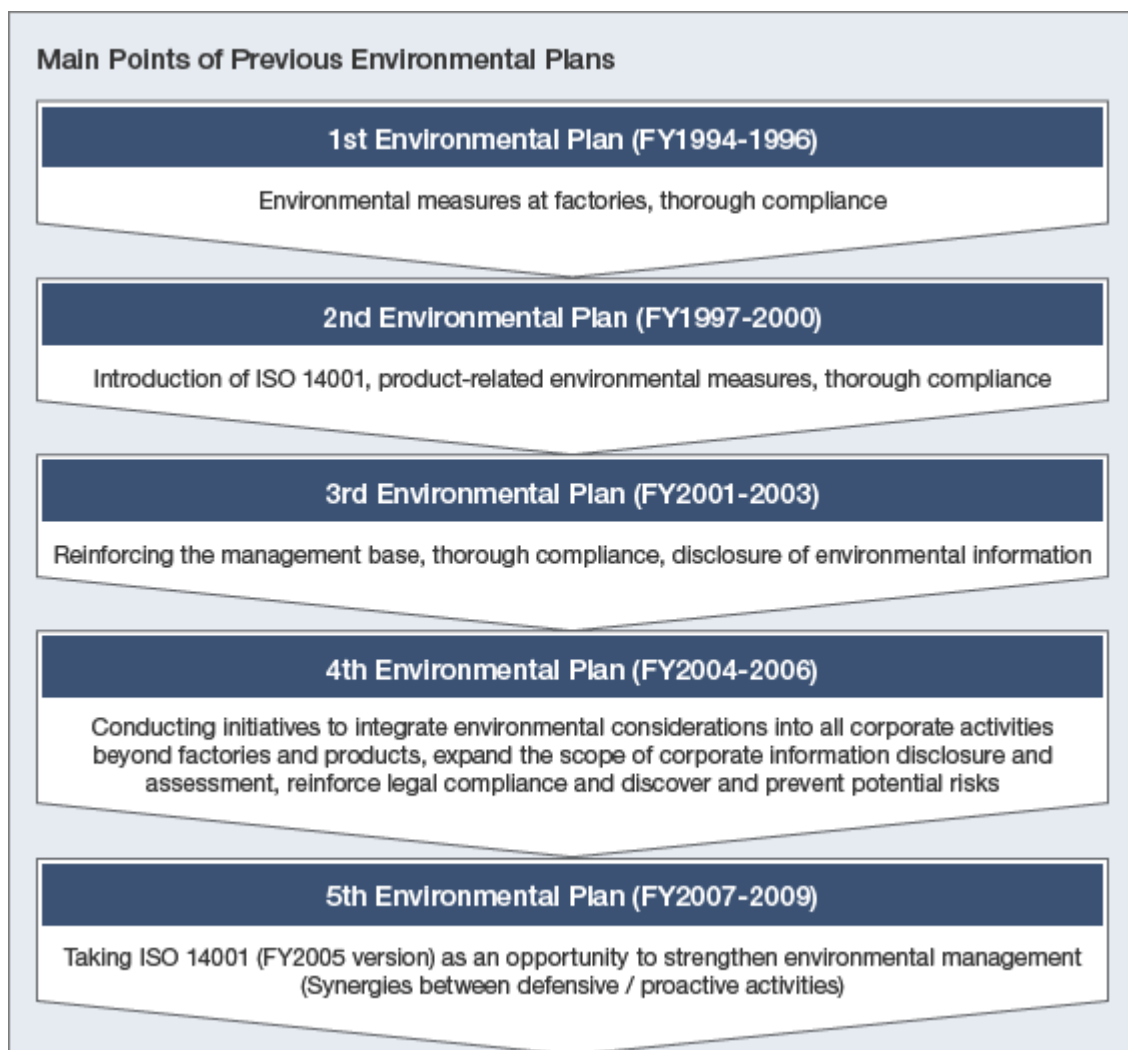
<b>1. Initiatives Toward Creating a Low-Carbon Society</b>
1.1 Contribution to reducing CO <sub>2</sub> emissions
(1) Reduce CO <sub>2</sub> emissions from product usage by improving product performance: average reduction rate for 84 products: 27%
(2) Increase amount of contribution to reducing CO <sub>2</sub> emissions from product usage
1.2 Reducing CO <sub>2</sub> from production: improve CO <sub>2</sub> emissions per unit of sales to 83% compared with fiscal 2011 (▲17%)
1.3 Reducing non-CO <sub>2</sub> greenhouse gases: 70% reduction compared with fiscal 2006 on a CO <sub>2</sub> equivalent basis
1.4 Participation in the low-carbon society action plan
<b>2. Initiatives Toward Creating a Recycling-Based Society</b>
2.1 Final disposal ratio: Mitsubishi Electric: Less than 0.1%, Affiliates in Japan: Less than 0.1%, Overseas Affiliates: Less than 1.0%
2.2 Reducing resource inputs: average reduction rate for 64 products: 39% (compared with fiscal 2001)
<b>3. Strengthening Our Environmental Management Foundation</b>
3.1 Compliance with environmental regulations
3.2 Prevention of environmental accidents
3.3 Reduction of environmental liabilities: PCB waste treatment, purification of groundwater and soil contamination
3.4 Training of environmental personnel
(1) Train key environmental personnel
(2) Foster environmental awareness and harmony with the community and nature
3.5 Publicity and advertising about environmental contribution
<b>4. Expanding Environment-Related Businesses</b>
4.1 Expansion of environment-related businesses
4.2 Creation of products with highly innovative environmental features: have each business unit select one or more products

## Environment – Evolution of the Environmental Plan (1st through 8th)

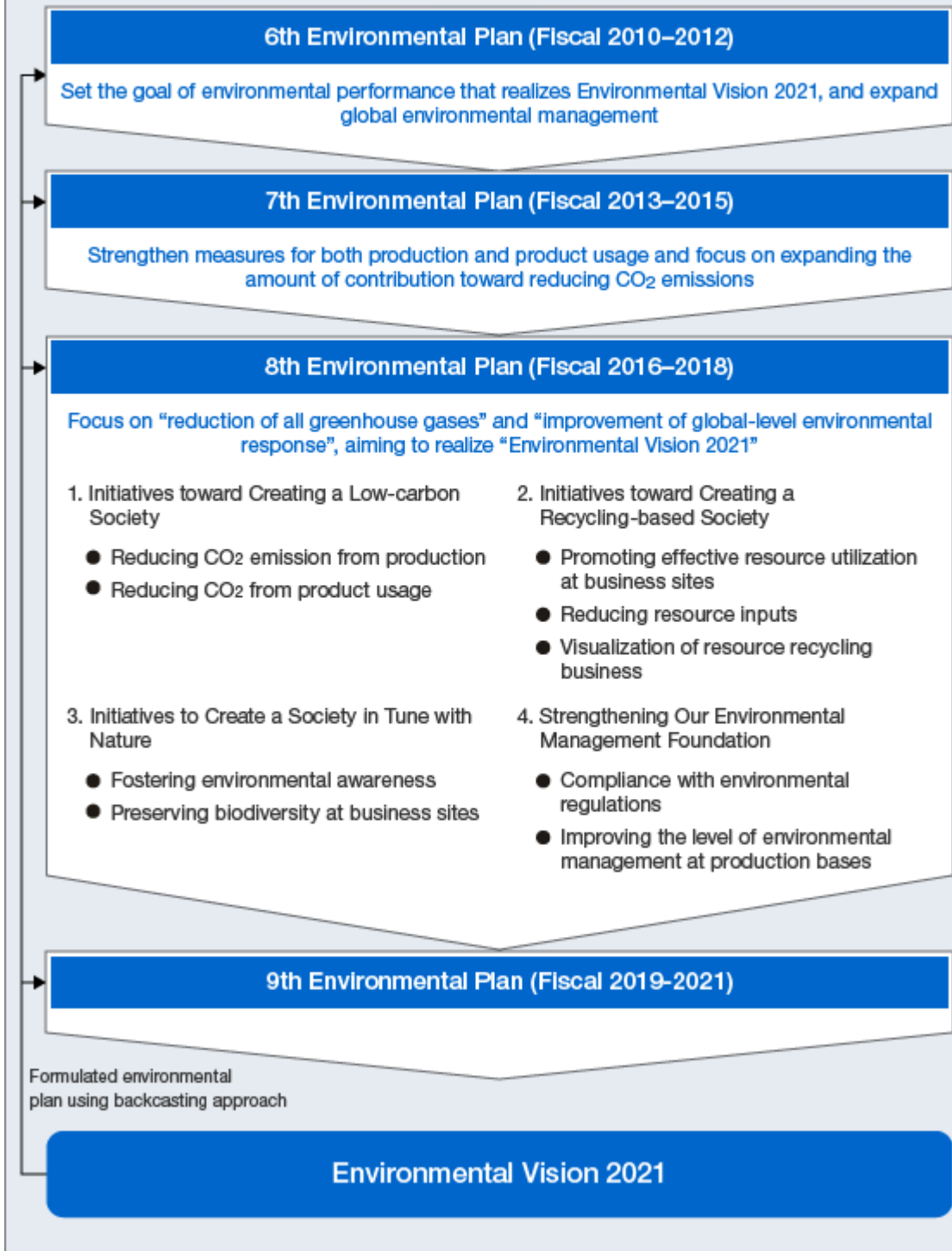
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Approximately every three years since fiscal 1994, the Mitsubishi Electric Group has formulated an environmental plan with specific targets. During this period, we have progressively stepped up our environmental activities based on the degree to which the targets of each plan (1st through 5th) were achieved.

In line with Environmental Vision 2021, which was formulated in October 2007, we changed the manner in which plans are implemented, starting from the 6th Environmental Plan (fiscal 2010-2012). In specific terms, we have adopted a backcasting approach, which identifies activity targets over the period of each plan taking into consideration matters that need to be achieved in realizing the Vision. Currently, we are promoting the 8th Environmental Plan (fiscal 2016-2018).



"Environmental Vision 2021" established in October 2007





# Environment – Product Environmental Data

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## ▶ Product Development

Promoting Design for Environment activities based on product assessments that take into consideration three perspectives—effective use of resources, efficient use of energy and avoiding emissions of substances with potential environmental risk.

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## ▶ Factor X

Pursuing products with a low environmental footprint and high performance using Factor X, an index that quantifies the idea of maximizing product value while minimizing impact on the environment.

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## ▶ Energy & Electric Systems

- ▶ Ozone Generator
  - ▶ Super High-Efficiency Transformers
  - ▶ Space-Saving Elevator System
  - ▶ Escalator
- 

## ▶ Industrial Automation Systems

- ▶ Electronic Hybrid Functional Control Panel
  - ▶ Computerized Numerical Controller
  - ▶ Wire Electric Discharge Machine
  - ▶ Electronic Multi-Measuring Instrument
  - ▶ Energy Measuring Unit
  - ▶ Laser Processing Machine
  - ▶ EPS Motor
  - ▶ Spindle Motor
  - ▶ Three-Phase Motor
- 

## ▶ Information & Communication Systems

- ▶ Optical Network Unit
  - ▶ Mitsubishi Logistics Information System: Dr. Logis
  - ▶ Integrated Environmental Information System
  - ▶ Environmentally Resistant Wide-Area Optical Ethernet Switch
  - ▶ WDM Optical Transmission Equipment
  - ▶ Information Equipment Recycling Service
- 

## ▶ Electronic Devices

- ▶ DIIPM Module
  - ▶ Laminated Bus Bar
  - ▶ Contact Image Sensor
- 

## ▶ Home Appliances

- ▶ LED Lighting
- ▶ Jet Towel Hand Dryers
- ▶ Room Air Conditioners
- ▶ Refrigerator
- ▶ Photovoltaic Module
- ▶ Photovoltaic Inverter
- ▶ Eco Cute for Household Use
- ▶ Eco Cute for Commercial Applications
- ▶ Ventilator
- ▶ Energy Recovery Ventilator for Commercial Use
- ▶ Lossnay Central Ventilator System

# Environment – Product Development

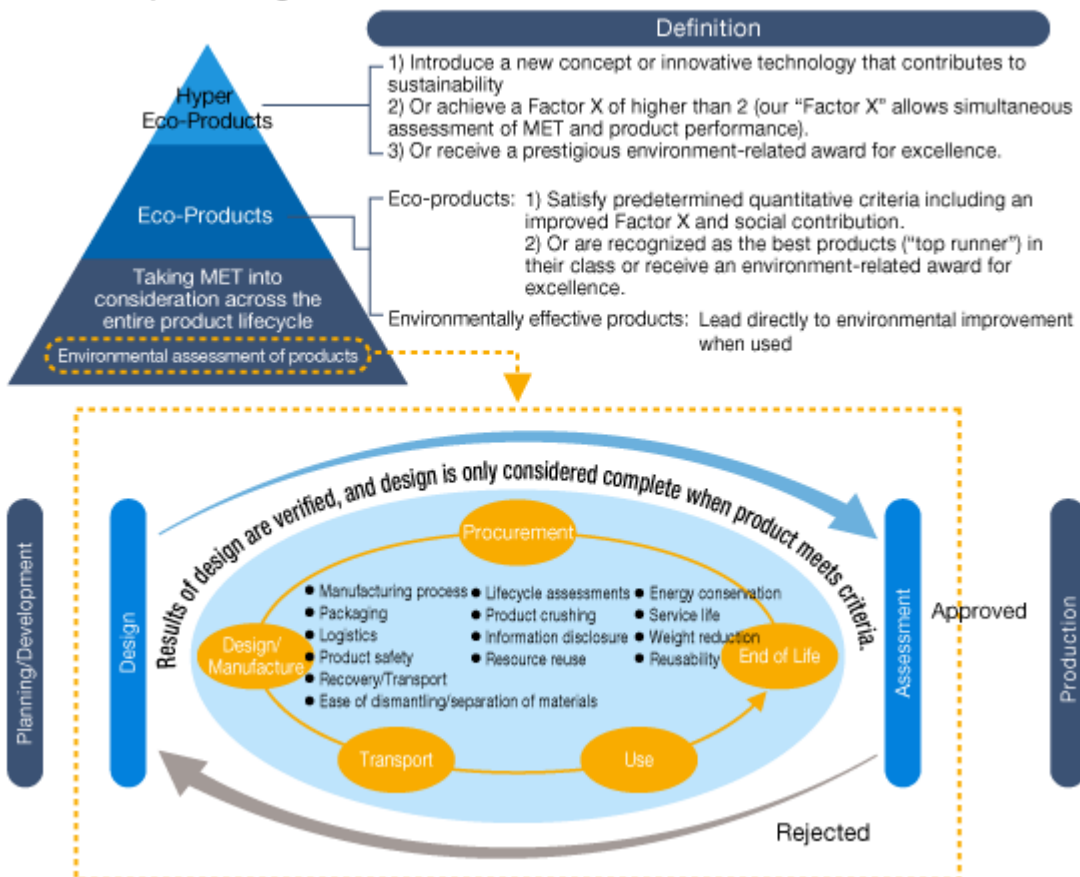
## Aiming for More Advanced "Design for Environment"

### Reducing CO2 Emissions and Improving Resource Efficiency in Line with Environmental Vision 2021

Since fiscal 2004, the Mitsubishi Electric Group has implemented product assessments from an MET\*1 perspective for all of its newly developed products. Beginning in fiscal 2016, operations will be based on Design for Environment rules that conform to international standards\*2. The Group has conducted evaluations using LCA\*3 encompassing the entire product lifecycle from the extraction of resources through to design, manufacture, use, and disposal. These efforts are aimed at reducing environmental impact. In pursuing design for the environment, we have determined targets for individual products by utilizing the Factor X environmental efficiency improvement index. Products whose factor has improved compared to the base fiscal year are designated as "eco-products," while products whose factor has improved by more than two are designated as "hyper eco-products."

- \*1 MET stands for material (effective use of material resources), energy (efficient use of energy) and toxicity (avoiding emissions of toxic substances with potential environmental risk).
- \*2 International standards is intended to be a reference to IEC 62430:2009, "Environmentally conscious design for electrical and electronic products," which specifies requirements and procedures to integrate environmental aspects into design and development processes of electrical and electronic products, including combination of products, and the materials and parts of which they are composed.
- \*3 LCA stands for lifecycle assessment, a product assessment approach seeking to quantitatively and comprehensively evaluate the environmental impact of products beginning with the collection of resources and continuing through to design, manufacturing, transportation, usage, and end-of-life processes.

### The Concept of Design for the Environment





# Environment – Factor X

## Factor X: Measuring Improvements in the Environmental Efficiency of Products

### Index Based on the Product Value and Environmental Impact

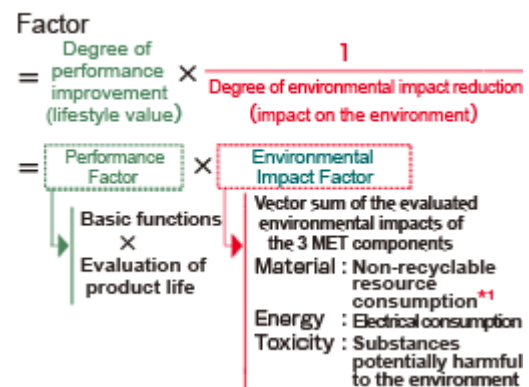
Factor X is an index that quantifies the idea of maximizing product value while minimizing impact on the environment. "X" is a value that compares a new product to a baseline product. The larger the X value, the greater the improvement in product performance and the lower the environmental impact. For example, a factor of 4 indicates a fourfold improvement in environmental consideration. Our calculation of Factor X is based upon 3 elements: reduction of resource inputs, reduction of the amount of energy used in production, and avoidance of emissions of substances with potential environmental risk. To these three we also add level of product performance improvement.

While we continue to use Factor X, Mitsubishi Electric is also investigating better ways of assessing product value, so that we may produce superior products with a lower environmental impact, and help achieve Environmental Vision 2021.

### Basic Concepts to Calculate Factor X

- Comparison between a new product and a baseline product (in principle, we use Mitsubishi Electric products and a base year of 1990).
- Evaluations of the performance factor (improvement in product performance) and the environmental impact factor (degree of environmental impact reduction) are multiplied together to produce the rating.
- The performance assessment index is evaluated as follows: [Basic functions (product functions, performance, quality, etc.) X product life]. For environmental impact, MET is based on three indices [(1) volume of non-recycled resources used,\*1(2) energy consumed, and (3) substances with potential environmental risk] from which the index of one baseline product being evaluated is calculated to obtain environmental impact by combining the vector length.

### ● Factor Calculation



The basic concepts for calculating Factor X are currently under review in order to reflect our changing of the base year to the year 2000 and the introduction of Lifecycle Thinking.

\*1 Index for volume of non-recycled resources used = virgin resource consumption + non-recyclable volume (i.e., volume disposed of without being recycled) = [weight of product - volume of recycled materials and parts] + [weight of product - recyclable volume]

## Environment – Energy & Electric Systems

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In the area of heavy electric machinery systems, Mitsubishi Electric is contributing broadly to society by lowering the environmental burden of energy systems and infrastructure systems, which are used in many places throughout society.

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▣ **Ozone Generator**

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▣ **Super High-Efficiency  
Transformers**

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▣ **Space-Saving Elevator System**

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▣ **Escalator**

# Environment – Ozone Generator

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## Ozone Generator OS

### Produces high-concentration ozone efficiently for lower life-cycle costs

The Ozone Generator is a device that produces ozone gas using electrical discharge. A high voltage with high frequency is applied between two electrodes to produce a discharge space. Oxygen gas or air is then passed through the space and some of the oxygen is converted to ozone. Ozone is a gas consisting of three bonded oxygen atoms. It has sterilization and oxidation properties that are more powerful than chlorine. It also has exceptional deodorization and de-pigmentation abilities. Water treatment systems that use the power of ozone have been recognized for their purification capabilities and environmental compatibility. They continue to be installed at sites involved in potable water treatment, sewage treatment and industrial wastewater treatment.

The Ozone Generator OS produces high-concentration ozone efficiently. It generates concentrations as high as 240 g/m<sup>3</sup> (N), an improvement upon Mitsubishi Electric's previous model, which could produce an ozone concentration as high as 150 g/m<sup>3</sup> (N).



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### **M** Materials: Effective use of resources

- Approximately 40% lower weight compared to previous Mitsubishi Electric model.

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### **E** Energy: Efficient use of energy

- Approximately 10% lower power consumption compared to previous Mitsubishi Electric model.

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### **T** Toxicity: Avoidance of substances that are potentially harmful to the environment

- Unlike sterilization and oxidation using chemicals such as chlorine, ozone breaks down after treatment and reverts to oxygen, which prevents environmental pollution.

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#### Note

Shortening the length of the discharge gap has allowed Mitsubishi Electric's Ozone Generator to produce high-concentration ozone efficiently. The discovery and application of this technology has been duly recognized, leading to it being honored with the following awards.

1. 21st Century Invention Prize at the 2006 National Invention Awards "Technology for producing high-concentration ozone efficiently"
2. Japan Machinery Federation Chairman's Prize at the 2006 Outstanding Energy Efficient Device Awards "Tubular type ozone generator with small discharge gap"
3. Prime Minister's Award at the 2007 Japan Industrial Technology Awards "High-concentration generator with very small discharge gap"

# Environment – Super High-Efficiency Transformers

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## Super High-Efficiency Transformers EX-II Series

Factor: 1.214; Performance Factor: 1.00;  
Environmental Load Factor: 1.214

Hyper Eco-Product

Step-down transformers use electromagnetic induction to reduce the alternating high-voltage electricity (e.g., 6,600V) supplied by electric utilities to the voltage levels used in factories and buildings. Our ultra-efficient EX-II Series power transformers are specifically designed to reduce environmental impact based on suppressing power loss during operation to minimize CO<sub>2</sub> emissions and contribute to the prevention of global warming. Noise produced by the transformers has also been minimized.



### Reasons for Hyper Eco-Product Certification

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- This product has been certified to carry Mitsubishi Electric's environmental mark

### Detailed environmental data

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- ▶ RA-TS

### **M** Materials: Effective use of resources

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- Use of resources increased by approximately 34% due to our goal of creating products with reduced or zero load-loss.

### **E** Energy: Efficient use of energy

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- Power consumption reduced by approximately 51% through creating products with reduced or zero load-loss.

### **T** Toxicity: Avoidance of substances that are potentially harmful to the environment

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- Eliminated the use of chrome in coating materials to reduce toxicity.

## Note

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EX-II Series power transformers realize the same efficiency as the previous EX Series while achieving installation space and external dimensions equal to those of N Series transformers, which set the current standard in Japan's Top Runner Program. In other words, the EX-II Series delivers high energy efficiency together with space savings. Here's an example of how EX-II power transformers reduce power consumption and environmental impact. If EX-II Series power transformers replaced all baseline products manufactured in 2000, CO<sub>2</sub> emissions would be reduced 12.1 tons\* annually (when applied to three-phase 6.6kV/210V, 1,000kVA 50Hz systems).

\* Based on a CO<sub>2</sub> emission coefficient of 0.559 kg-CO<sub>2</sub>/kWh, the average value for general electricity utility companies and other electricity suppliers in Japan. (Source: Notifications 1 and 2 of the Japanese Ministry of Economy, Trade and Industry and Ministry of the Environment, 2012).

## Super High-Efficiency Transformers

### Summary data

		Environmental load				Value of product
		M: Effective utilization of resources	E: Effective utilization of energy	T: Avoidance of discharge of environmentally hazardous substances		
Baseline product	2000 product	1	1	1	1.732	1
	RA-T (3φ 1,000kVA 50Hz)					
Evaluated product	2012 product	1.34	0.49	0	1.427	1
	RA-TS (3φ 1,000kVA 50Hz)					
Details of improvement		Use of resources increased approx. 34% aiming to reduce load-loss	Power consumption reduced approx. 51% via reduced or zero load-loss	Eliminated the use of chrome in coating materials		
Environmental load factor: A		(1/Environmental load of new product)/(1/Environmental load of standard product)			1.214	
Performance factor: B		(Added value of new product)/(Added value of standard product)			1	
Factor X: AxB		(Added value of new product/Environmental load of new product)/(Added value of standard product/Environmental load of standard product)			1.214	

\*For operation of 3φ 1,000kVA 50Hz transformer with load factor of 50%.

### Environmental load factor

		Baseline product (2000 product equivalent)		Evaluated product	
M	(1) Weight of product	2,700.0	kg	3,630.0	kg
	Iron	1,852.1	kg	1,988.9	kg
	Copper	2.0	kg	1,024.6	kg
	Aluminum	197.9	kg	0.0	kg
	Resin (Recycled material)	0.0	kg	0.0	kg
	Resin (Non-recycled material)	0.0	kg	0.0	kg
	Others	648.0	kg	616.5	kg
	(2) Weight of recycled material	684.1	kg	819.1	kg
	(3) Weight of reused parts	0.0	kg	0.0	kg
	(4) Weight of 3R material [(2) + (3)]	684.1	kg	819.1	kg
(5) Consumption of virgin resources [(1) – (4)]	2,015.9	kg	2,810.9	kg	
(6) Recyclable weight (3R possible)	2,052.0	kg	3,013.5	kg	
(7) Non-recyclable weight [(1) – (6)]	648.0	kg	616.5	kg	
	Power consumption during annual operation (F1)	42,508	kWh	20,882	kWh

E	Power consumption in annual standby state (E2)	0	kWh	0	kWh
	Total (Annual power consumption)	42,508	kWh	20,882	kWh
	Lead usage in solder (T1)	0	g	0	g
	Cadmium usage (T2)	0	g	0	g
	Mercury usage (T3)	0	g	0	g
T	Hexavalent chromium usage (T4)	74	g	0	g
	PBB usage (T5)	0	g	0	g
	PBDE usage (T6)	0	g	0	g
	HCFC refrigerant <sup>2</sup>	0	g	0	g

\* For operation of 3φ 1,000kVA 50Hz transformer with load factor of 50%.

#### Performance factor

Example of improvement of performance/life	Performance/life index
Performance factor	1

# Environment – Space-saving Elevator System

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## Machine-Room-Less Elevator System AXIEZ

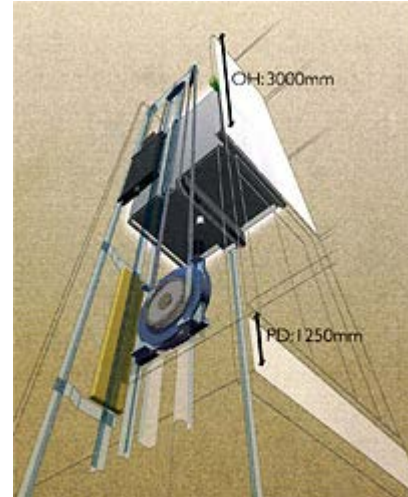
Factor: 1.091; Performance Factor: 1.00;  
Environmental Load Factor: 1.091 (applies only to elevator equipment)

- \* Factors for baseline products manufactured in fiscal 1996.
- \* The performance factor of this elevator system has not been evaluated.

### One of the Industry's Most Compact and Space-Saving Elevator Systems Less Impact on the Environment through Reduced Use of Natural Resources and Hazardous Substances

The AXIEZ machine-room-less elevator system responds to diversified needs through enhanced performance and functionality. The development of more compact equipment and the Smooth Emergency Terminal Slowdown (SETS) unit\* enables smaller elevator shafts. Pit depth is standardized to 1,250mm and the elevator shaft overhead dimension to 3,000mm. Operating speeds range from 45 to 105 meters per minute.

- \* A unit that uses microcomputers to monitor elevator speed and immediately detect and reduce excessive speed to a much slower and smoother pace near both ends of the elevator shaft (highest and lowest floors). This enables more compact shock absorbers and reduces the space needed at the top and bottom of the elevator shaft.



Detailed environmental data

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- P9-CO-60, 6stop

### **M** Materials: Effective use of resources

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- Overall weight of elevator equipment reduced by up to 400kg per car (equivalent to approx. 1,200 tons per year) through streamlining of the elevator shaft and car equipment (return car, machinery mount, car dimensions, emergency brake, etc.).
- Recycled plastic materials adopted for part of the car control panel.

### **E** Energy: Efficient use of energy

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- Adopted LED ceiling lighting in cars, reduced the standby power consumption and reduced overall power consumption up to 20% compared to conventional elevators (standard specifications) through optimizing the balance between the car and counterweight.
- Electricity from regenerative braking during elevator operation can be utilized to power other equipment inside the building, helping to achieve a 30% reduction\* in electricity usage.  
\* When equipped with the optional regenerative capacitor. Results may vary depending on specifications and actual operational conditions.

### **T** Toxicity: Avoidance of substances that are potentially harmful to the environment

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- Use of lead-free materials for circuit boards and use of plating that does not contain hexavalent chrome as part of efforts to promote the use of RoHS-compliant parts and materials.
- Reduced usage of toluene, xylene, and other atmospheric and soil contaminants.
- In compliance with building laws and regulations, reduced emissions of substances subject to restrictions to levels at or below standards for the entire elevator system. Reduced formaldehyde concentrations to levels below the standard of 100µg/m<sup>3</sup>.



## Space-Saving Elevator System

### Summary data

		Environmental load				Value of product
		M: Effective utilization of resources	E: Effective utilization of energy	T: Avoidance of discharge of environmentally hazardous substances		
Baseline product	1996 product	1	1	1	1.732	1
Evaluated product	2005 product	0.829	0.906	1	1.584	1
	P9-CO-60, 6stop					
Details of improvement		Reduction in weight of equipment around cars; Reduction in environmental load during disposal due to use of plant-derived plastic	Promotion of energy savings	Adoption of RoHS-compliant parts and materials; Reduction in toluene, xylene and other hazardous substances that contaminate the air and soil; Prevention of sick-house syndrome		Details: (1) Application of variable-speed elevator system (2) Increased safety owing to universal door system
Environmental load factor: A		(1/Environmental load of new product)/ (1/Environmental load of standard product)			1.094	
Performance factor: B		(Added value of new product)/ (Added value of standard product)			1	
Factor X: AxB		(Added value of new product/Environmental load of new product)/ (Added value of standard product/Environmental load of standard product)			1.094	

### Environmental load factor

		Baseline product (1990 product equivalent)		Evaluated product	
M	(1) Weight of product	280	kg	232	kg
	Iron	280	kg	232	kg
	Copper		kg		kg
	Aluminum		kg		kg
	Resin (Recycled material)		kg		kg
	Resin (Non-recycled material)		kg		kg
	Others		kg		kg
	Reduced weight after conversion into identical function <sup>1</sup>		kg		kg
	(2) Weight of recycled material	98	kg	81.2	kg
	(3) Weight of reused parts		kg		kg
	(4) Weight of 3R material [(2) + (3)]	98	kg	81.2	kg
	(5) Consumption of virgin resources [(1) – (4)]	182	kg	150.8	kg

	(6) Recyclable weight (3R possible)		kg		kg
	(7) Non-recyclable weight [(1) – (6)]	280	kg	232	kg
	Power consumption during annual operation (E1)	2,869	kWh	2,600	kWh
E	Power consumption in annual standby state (E2)		kWh		kWh
	Total (Annual power consumption)		kWh		kWh
	Lead usage in solder (T1)	0	g	0	g
	Cadmium usage (T2)	0	g	0	g
	Mercury usage (T3)	0	g	0	g
T	Hexavalent chromium usage (T4)		g		g
	PBB usage (T5)	0	g	0	g
	PBDE usage (T6)	0	g	0	g
	HCFC refrigerant <sup>2</sup>				
	Total				

Factors with 3R viewpoint: Addition method

	Quantitative data				Baseline product	Evaluated product	
	Baseline product	(Unit)	Evaluated product	(Unit)			
M	2 x Weight -3R-3R possible [(5) + (7)]	–	kg	–	kg	1	0.829
E	Reduction in energy consumption	–	kWh	–	kWh	1	0.906
T	Reduction in hazardous substances	–	g	–	g	1	1
Environmental load (MET resultant value)					1.732	1.584	
Environmental load factor					1.094		

- 1 The weight of the function absent in the baseline product, which cannot be expressed as an influence on environmental load or as the added value of the product. It is the weight of the part not subject to evaluation (oxygen adding function and ventilation function).
- 2 Evaluation after HCFC refrigerant is added to the environmentally hazardous substances.

# Environment – Escalator

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## Escalator ZJ-S

Factor: 1.280

Performance Factor: 1.000\*

Environmental Impact Factor: 1.280

\* No performance factor evaluation for this product.

ZJ-S constitutes a new escalator design providing high quality and reliability. Particular attention was paid to safety and convenience in creating this design.



Detailed environmental data

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▀ ZJ-S

### **M** Materials: Effective use of resources

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- The ZJ-S design is characterized by its relatively small number of parts and light weight. Installing ZJ escalators for floor heights of 6.5–7.0 m results in the use of less material than required by other escalator models.
- To minimize the amount of material used in truss members, the size of the truss chords and other parts was scaled down, resulting in lighter parts and overall weight reduction.
- Recyclable thermoplastic polyurethane handrails and rollers were installed.

### **E** Energy: Efficient use of energy

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- An optional automatic operation function helps make the escalator more energy efficient. A line of VVVF inverter-based post and postless products that stop/slow down when not in use has been prepared; combining these features with variable speed functionality results in expanded application for automatic operation functions.

### **T** Toxicity: Avoidance of substances that are potentially harmful to the environment

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- Active employment of RoHS-compliant parts and materials (Switched to lead-free boards, and plating free of hexavalent chromium.)
- Reduced usage of toluene, xylene, and other atmospheric and soil contaminants.

## Escalator

### Summary data

		Environmental load				Value of product
		M: Effective use of resources	E: Efficient use of energy	T: Avoidance of substances that are potentially harmful to the environment		
Standard product	1996 product	1	1	1	1.732	1
	JS-S					
Evaluated product	2009 product	0.960	0.954	0	1.353	1
	ZJ-S					
Details of improvement		Maximized number of parts that use recycled plastic	Industry top-class energy savings	Eliminated all substances restricted by the EU's RoHS Directive		Items for consideration: <ul style="list-style-type: none"> <li>• Upgraded quality</li> <li>• Improved safety</li> <li>• Enhanced convenience</li> <li>• Commoditization of structural and drive components</li> <li>• Extension of applied elevation height (story height)</li> <li>• Revamped design</li> <li>• Broader electrical options</li> </ul>
Environmental impact factor		(1/Environmental impact of new product)/(1/Environmental impact of standard product)			1.280	
Performance factor		(Added value of new product)/(Added value of standard product)			1	
Factor X: Environmental impact factor × Performance factor		(Added value, environmental impact of new products)/(Added value, environmental impact of standard products)			1.280	

### Environmental Impact Factor

		Standard product (1990 product equivalent)		Evaluated product	
M	(1) Weight of product	8924	kg	8564	kg
	Iron	7055	kg	6905	kg
	Copper	-	kg	-	kg
	Aluminum	1260	kg	1050	kg
	Resin (Recycled material)	-	kg	-	kg
	Resin (Non-recycled material)	173	kg	178	kg
	Others	436	kg	431	kg
	(2) Weight of recycled material	-	kg	-	kg
	(3) Weight of reused parts	0	kg	0	kg
	(4) Weight of 3R material [(2) + (3)]	-	kg	-	kg
	(5) Consumption of virgin resources [(1) – (4)]	-	kg	-	kg
	(6) Recyclable weight (3R possible)	-	kg	-	kg
	(7) Nonrecyclable weight [(1) – (6)]	-	kg	-	kg
	Power consumption during annual operation (E1)	284,000	kWh	271,000	kWh
E	Power consumption in annual standby state (E2)	-	kWh	-	kWh
	Total (Annual power consumption)	284,000	kWh	271,000	kWh

	Lead usage in solder (T1)	76	g	0	g
	Cadmium usage (T2)	0	g	0	g
	Mercury usage (T3)	0	g	0	g
T	Hexavalent chromium usage (T4)	(Used in plating*)	g		g
	PBB usage (T5)	0	g	0	g
	PBDE usage (T6)	0	g	0	g
	HCFC refrigerant	0		0	

\* As determination of the volumes used in 1990 is problematic, values for this year are excluded.

## Environment – Industrial Automation Systems

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In industrial Mechatronics, we help customers reduce their environmental burden by increasing the energy- and resource-efficiency of various devices that are indispensable for industry.

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▶ **Electronic Hybrid Functional Control Panel**

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▶ **Computerized Numerical Controller**

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▶ **Wire Electric Discharge Machine**

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▶ **Electronic Multi-Measuring Instrument**

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▶ **Energy Measuring Unit**

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▶ **Laser Processing Machine**

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▶ **EPS Motor**

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▶ **Spindle Motor**

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▶ **Three-Phase Motor**

# Environment – Electronic Hybrid Functional Control Panel

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## Electronic Hybrid Functional Control Panel MACTUS 30LCB

### Integration simplifies and enhances the performance of water treatment plants

With conventional systems for power instrumentation and control at drinking water treatment facilities, sewage treatment facilities and other water treatment plants, it was necessary to produce, install, wire and coordinate (on-site) separate control panels for power, control and instrumentation circuits. The Electronic Hybrid Functional Control Panel consolidates these previously separate circuits and reduces the number of control panels to save space, reduce wiring, lower power consumption and provide high-performance electrical facilities. It is the first Mitsubishi Electric product that has been certified with the Eco-Leaf environmental label (conforms to the ISO Type III framework).



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### **M** Materials: Effective use of resources

- Fewer control panels and less wiring due to integration of previously separate functions.
- Systems previously requiring three control panels can be configured with two panels (scope of consolidation differs depending on the size of the plant).

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### **E** Energy: Efficient use of energy

- Energy is saved through consolidating previously separate functions and by integrating and changing controls from H/W circuits to S/W circuits. Power consumption is reduced by up to 40% compared to Mitsubishi Electric's previous system (energy savings differ depending on the size of the plant).

# Environment – Computerized Numerical Controller

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## Computerized Numerical Controller M700VS Series

Factor 2.72: Performance Factor 1.12:  
Environmental Load Factor 2.429

Hyper Eco-Product

### Best controller for top level manufacturing

The Computerized Numerical Controller is a computer that accurately controls the amount of movement and speed of machine tool implements. With fewer long-life parts, such as HDDs and the cooling fans, part replacement maintenance and machine tool waste is also reduced.



### Reasons for Hyper Eco-Product Certification

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- Factor X is more than or equal to 2

### Detailed environmental data

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▶ M700VS Series

### **M** Materials: Effective use of resources

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- Compact and lightweight resource-saving design (volume: 13% reduction mass; 29% reduction).

### **E** Energy: Efficient use of energy

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- We have developed the high-efficiency and electric power saving graphic circuit, which reduces power consumption by approximately 66% compared to the previous model.

### **T** Toxicity: Avoidance of substances that are potentially harmful to the environment

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- Conforms to the EU RoHS Directive; the occurrence of six regulated substances (lead, mercury, cadmium, hexavalent chromium, PBB, and PBDE) is controlled.



## Computerized Numerical Controller

### Summary data

		Environmental load				Value of product
		M: Effective utilization of resources	E: Effective utilization of energy	T: Avoidance of discharge of environmentally hazardous substances		
Standard product	2004 product	1	1	1	1.732	1
	M700 series					
Evaluated product	2008 product	0.62	0.34	0	0.713	
	M700VS series					
	Details of improvement	Compact and lightweight resource-saving design.	Reduced power consumption	Complies with Europe's RoHS Directive		Achieves high-speed, high-precision control (1.12 times better performance than standard product)
Environmental load factor: A		(1/Environmental load of new product)/(1/Environmental load of standard product)			2.429	
Performance factor: B		(Added value of new product)/(Added value of standard product)			1.12	
Factor X: AxB		(Added value of new product/Environmental load of new product)/(Added value of standard product/Environmental load of standard product)			2.72	

### Environmental load factor

		Standard product (2004 product equivalent)		Evaluated product	
M	(1) Weight of product	7.03	kg	5.02	kg
	Iron	2.31	kg	1.83	kg
	Copper	0	kg	0	kg
	Aluminum	0.59	kg	0.47	kg
	Resin (Recycled material)	0	kg	0	kg
	Resin (Non-recycled material)	1.48	kg	1.2	kg
	Others	2.65	kg	1.52	kg
	Reduced weight after conversion into identical function <sup>1</sup>		kg		kg
	(2) Weight of recycled material	0.91	kg	0.72	kg
	(3) Weight of reused parts	0	kg	0	kg
	(4) Weight of 3R material [(2) + (3)]	0.91	kg	0.72	kg
	(5) Consumption of virgin resources [(1) – (4)]	6.12	kg	4.3	kg
	(6) Recyclable weight (3R possible)	6.94	kg	4.97	kg
	(7) Nonrecyclable weight [(1) – (6)]	0.1	kg	0.05	kg
	Power consumption during annual operation (E1)	267	kWh	92	kWh
E	Power consumption in annual standby state (E2)	0	kWh	0	kWh
	Total (Annual power consumption)	267	kWh	92	kWh
	Lead usage in solder (T1)	3	g	0	g

T	Cadmium usage (T2)	0	g	0	g
	Mercury usage (T3)	0	g	0	g
	Hexavalent chromium usage (T4)	0	g	0	g
	PBB usage (T5)	0	g	0	g
	PBDE usage (T6)	0	g	0	g
	HCFC refrigerant <sup>2</sup>	0	g	0	g
	Others	0	g	0	g
Total	3	g	0	g	

Factors with 3R viewpoint: Addition method

	Quantitative data				Standard product	Evaluated product	
	Standard product	(Unit)	Evaluated product	(Unit)			
M	2 x Weight-3R-3R possible [(5) + (7)]	-	kg	-	kg	1	
E	Reduction in energy consumption	-	kWh	-	kWh	1	
T	Reduction in hazardous substances	-	g	-	g	1	
Environmental load (MET resultant value)							
Environmental load factor							

1 The weight of the function absent in the standard product, which cannot be expressed as an influence on environmental load or as the added value of the product. It is the weight of the part not subject to evaluation. (Oxygen adding function and ventilation function)

2 Evaluation after HCFC refrigerant is added to the environmentally hazardous substances.

Performance factor

Example of improvement of performance/life	Performance/life index
Improved NC performance due to faster micro-line fed <ul style="list-style-type: none"> <li>Standard product: 135 m/min</li> <li>Evaluated product: 151 m/min</li> </ul> Details on Eco Leaf environmental label (link to website of Japan Environmental Management Association for Industry)	1.12
Performance factor	1.12

# Environment – Wire Electric Discharge Machine

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## Wire Electric Discharge Machine NA series

Factor NA1200:4.60 NA2400:3.91  
Performance Factor NA1200:3.086  
NA2400:3.086  
Environmental Load Factor NA1200:1.492  
NA2400:1.267



### Next-generation WEDM provides high-precision machining and lower running costs

A wire electric discharge machine is a type of machine tool classified by JIS regulations as a special processing machine. It provides precision machining by utilizing electrical discharge between the workpiece and wire electrodes to melt and remove the workpiece. It uses significantly less power and wire than Mitsubishi Electric's previous model, helping to reduce running costs.



NA1200



NA2400

### Reasons for Hyper Eco-Product Certification

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- Factor rating of 3 or more

### Detailed environmental data

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- ▶ NA1200
- ▶ NA2400

### **M** Materials: Effective use of resources

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- Optical product design delivers increased processing size (due to a larger machine) without increasing the amount of cast metal used.
- Unit design reduces total number of parts.
- Resources saved by digitizing the user's manual.

### **E** Energy: Efficient use of energy

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- A new power supply reduces processing time by as much as 30% compared to the previous Mitsubishi Electric model.
- Brand new control system called Intelligent Master reduces wire consumption by up to 44% compared to the previous Mitsubishi Electric model.
- New "wake-up mode" function reduces standby power consumption.
- Total power consumption is cut by up to 69% compared to the previous Mitsubishi Electric model.

### **T** Toxicity: Avoidance of substances that are potentially harmful to the environment

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- New components were selected for the circuit board. Circuit boards with lead-free solder substantially reduce the amount of lead used.

## Note

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The NA Series was designed to provide delicate, high-precision machining and lower running costs while also being operator friendly and easy to use. The NA 2400 Series features 37% more machine strokes, an especially large table and an automatic elevation tank. The work position can be checked from three directions, which makes large work set-up easy. The product is also readily compatible with automation via robots or other automation equipment.

Additionally, a survey of worker movement resulted in improvement to the positioning of the control unit, which helps the product achieve Universal Design ideals.

The product's user-friendly design was recognized, and it was awarded a Good Design Award for fiscal 2008.

## Wire Electric Discharge Machine

### Summary data

		Environmental load				Value of product
		M: Effective utilization of resources	E: Effective utilization of energy	T: Avoidance of discharge of environmentally hazardous substances		
Standard product	1990 product	1	1	1	1.732	1
	90SZ					
Evaluated product	2009 product	0.89	0.66	0.33	1.161	
	NA1200					
	Details of improvement	Reduced product weight	Supply pump turned off when processing on standby	Uses lead-free P-plating	-	Marketed new, mid-size, wire-cut electrical discharge machine that provides more convenience to the customer due to linear drive, a new power supply and automatic elevation tank improved XY stroke.
Environmental load factor: A		(1/Environmental load of new product)/(1/Environmental load of standard product)			1.492	
Performance factor: B		(Added value of new product)/(Added value of standard product)			3.086	
Factor X: AxB		(Added value of new product/Environmental load of new product)/(Added value of standard product/Environmental load of standard product)			4.603	

## Wire Electric Discharge Machine

### Summary data

		Environmental load				Value of product
		M: Effective utilization of resources	E: Effective utilization of energy	T: Avoidance of discharge of environmentally hazardous substances		
Standard product	1990 product	1	1	1	1.732	1
	110SZ					
Evaluated product	2009 product	1.1	0.7	0.3	1.338	
	NA2400					
	Details of improvement	Increase in product weight	Supply pump turned off when processing on standby	Uses lead-free P-plating	-	Marketed new, mid-size wire-cut electrical discharge machine that provides more convenience to the customer due to linear drive, a new power supply, raising and lowering in three directions and improved XY stroke.
Environmental load factor: A		$(1/\text{Environmental load of new product}) / (1/\text{Environmental load of standard product})$			1.295	
Performance factor: B		$(\text{Added value of new product}) / (\text{Added value of standard product})$			3.086	
Factor X: AxB		$(\text{Added value of new product} / \text{Environmental load of new product}) / (\text{Added value of standard product} / \text{Environmental load of standard product})$			3.995	

# Environment – Electronic Multi-Measuring Instrument

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## Electronic Multi-Measuring Instrument

ME110SSR / ME110SSR-4APH / ME110SSR-4A2P / ME110SSR-C

Factor: 1.209; Performance Factor: 1.833;  
Environmental Load Factor: 2.217

Hyper Eco-Product

### Enhanced Operational Ease and Viewing Clarity

Electronic multi-measuring instruments measure and display key energy data such as electric voltage, current, power and quantity which is useful for analysis of how energy is being used in buildings and factories. Data can be relayed remotely via output, communication and other functions. In addition, these devices contribute to energy-savings through higher efficiency circuits.



Detailed environmental data

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ME110SSR / ME110SSR-4APH / ME110SSR-4A2P / ME110SSR-C

### **M** Materials: Effective use of resources

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- Number of parts reduced by 6% compared to previous model.

### **E** Energy: Efficient use of energy

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- Power consumption reduced by 12% compared to previous model.

### **T** Toxicity: Avoidance of substances that are potentially harmful to the environment

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- No use of any of the six hazardous substances (lead, mercury, cadmium, hexavalent chromium, PBB and PBDE) specified in the EU RoHS Directive.



## Electronic Multi-Measuring Instrument

### Summary data

		Environmental load				Value of product
		M: Effective utilization of resources	E: Effective utilization of energy	T: Avoidance of discharge of environmentally hazardous substances		
Baseline product	2005 product	1	1	1	1.732	1
	ME110NSR					
Evaluated product	2011 product	0.754	0.871	0.850	1.432	1.833
	ME110SSR					
Details of improvement						
Environmental load factor: A		(1/Environmental load of new product)/(1/Environmental load of standard product)			1.209	
Performance factor: B		(Added value of new product)/(Added value of standard product)			1.833	
Factor X: AxB		(Added value of new product/Environmental load of new product)/(Added value of standard product/Environmental load of standard product)			2.217	

### Environmental load factor

		Baseline product (2005 product equivalent)		Evaluated product	
M	(1) Weight of product	0.545	kg	0.483	kg
	Iron	0	kg	0	kg
	Copper	0	kg	0	kg
	Aluminum	0	kg	0	kg
	Resin (Recycled material)	0.053	kg	0.053	kg
	Resin (Non-recycled material)	0.005	kg	0.005	kg
	Others	0.487	kg	0.425	kg
	(2) Weight of recycled material	0.053	kg	0.053	kg
	(3) Weight of reused parts	0.2	kg	0.2	kg
	(4) Weight of 3R material [(2) + (3)]	0.253	kg	0.253	kg
	(5) Consumption of virgin resources [(1) – (4)]	0.292	kg	0.292	kg
	(6) Recyclable weight (3R possible)	0.373	kg	0.363	kg
	(7) Non-recyclable weight [(1) – (6)]	0.172	kg	0.12	kg
E	Power consumption during annual operation (E1)	70	kWh	61	kWh
	Power consumption in annual standby state (E2)	0	kWh	0	kWh
	Total (Annual power consumption)	70	kWh	61	kWh
T	Lead usage in solder (T1)	0	g	0	g
	Cadmium usage (T2)	0	g	0	g
	Mercury usage (T3)	0	g	0	g
	Hexavalent chromium usage (T4)	0	g	0	g
	PBB usage (T5)	0	g	0	g
	PBB usage (T6)	0	g	0	g

FCBE usage (t)	0	g	0	g
HCFC refrigerant	0	g	0	g

Performance factor

Example of improvement of performance/life	Performance/life index
Wide viewing angle LCDs adopted	1.2
High-intensity LEDs adopted for backlights	1.2

# Environment – Energy Measuring Unit

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## Energy Measuring Unit (EcoMonitorPro)

Factor 3.96: Performance Factor 2.50:  
Environmental Load Factor 1.582

Hyper Eco-Product

These gauges make it possible to measure electricity usage for electric power systems covering multiple factories and buildings at the level of individual facilities or lines, and at 1-second or 1-minute intervals.



### Reasons for Hyper Eco-Product Certification

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- Factor rating of 2 or more

### Detailed environmental data

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- ▶ EMU2-HM1-B

### **M** Materials: Effective use of resources

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- Reduced virgin resource usage in products by 45%.
- Reduced the volume of unrecyclable materials by 45%.

### **E** Energy: Efficient use of energy

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- Reduced electricity consumption by 51% during usage and 82% during standby.

### **T** Toxicity: Avoidance of substances that are potentially harmful to the environment

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- Reduced the amount of lead used in solder by 12.5%.

## Energy Measuring Unit

### Summary data

		Environmental load				Value of product
		M: Effective utilization of resources	E: Effective utilization of energy	T: Avoidance of discharge of environmentally hazardous substances		
Standard product	1998 product	1	1	1	1.732	1
	EMU-B3P5					
Evaluated product	2003 product	0.55	0.37	0.88	1.095	2.5
	EMU2-HM1-B					
	Details of improvement	45% reduction in consumption of virgin resources for product 45% reduction in nonrecyclable weight	Reduction of power consumption during use by 51% 82% reduction in the standby state	12.5% reduction in lead in solder		(Details) Number of factors of energy measurement 4 → 10: 2.5 times greater
Environmental load factor: A		(1/Environmental load of new product)/(1/Environmental load of standard product)			1.582	
Performance factor: B		(Added value of new product)/(Added value of standard product)			2.5	
Factor X: AxB		(Added value of new product/Environmental load of new product)/(Added value of standard product/Environmental load of standard product)			3.96	

### Environmental load factor

		Standard product (1990 product equivalent)		Evaluated product	
M	(1) Weight of product	0.282	kg	0.155	kg
	Iron		kg		kg
	Copper		kg		kg
	Aluminum		kg		kg
	Resin (Recycled material)		kg		kg
	Resin (Non-recycled material)		kg		kg
	Others	0.282	kg	0.155	kg
	Reduced weight after conversion into identical function <sup>1</sup>		kg		kg
	(2) Weight of recycled material	0	kg	0	kg
	(3) Weight of reused parts		kg		kg
	(4) Weight of 3R material [(2) + (3)]	0	kg	0	kg
	(5) Consumption of virgin resources [(1) – (4)]	0.282	kg	0.155	kg
	(6) Recyclable weight (3R possible)	0.027	kg	0.0163	kg
	(7) Nonrecyclable weight [(1) – (6)]	0.255	kg	0.1387	kg
E	Power consumption during annual operation (E1)	0.0043	kWh	0.0021	kWh

	Power consumption in annual standby state (E2)	0.0035	kWh	0.0006	kWh
	Total (Annual power consumption)		kWh		kWh
	Lead usage in solder (T1)	0.8	g	0.7	g
	Cadmium usage (T2)	0	g	0	g
	Mercury usage (T3)	0	g	0	g
T	Hexavalent chromium usage (T4)	0	g	0	g
	PBB usage (T5)	0	g	0	g
	PBDE usage (T6)	0	g	0	g
	HCFC refrigerant <sup>2</sup>				
	Total				

Factors with 3R viewpoint: Addition method

		Quantitative data				Standard product	Evaluated product
		Standard product	(Unit)	Evaluated product	(Unit)		
M	2 x Weight-3R-3R possible [(5) + (7)]	-	kg	-	kg	1	0.546927374
E	Reduction in energy consumption	-	kWh	-	kWh	1	0.365988426
T	Reduction in hazardous substances	-	g	-	g	1	0.875
Environmental load (MET resultant value)						1.7321	1.094852538
Environmental load factor						1.5820	

- 1 The weight of the function absent in the standard product, which cannot be expressed as an influence on environmental load or as the added value of the product. It is the weight of the part not subject to evaluation. (Oxygen adding function and ventilation function)
- 2 Evaluation after HCFC refrigerant is added to the environmentally hazardous substances.

Performance factor

Example of improvement of performance/life	Performance/life index
Number of factors of energy measurement 4 → 10: 2.5 times greater	2.5

# Environment – Laser Processing Machine

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## Two-Dimensional CO<sub>2</sub> Laser Processing Machines eX Series

Factor: 2.42; Performance Factor: 1.85;  
Environmental Load Factor: 1.308

Hyper Eco-Product

Laser processing machines use the directional and high-energy characteristics of laser to achieve precision machining via a process of irradiating the laser beam to melt (or cut away) parts of the workpiece to shape the final product. The eX Series, recognized as a world leader in two-dimensional CO<sub>2</sub> laser processing machines, maximizes productivity and realizes simple dual-action operation.



The eX Series won the 32nd (2011) Commendation for Excellent Energy Equipment, the Agency for Natural Resources and Energy Director's Award sponsored by the Japan Machinery Federation.

Detailed environmental data

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▶ eX Series

### **M** Materials: Effective use of resources

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- Optimal structural design used, resulting in reduced weight of principal structural components and enhanced rigidity of processing equipment.

### **E** Energy: Efficient use of energy

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- Improved processing speeds and control technologies, resulting in reduced processing time of thin sheets by approximately 20% compared to our previous models.
- Use of the latest piercing technologies to reduce the processing time of thick and intermediate-thickness mild-steel plates by approximately 30% compared to our previous models.
- Equipped with an Eco mode which reduces power consumption during non-processing time to reduce standby consumption costs up to 99% compared to our previous models.

### **T** Toxicity: Avoidance of substances that are potentially harmful to the environment

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- Reduced use of lead through fewer parts attached using a solder.

## Laser Processing Machine

### Summary data

		Environmental load				Value of product
		M: Effective utilization of resources	E: Effective utilization of energy	T: Avoidance of discharge of environmentally hazardous substances		
Baseline product	2000 product	1	1	1	1.732	1
	Lv Series					
Evaluated product	2012 product	0.889	0.68	0.707	1.324	1.85
	eX Series					
Details of improvement		Reduced weight of principal structural components	Reduced processing time; Eco mode	Reduced use of lead through fewer soldered parts		
Environmental load factor: A		(1/Environmental load of new product)/(1/Environmental load of standard product)			1.308	
Performance factor: B		(Added value of new product)/(Added value of standard product)			1.85	
Factor X: AxB		(Added value of new product/Environmental load of new product)/(Added value of standard product/Environmental load of standard product)			2.420	

### Environmental load factor

		Baseline product (2000 product equivalent)		Evaluated product	
M	(1) Weight of product	11,200.0	kg	9,966.7	kg
	Iron	9,730.0	kg	8,596.7	kg
	Copper	30.0	kg	30.0	kg
	Aluminum	120.0	kg	120.0	kg
	Resin (Recycled material)	0.0	kg	0.0	kg
	Resin (Non-recycled material)	0.0	kg	0.0	kg
	Others	1,320.0	kg	1,220.0	kg
	(2) Weight of recycled material	3,430.7	kg	3,034.0	kg
	(3) Weight of reused parts	0.0	kg	0.0	kg
	(4) Weight of 3R material [(2) + (3)]	3,430.7	kg	3,034.0	kg
	(5) Consumption of virgin resources [(1) – (4)]	7,769.3	kg	6,932.6	kg
	(6) Recyclable weight (3R possible)	10,050.0	kg	8,896.7	kg
	(7) Non-recyclable weight [(1) – (6)]	1,150.0	kg	1,070.0	kg
E	Power consumption during annual operation (E1)	174,389	kWh	117,611	kWh
	Power consumption in annual standby state (E2)	9,297	kWh	4,223	kWh
	Total (Annual power consumption)	183,686	kWh	124,921	kWh
	Lead usage in solder (T1)	30	g	20	g



	Cadmium usage (T2)	0	g	0	g
	Mercury usage (T3)	0	g	0	g
T	Hexavalent chromium usage (T4)	0	g	0	g
	PBB usage (T5)	0	g	0	g
	PBDE usage (T6)	0	g	0	g
	HCFC refrigerant	0	g	0	g

Performance factor

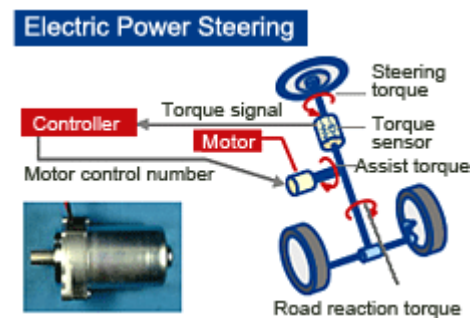
Example of improvement of performance/life	Performance/life index
Sample workpiece: SUS304 t1mm; Processing speed improved 1.7 times	1.7
Sample workpiece: SUS400 t1.2mm; Processing speed improved 2.0 times	2
Performance factor	1.85

# Environment – EPS Motor

## EPS Motor (30A Class)

Factor 1.451: Performance Factor 1.085:  
Environmental Load Factor 1.337

The EPS Motor is used in power steering systems, which provide assistance in turning automobile steering wheels. Because the electric power steering system (EPS) engages the motor only when the steering wheel is being turned, it consumes less energy than the traditional hydraulic power steering system (HPS), which is driven by a hydraulic pump that is constantly in operation when an engine is on. This can result in a fuel efficiency improvement of about 3%-5%. Replacing HPSs with EPSs, therefore, would increase fuel economy and significantly reduce CO<sub>2</sub> emissions.



### M Materials: Effective use of resources

- Use of closed-loop recycled plastic consisting of waste recovered from the formation process to make a holder for protecting and securing a magnet on the stator.
- Reduction of copper coil edge line parts volume through innovations in edge line processing for windings.
- Weight reduction through simplification of the structure of the connection parts for attachment of the mechanism side to the motor.

### E Energy: Efficient use of energy

- Increased energy efficiency through optimal electromagnetic design of the rotor winding coil.

### T Toxicity: Avoidance of substances that are potentially harmful to the environment

- Eliminated environmental burden substances covered by the EU-ELV Directive's phased usage restrictions, and reduced usage of other heavy metals.

#### Note

**Received the fiscal year 2007 Commendation for Science and Technology by the Minister of Education Culture, Sports, Science and Technology.**

Received the fiscal year 2007 Commendation for Science and Technology by the Minister of Education Culture, Sports, Science and Technology for our EPS (motor and controller). Mitsubishi Electric was praised for benefiting the global environment by making it possible to switch from HPSs to EPSs, and increase fuel economy by 3%-5%.

# Environment – Spindle Motor

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## Spindle Motor SJ-D Series

Factor: 1.470

Performance Factor: 1.000\*

Environmental Impact Factor: 1.470

\* No performance factor evaluation for this product.

### The SJ-D Series Spindle Motors? Fusing Next-Generation Functionality and Design

Spindle motors are used to rotate the cutting edges and processing tools of machining centers, lathes and other machine tools. Mitsubishi Electric continues to strive for energy savings and resource conservation in its products as part of its environmental countermeasures. In addition to such environmental considerations, the SJ-D Series of spindle motors also offers enhanced safety and reliability, and delivers maximum motor performance.

In a field where industrial equipment products have a lifespan in excess of 10 years, this series fuses functionality and design to become a product unaffected by prevalent trends. The SJ-D Series of spindle motor received a Good Design Award (Best 15) in 2009.



Detailed environmental data

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▀ SJ-D

### **M** Materials: Effective use of resources

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- The SJ-D Series' revised electrical design cuts the use of copper wiring by 43%, while its optimized structure lowers the parts count.

### **E** Energy: Efficient use of energy

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- The optimal electrical design facilitates a 25% reduction in motor power loss compared with conventional models, lowering power consumption.

### **T** Toxicity: Avoidance of substances that are potentially harmful to the environment

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- Compliant with European RoHS Directive.

## Spindle Motor

### Summary data

		Environmental load				Value of product
		M: Effective use of resources	E: Efficient use of energy	T: Avoidance of substances that are potentially harmful to the environment		
Standard product	1990 product	1	1	1	1.732	1
	SJ-V11-01T					
Evaluated product	2009 product	0.855	0.817	0	1.732	1
	SJ-DJ11/100-01					
Details of improvement		Maximize number of parts that use recycled plastic	Industry top-class energy savings	Eliminated all substances restricted by the EU's RoHS Directive		
Environmental impact factor		(1/Environmental impact of new product)/(1/Environmental impact of standard product)			1.470	
Performance factor		(Added value of new product)/(Added value of standard product)			1*	
Factor X: Environmental impact factor × Performance factor		(Added value, environmental impact of new products) / (Added value, environmental impact of standard products)			1.470	

\* No performance factor evaluation for this product.

### Environmental Impact Factor (comparison at rated capacity of 11 kw)

		Standard product (1990 product equivalent)		Evaluated product	
M	(1) Weight of product	80.8	kg	55.1	kg
	Iron	70.0	kg	40.0	kg
	Copper	6.1	kg	3.0	kg
	Aluminum	4.2	kg	11.6	kg
	Resin (Recycled material)	-	kg	-	kg
	Resin (Non-recycled material)	-	kg	-	kg
	Others	0.5	kg	0.5	kg
	(2) Weight of recycled material	25.3	kg	16.1	kg
	(3) Weight of reused parts	-	kg	-	kg
	(4) Weight of 3R material [(2) + (3)]	80.3	kg	54.6	kg
	(5) Consumption of virgin resources [(1) – (4)]	55.5	kg	39.0	kg
	(6) Recyclable weight (3R possible)	80.3	kg	54.6	kg
	(7) Nonrecyclable weight [(1) – (6)]	0.5	kg	0.5	kg
E	Power consumption during annual operation (E1)	-	kWh	-	kWh
	Power consumption in annual standby state (E2)	-	kWh	-	kWh
	Total (Annual power consumption)	7.05E+10	kWh	7.03E+10	kWh
	Lead usage in solder (T1)	0	g	0	g
	Cadmium usage (T2)	0	g	0	g
	Mercury usage (T3)	0	g	0	g

	mercury usage (T3)	0	g	0	g
T	Hexavalent chromium usage (T4)	0	g	0	g
	PBB usage (T5)	0	g	0	g
	PBDE usage (T6)	0	g	0	g
	HCFC refrigerant	0		0	

# Environment – Three-Phase Motor

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Factor: 1.209; Performance Factor: 1.00;  
Environmental Load Factor: 1.209

\* This is the data of representative models.

## High-Performance Energy-Efficient Motors Compliant with U.S. Department of Energy Standards

Motors are used in various industrial equipment including fans, pumps and many other devices. For this reason, making motors more energy efficient is a vital part of efforts to reduce environmental impact. Today, various laws and regulations relating to manufacturing and sales of motors are in place around the world to ensure the high energy efficiency of motors.



The SF-PR Series of three-phase alternating current induction motors has received compliance certification from the U.S. Department of Energy, and satisfies the required efficiency level set out in the energy-efficiency laws and regulations in the U.S., particularly NEMA MG-12-12 (IE3), within the dimensions defined by the International Electrotechnical Commission (IEC). This motor complies with the Top Runner standard of the Act on the Rational Use of Energy. (Energy Conservation Law of Japan).

Detailed environmental data

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▸ SF-PR Series

### **M** Materials: Effective use of resources

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- Use of our original steel plate frame technology to attain the efficiency level required by U.S. laws and regulations. This also helps to curb additional material usage associated with an increase in motor size.

### **E** Energy: Efficient use of energy

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- The optimal design facilitates a 2% improvement in energy efficiency compared to the previous SF-HR Series.

### **T** Toxicity: Avoidance of substances that are potentially harmful to the environment

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- Compliant with the EU RoHS Directive.

## Three-Phase Motor

### Summary data

		Environmental load				Value of product
		M: Effective utilization of resources	E: Effective utilization of energy	T: Avoidance of discharge of environmentally hazardous substances		
Baseline product	2000 product	1	1	1	1.732	1
	SF-JR					
Evaluated product	2012 product	1.034	0.991	0	1.432	1
	SF-PR					
Details of improvements		Curbed increase in materials usage	Optimized electrical design that enhances efficiency	No use of harmful substances specified in the EU RoHS Directive		
Environmental load factor: A		(1/Environmental load of new product)/(1/Environmental load of standard product)			1.209	
Performance factor: B		(Added value of new product)/(Added value of standard product)			1	
Factor X: AxB		(Added value of new product/Environmental load of new product)/(Added value of standard product/Environmental load of standard product)			1.209	

### Environmental load factor

		Baseline product (2000 product)		Evaluated product	
M	(1) Weight of product	110.4	kg	114.1	kg
	Iron	94.5	kg	94.2	kg
	Copper	8.8	kg	12.7	kg
	Aluminum	6.8	kg	6.9	kg
	Resin (Recycled material)	0.23	kg	0.23	kg
	Resin (Non-recycled material)	0.0	kg	0.0	kg
	Others	0.0	kg	0.0	kg
	(2) Weight of recycled material	35.6	kg	36.0	kg
	(3) Weight of reused parts	0.0	kg	0.0	kg
	(4) Weight of 3R material [(2) + (3)]	35.6	kg	36.0	kg
	(5) Consumption of virgin resources [(1) – (4)]	74.8	kg	78.1	kg
	(6) Recyclable weight (3R possible)	110.4	kg	114.2	kg
	(7) Non-recyclable weight [(1) – (6)]	0.0	kg	0.0	kg
E	Power consumption during annual operation (E1)	-	kWh	-	kWh
	Power consumption in annual standby state (E2)	-	kWh	-	kWh
	Total (Annual power consumption)	49,020	kWh	48,600	kWh
T	Lead usage in solder (T1)	0	g	0	g
	Cadmium usage (T2)	0	g	0	g
	Mercury usage (T3)	0	g	0	g
	Hexavalent chromium usage (T4)	1	g	0	g
	PBB usage (T5)	0	g	0	g

PBDE usage (T6)	0	g	0	g
HCFC refrigerant <sup>2</sup>	0	g	0	g

\* Data for a representative model.

Performance factor

Example of improvements in performance/service life	Performance/Service life index
Performance factor	



## Environment – Information & Communication Systems

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In information and communication systems, Mitsubishi Electric provides solutions based on advanced IT technology, and supports customers' environmental activities by helping them to gather, analyze, and apply environmental burden information.

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▶ **Optical Network Unit**

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▶ **Mitsubishi Logistics Information System: Dr. Logis**

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▶ **Integrated Environmental Information System**

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▶ **Environmentally Resistant Wide-Area Optical Ethernet Switch**

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▶ **WDM Optical Transmission Equipment**

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▶ **Information Equipment Recycling Service**

# Environment – Optical Network Unit

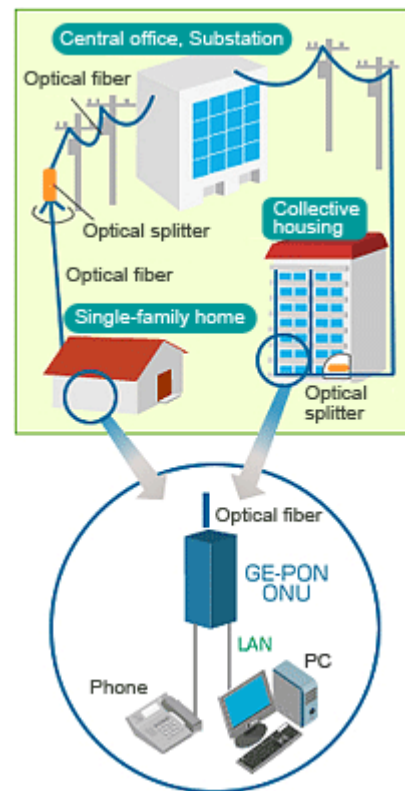
## Optical Network Unit GE-PON ONU

Factor 24.11: Performance Factor 6.67:  
Environmental Load Factor 3.62

Hyper Eco-Product

### Provides high-speed broadband over optical fiber

The GE-PON system makes high-speed broadband over optical fiber to the home possible by connecting and terminating optical fiber installed in the home. Using passive optical network, or PON, technology, one strand of optical fiber can be shared by up to 64 users, which reduces device size and cuts power consumption. The system provides a pleasant Internet experience with speeds as high as 1 Gbps.



### Reasons for Hyper Eco-Product Certification

- Significant electricity consumption reduction achieved by reducing the number of parts compared to previous equipment
- Factor rating of 2 or more
- Lead-free

### Detailed environmental data

▶ GE-PON ONU

### **M** Materials: Effective use of resources

- Virgin resource consumption reduced substantially by making the product smaller and eliminating metal materials.  
Iron: 0.046kg→0kg  
Aluminum: 0.306kg→0kg  
Plastic: 0.5kg→0.133kg

### **E** Energy: Efficient use of energy

- Eliminating parts with high power consumption (FPGA) reduced power consumption by 65% compared to the previous Mitsubishi Electric product.

### **T** Toxicity: Avoidance of substances that are potentially harmful to the environment

- Complies with Europe's RoHS Directive
- Uses lead-free solder

## Optical Network Unit

### Summary data

		Environmental load				Value of product
		M: Effective utilization of resources	E: Effective utilization of energy	T: Avoidance of discharge of environmentally hazardous substances		
Standard product	1990 product	1	1	1	1.73	1
	ATM-DSU					
Evaluated product	2007 product	0.31	0.36	0	0.48	1.1
	GEPON-ONU					
	Details of improvement	Reduced volume of materials used (plastics, etc.)	Eliminating parts with high power consumption (FPGA) reduced power consumption	Uses lead-free solder		Performance factor evaluated based on transmission speed. ATM-DSU: 150 Mbps; GEPON: 1Gbps
Environmental load factor: A		(1/Environmental load of new product)/(1/Environmental load of standard product)			3.62	
Performance factor: B		(Added value of new product)/(Added value of standard product)			6.67	
Factor X: AxB		(Added value of new product/Environmental load of new product)/(Added value of standard product/Environmental load of standard product)			24.11	

### Environmental load factor

		Standard product (1990 product equivalent)		Evaluated product	
M	(1) Weight of product	0.85	kg	0.22	kg
	Iron	0.05	kg	0.00	kg
	Copper	0.00	kg	0.00	kg
	Aluminum	0.31	kg	0.00	kg
	Resin (Recycled material)	0.00	kg	0.00	kg
	Resin (Non-recycled material)	0.50	kg	0.13	kg
	Others	0.00	kg	0.09	kg
	Reduced weight after conversion into identical function <sup>1</sup>		kg	-0.70	kg
	(2) Weight of recycled material	0.07	kg	0.00	kg
	(3) Weight of reused parts	0.00	kg	0.00	kg
	(4) Weight of 3R material [(2) + (3)]	0.07	kg	0.00	kg
	(5) Consumption of virgin resources [(1) – (4)]	0.78	kg	0.22	kg
	(6) Recyclable weight (3R possible)	0.60	kg	0.10	kg
	(7) Nonrecyclable weight [(1) – (6)]	0.25	kg	0.12	kg
	Power consumption during annual operation (E1)	7.08	kWh	2.65	kWh
E	Power consumption in annual standby state (E2)	77.89	kWh	27.38	kWh
	Total (Annual power consumption)	84.97	kWh	30.03	kWh

T	Lead usage in solder (T1)	2.70	g	0.00	g
	Cadmium usage (T2)	0.00	g	0.00	g
	Mercury usage (T3)	0.00	g	0.00	g
	Hexavalent chromium usage (T4)	0.00	g	0.00	g
	PBB usage (T5)	0.00	g	0.00	g
	PBDE usage (T6)	0.00	g	0.00	g
	HCFC refrigerant <sup>2</sup>				
	Others				
Total					

Factors with 3R viewpoint: Addition method

		Quantitative data				Standard product	Evaluated product
		Standard product	(Unit)	Evaluated product	(Unit)		
M	2 x Weight-3R-3R possible [(5) + (7)]	-	kg	-	kg	1.00	0.31
E	Reduction in energy consumption	-	kWh	-	kWh	1.00	0.36
T	Reduction in hazardous substances	-	g	-	g	1.00	0.00
Environmental load (MET resultant value)						1.73	0.48
Environmental load factor						3.62	

1 The weight of the function absent in the standard product, which cannot be expressed as an influence on environmental load or as the added value of the product. It is the weight of the part not subject to evaluation. (Oxygen adding function and ventilation function)

2 Evaluation after HCFC refrigerant is added to the environmentally hazardous substances.

Performance factor

Example of improvement of performance/life	Performance/life index
Faster transmission speed (150 Mbps → 1 Gbps)	6.67
Performance factor	6.67

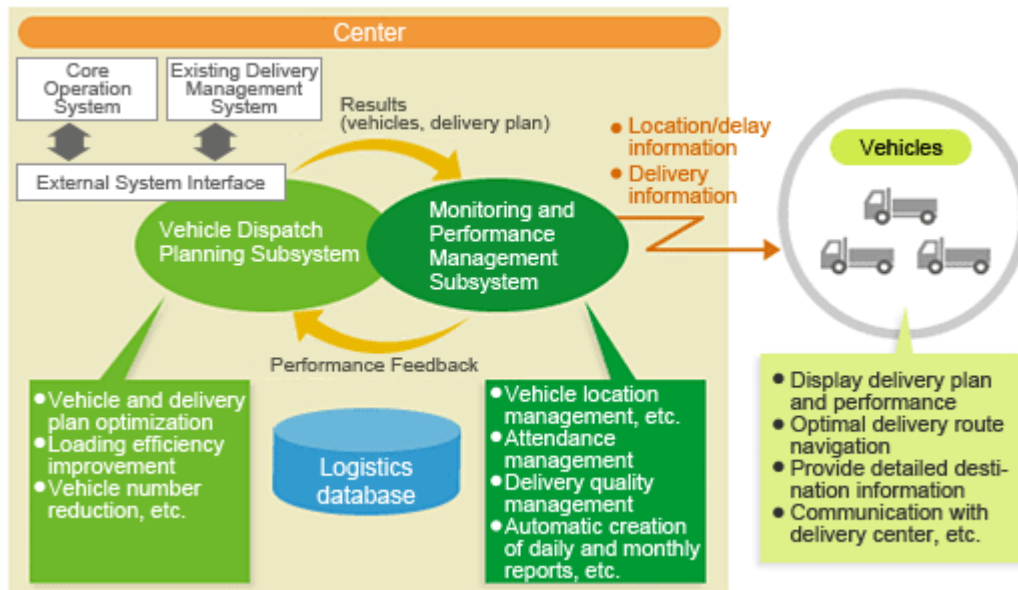
# Environment – Mitsubishi Logistics Information System: Dr. Logis

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## Information & Communication: Mitsubishi Logistics Information System: Dr. Logis

Dr. Logis is a system that supports optimal, realistic vehicle dispatch planning for distribution. It reduces the number of vehicles, distance traveled, and time required when delivering the same quantities under the same conditions.

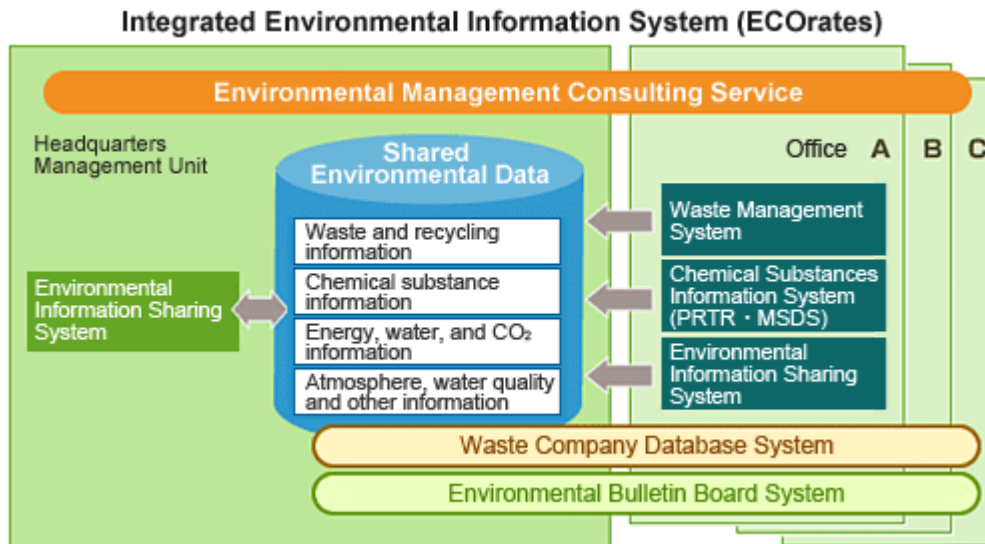
Trucks burning diesel, gasoline, or other fossil fuels are used in delivery work. Reducing distance and time traveled by minimizing the number of vehicles used and optimizing distribution routes for cases in which the same quantities are being delivered reduces fuel usage and, ultimately, NOx and CO<sub>2</sub> emissions.



# Environment – Integrated Environmental Information System

## Information & Communication: Integrated Environmental Information System (EORates)

EORates is an information system that, when applied in information sharing and communication, promotes legal compliance, risk avoidance, and environmentally conscious management through the introduction of IT to environmental management. EORates is comprised of three subsystems: the Waste Management System, Environmental Information Sharing System and Chemical Substances Information System.



# Environment – Environmentally Resistant Wide-Area Optical Ethernet Switch

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## Environmentally Resistant Wide-Area Optical Ethernet Switch MELNET-ES1100

### A Slim, Compact Optical Ethernet Switch Suitable for Outdoor Installation

MELNET-ES1100 is ideal for network configurations requiring environmental resistance and large capacity, such as onsite facility surveillance of roads, rivers, dams, erosion control hotspots, ports and harbors, railways, toll roads and other infrastructure, as well as CCTV video coverage equipment.



Optical Ethernet interfaces (1000BASE-X and 100BASE-FX) are mounted with a total of four ports. For each port, a module can be selected based on transmission distance, facilitating long-distance transmission from several kilometers up to 80 kilometers.

To enable outdoor storage (from -10°C to 55°C), MELNET-ES1100's slim, compact 1U rack size (44mm) can be stored within both JIS and 19-inch racks. In addition, its fanless design eliminates the need for fan replacement or fan filter cleaning. This product acquired the Eco-Leaf environmental label (conforming to the ISO Type III framework).



No.DG-10-001

[Detailed information on the Eco-Leaf environmental label](#) 

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### **M** Materials: Effective use of resources

- A redesigned heat dissipation mechanism realizes fewer parts and reduces weight by 30% compared to conventional models.

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### **E** Energy: Efficient use of energy

- Adoption of energy-efficient large-scale integration (LSI) and other components has reduced power consumption by 14% compared with conventional models.

---

### **T** Toxicity: Avoidance of substances that are potentially harmful to the environment

- MELNET-ES1100 complies with lead-free phase 1 standards (no lead used in surface treatment of circuit boards and mounting solder) and features vastly reduced overall lead content.

# Environment – WDM Optical Transmission Equipment

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## WDM Optical Transmission Equipment 10G x 80 Wavelength ROADM MF-800 GWR

Factor: 31.409

Performance Factor: 21.034

Environmental Impact Factor: 1.496

Hyper Eco-Product

### Space-Saving Design Realizing 420Gbit/s in One Bay

Mitsubishi Electric's Reconfigurable Optical Add-Drop Multiplexer (ROADM) is a type of wavelength-division multiplexing (WDM) transmission device that features large-volume data transmission of 10Gbit/s x 80 wavelengths (800Gbit/s). Thanks to its sophisticated circuit design and device integration, its single bay can accommodate 42 wavelengths (420Gbit/s) with ROADM and amplification function cards, resulting in substantial reductions in installation space. It is also capable of configuring Add/Drop/Thru for any wavelength from supervisor control terminals installed in operation centers. In addition, our line-up includes products that accommodate large-capacity transmission of 40 and 100Gbit/s per wavelength.

These features realize a ROADM that provides optimal solutions for network reconstruction according to relocation of facilities or traffic density.



### Reasons for Hyper Eco-Product Certification

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- Factor 2 or above

### Detailed environmental data

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- ▶ MF-800GWR

### **M** Materials: Effective use of resources

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- Use of suitable materials and reduced coating to enhance degradability and recyclability.

### **E** Energy: Efficient use of energy

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- Advanced components developed in-house successfully reduce the power consumption per single information bit to 4% of that in the year 2000.

### **T** Toxicity: Avoidance of substances that are potentially harmful to the environment

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- Designed to comply with the EU RoHS Directive. While some products are already fully RoHS-compliant, we are currently working toward compliance for all products.



## WDM Optical Transmission Equipment

### Summary data

		Environmental load				Value of product
		M: Effective utilization of resources	E: Effective utilization of energy	T: Avoidance of discharge of environmentally hazardous substances		
Baseline product	1999 product	1	1	1	1.732	1
	ATM-XC					
Evaluated product	2009 product	0.767	0.829	0.256	1.158	21
	MF-800GWR					
Details of improvement		Reduced coating of metallic components and enhanced degradability and recyclability	Reduced energy consumption to 4% of fiscal 2000 values (1Gbit/s equivalent) through large-scale integration of electrical circuits	Designed to EU RoHS Directive standards		Items for consideration: Performance ratio = 21 times <sup>1</sup> ATM : 156M × 128ch : 10G × 42ch
Environmental load factor		(1/Environmental load of new product) / (1/Environmental load of standard product)			1.496	
Performance factor		(Added value of new product) / (Added value of standard product)			21.034	
Factor X		(Added value/ Environmental load of new product) / (Added value/ Environmental load of standard product)			31.409	

<sup>1</sup> Product value is calculated as the performance factor per rack.

New product transmission volume/Standard product transmission volume = (10Gbit/s × 42ch)/(156Mbit/s × 128ch) = 21

### Environmental load factor

		Baseline product (1999 product equivalent)		Evaluated product	
M	(1) Weight of product	307	kg	300	kg
	Iron	252.0	kg	216.7	kg
	Copper	-	kg	-	kg
	Aluminum	-	kg	-	kg
	Resin (Recycled material)	-	kg	-	kg
	Resin (Non-recycled material)	-	kg	83.2	kg
	Others	55.0	kg	0.0	kg
	(2) Weight of recycled material	88.2	kg	75.8	kg
	(3) Weight of reused parts	-	kg	-	kg
	(4) Weight of 3R material [(2) + (3)]	88.2	kg	75.8	kg
	(5) Consumption of virgin resources [(1) - (4)]	218.8	kg	224.1	kg
	(6) Recyclable weight (3R possible)	75.6	kg	216.7	kg

(7) Non-recyclable weight [(1) – (6)]	231.4	kg	83.2	kg
E Power consumption during annual operation (E1)	38,544	kWh	31,974	kWh
E Power consumption in annual standby state (E2)	38,544	kWh	31,974	kWh
Total (Annual power consumption)	38,544	kWh	31,974	kWh
T Lead usage in solder (T1)	567	g	0.179	g
Cadmium usage (T2)	-	g	0.01	g
Mercury usage (T3)	-	g	0	g
T Hexavalent chromium usage (T4)	-	g	0.17	g
PBB usage (T5)	-	g	0	g
PBDE usage (T6)	-	g	0	g
HCFC refrigerant	0		0	

Performance factor

Example of improvement of performance/life	Performance/life index
Performance factor per rack New product transmission volume/Standard product transmission volume = (10Gbit/s × 42ch)/(156Mbit/s × 128ch) = 21	21
Performance factor (Average)	21


# Environment – Information Equipment Recycling Service

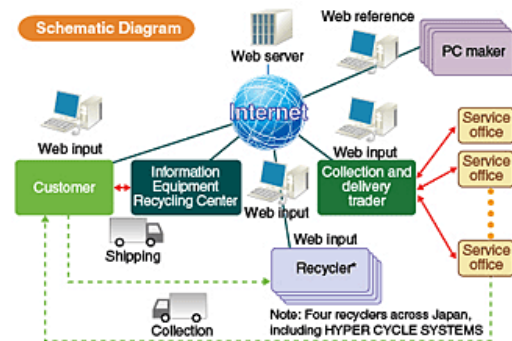
## Information Equipment Recycling Service

### Simple Disposal of Information Equipment

This recycling service has a Web-based menu, realizing user-friendly collection and recycling of end-of-lifecycle information and communications equipment. Customers can request estimates, place orders and monitor progress of the service online.



▶ Information Equipment Recycling Service Website (Japanese language only) 



### **M** Materials: Effective use of resources

- As various materials are used in equipment, we select the recycling process best suited to each type of device. Processes primarily include disassembling, crushing and separating by hand. In addition, techniques used in the crushing and separation processes yield high-grade steel and copper, supporting highly efficient recycling.

### **T** Toxicity: Avoidance of substances that are potentially harmful to the environment

- In order to avoid soil, water and air pollution, there is no combustion or washing involved in the recycling process.

## Note

### Supporting Simple Disposal for Customers

When disposing of Mitsubishi Electric information equipment\*, there is no need for customers to enter into contracts with multiple collection and delivery traders or waste disposal organizations. The customer also does not need to keep a record of or provide a manifest form (document needed for recycling).

\* Mitsubishi Electric information equipment is defined as any device manufactured by Mitsubishi Electric Corporation and Mitsubishi Electric Information Technology Corporation shown in the table below.

### Potential Equipment List

Type	Equipment	
Personal computers	Desktop computers	Notebook computers
Display equipment	CRT displays	Liquid-crystal displays
Workstations	Server workstations (including office computer/mainframe)	
External storage devices	Hard disk units	Floppy disk units
	MO disk units	Tape devices
I/O devices	Printers	Scanners
	Terminal adapters	Modems
	POS devices	Facsimile machines
	Routers	Surveillance camera systems
Power supply units	Uninterruptible power supply devices	

## Environment – Electronic Devices

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In the area of electronic devices, we are working to make critical electronic devices more energy efficient and reduce the use of lead and other controlled substances.

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▶ **DIIPM Module**

▶ **Laminated Bus Bar**

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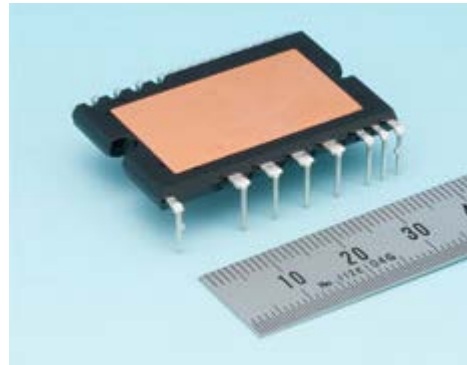
▶ **Contact Image Sensor**

# Environment – DIIPM Module

## Super Mini DIIPM Ver. 5 Series PS219B4

Factor: 2.531; Performance Factor: 1.50;  
Environmental Load Factor: 1.687

Dual Inline Package Intelligent Power Modules (DIIPMs) are used to drive inverters for home appliances and industrial motors.



Detailed environmental data

▶ PS219B4

### **M** Materials: Effective use of resources

- Use of insulation structure with high heat dissipation to suppress temperature increases in power chips, enabling a smaller package and greatly reducing (by approx. 40% compared to previous products) the space needed for mounting on the printed circuit board.

### **E** Energy: Efficient use of energy

- Reduced system power consumption through integration of a full-gate CSTBT™\*, an advanced insulated gate bipolar transistor (IGBT) developed by Mitsubishi Electric.  
\* CSTBT: Carrier Stored Trench Gate Bipolar Transistor.

### **T** Toxicity: Avoidance of substances that are potentially harmful to the environment

- Totally lead-free products achieved through introducing lead-free process for soldering power chips and use of lead-free plating for the outer terminals (RoHS compliant).

#### Note

##### Winner of Manufacturing Award at the 52nd Okochi Prize Ceremony

The DIIPM was awarded the Okochi Memorial Foundation Manufacturing Prize at the 52nd (2006) Okochi Prize Ceremony held on March 14, 2006 for the "development and production of a transfer-mold intelligent power module." The selection committee praised the development of the modules which unify multiple power chips to incorporate inverter power circuits and controller ICs while using a transfer-mold package with high reliability and low cost.



Summary data

		Environmental load				Value of product
		M: Effective utilization of resources	E: Effective utilization of energy	T: Avoidance of discharge of environmentally hazardous substances		
Baseline product	2002 product	1	1	1	1.732	1
	PS21564					
Evaluated product	2012 product	0.415	0.939	0	1.027	1.5
	PS219B4					
Details of improvement		Miniaturization of package	Introduction of full-gate CSTBT™	Completely lead-free product (both external plating and interior)		Details: High heat dissipation structure realizes reduced heat resistance
Environmental load factor: A		(1/Environmental load of new product)/(1/Environmental load of standard product)			1.687	
Performance factor: B		(Added value of new product)/(Added value of standard product)			1.500	
Factor X: AxB		(Added value of new product/Environmental load of new product)/(Added value of standard product/Environmental load of standard product)			2.531	

Environmental load factor

		Baseline product (2002 product equivalent)		Evaluated product	
M	(1) Weight of product	0.02	kg	0.0083	kg
	Iron	0	kg	0	kg
	Copper	0	kg	0	kg
	Aluminum	0	kg	0	kg
	Resin (Recycled material)	0	kg	0	kg
	Resin (Non-recycled material)	0	kg	0	kg
	Others	0	kg	0	kg
	(2) Weight of recycled material	0	kg	0	kg
	(3) Weight of reused parts	0	kg	0	kg
	(4) Weight of 3R material [(2) + (3)]	0	kg	0	kg
	(5) Consumption of virgin resources [(1) – (4)]	0.02	kg	0.0083	kg
	(6) Recyclable weight (3R possible)	0	kg	0	kg
	(7) Non-recyclable weight [(1) – (6)]	0.02	kg	0.0083	kg
E	Power consumption during annual operation (E1)	98	kWh	92	kWh
	Power consumption in annual standby state (E2)	0	kWh	0	kWh
	Total (Annual power consumption)	98	kWh	92	kWh
	Lead usage in solder (T1)	0.21	g	0	g
	Cadmium usage (T2)	0	g	0	g

	Mercury usage (T3)	0	g	0	g
T	Hexavalent chromium usage (T4)	0	g	0	g
	PBB usage (T5)	0	g	0	g
	PBDE usage (T6)	0	g	0	g
	HCFC refrigerant	0	g	0	g

Performance factor

Example of improvement of performance/life	Performance/life index
Reduced heat resistance through adoption of new high heat dissipation structure (Standard: Max. 4.5 → 3.0°C/W)	1.5



# Environment – Laminated Bus Bar

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## Laminated Bus Bar (Large Current Circuit Board)

Factor: 2.45

Performance Factor: 2

Environmental Impact Factor: 1.22

### Improved Inverter Power Conversion Efficiency and Reduced Weight through use of Aluminum Materials

The laminated bus bar, a large current circuit board, achieves high-speed operation by preventing electrical surges during high-speed switching. The board is used for power semiconductor devices such as IGBTs\*1 and IPMs\*2.

Reduced inductance makes it possible for the inverter's main circuit wiring to be completely snubberless.

Reduced snubber loss results in improved power conversion efficiency.

Aluminum, rather than copper, is used as the unit's main material, making it more lightweight.



\*1 IGBT: Insulated Gate Bipolar Transistor

A semiconductor device used for power control applications

\*2 IPM: Intelligent Power Module

A semiconductor device used for ON-OFF switching that contains circuitry for control and protection in a single package

Detailed environmental data

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- ▀ Laminated bus bar

### **M** Materials: Effective use of resources

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- Achieved a 70% weight reduction by using aluminum rather than copper as the main material

### **E** Energy: Efficient use of energy

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- Completely snubberless inverter main circuit wiring
- Significantly improved power conversion efficiency

### **T** Toxicity: Avoidance of substances that are potentially harmful to the environment

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- Eliminates six substances indicated by the RoHS Directive (non-applicable).

## Laminated Bus Bar

### Summary data

		Environmental load				Value of product
		M: Effective use of resources	E: Efficient use of energy	T: Avoidance of substances that are potentially harmful to the environment		
Baseline product*1	2005 product	1	1	1	1.732	1
Evaluated product*2	2012 product	1	1	0	1.414	1
Details of improvement		Reduced mass (copper → aluminum)	Improved power conversion through inductance reduction	Eliminated six substances indicated by the RoHS Directive		
Environmental impact factor		(1/Environmental impact of new product) / (1/Environmental impact of standard product)			1.22	
Performance factor		(Added value of new product) / (Added value of standard product)			2	
Factor X: Environmental impact factor × Performance factor		(Added value, environmental impact of new products) / (Added value, environmental impact of standard product)			2.45	

\*1 Product evaluated as "aluminum power conversion equipment application laminated bus bar"  
 Comparison assumption based on "same bus bar application made from copper" as benchmark product.

### Environmental Impact Factor

		Baseline product (2005 product equivalent)		Evaluated product	
M	(1) Weight of product	6.6	kg	2.2	kg
	Iron	-	kg	-	kg
	Copper	6.5	kg	-	kg
	Aluminum	-	kg	2.1	kg
	Resin (Recycled material)	-	kg	-	kg
	Resin (Non-recycled material)	0.1	kg	0.1	kg
	Others	-	kg	-	kg
	(2) Weight of recycled material	0.0	kg	0.0	kg
	(3) Weight of reused parts	0.0	kg	0.0	kg
	(4) Weight of 3R material [(2) + (3)]	0.0	kg	0.0	kg
	(5) Virgin resource consumption [(1) – (4)]	6.5	kg	2.2	kg
	(6) Recyclable weight (3R possible)	6.5	kg	2.1	kg
	(7) Nonrecyclable weight [(1) – (6)]	0.1	kg	0.1	kg
E	Power consumption during annual operation (E1)	*2	kWh	*2	kWh
	Power consumption in annual standby state (E2)	*2	kWh	*2	kWh
	Total (Annual power consumption)	*2	kWh	*2	kWh
T	Lead usage in solder (T1)	0	g	0	g
	Cadmium usage (T2)	0	g	0	g
	Mercury usage (T3)	0	g	0	g

	mercury usage (T3)	0	g	0	g
T	Hexavalent chromium usage (T4)	0	g	0	g
	PBB usage (T5)	0	g	0	g
	PBDE usage (T6)	0	g	0	g
	HCFC refrigerant	0		0	

\*2 Power consumption is not indicated because of differences among machines installed in end-user products.

#### Performance factor

Example of improvement of performance/life	Performance/life index
Achieved snubber elimination in protective power semiconductor device through improved inductance characteristics.	1
Reduced weight by switching from copper to aluminum materials (reduced weight to 1/3)	3
Performance factor (average)	2

# Environment – Contact Image Sensor

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## Contact Image Sensor UD2F200AX

Factor: 2.414; Performance Factor: 1.50;  
Environmental Load Factor: 1.61

### Same High Performance with a More Compact and Energy-Efficient Design

Contact image sensors are used in bill validators found in ATMs and other banking terminals. This particular contact image sensor not only achieves the required speed and performance standards demanded by the market, but it can also be customized to user specifications, making it ideal for a wide range of product applications around the world.



Detailed environmental data

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► UD2F200AX

### **M** Materials: Effective use of resources

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- More compact (volume reduced 52%) and 38% lighter than conventional sensors.

### **E** Energy: Efficient use of energy

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- Power consumption reduced by 44% compared to conventional contact image sensors owing to use of our originally developed integrated circuits (ICs) (application-specific IC/sensor IC).

### **T** Toxicity: Avoidance of substances that are potentially harmful to the environment

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- Compliant with the EU RoHS Directive.

## Contact Image Sensor

### Summary data

		Environmental load				Value of product
		M: Effective utilization of resources	E: Effective utilization of energy	T: Avoidance of discharge of environmentally hazardous substances		
Baseline product	2001 product	1	1	1	1.732	1
	UA2B200AX					
Evaluated product	2012 product	0.871304	0.5615	0.288675	1.076	1.5
	UD2F200AX					
Details of improvement		Use of plastic housing and integrated base plates (reduced weight)	Reduced power consumption of IC devices	No use of substances specified in the RoHS Directive		Details: Increased read rate
Environmental load factor: A		$(1 / \text{Environmental load of new product}) / (1 / \text{Environmental load of standard product})$			1.610	
Performance factor: B		$(\text{Added value of new product}) / (\text{Added value of standard product})$			1.5	
Factor X: AxB		$(\text{Added value of new product} / \text{Environmental load of new product}) / (\text{Added value of standard product} / \text{Environmental load of standard product})$			2.414	

### Environmental load factor

		Baseline product (2001 product equivalent)		Evaluated product	
M	(1) Weight of product	117.8	kg	81.0	kg
	Iron	2.0	kg	0.0	kg
	Copper	0.0	kg	0.0	kg
	Aluminum	70.4	kg	0.0	kg
	Resin (Recycled material)	0.0	kg	29.1	kg
	Resin (Non-recycled material)	8.4	kg	11.5	kg
	Others	50.4	kg	40.4	kg
	(2) Weight of recycled material	0.0	kg	29.1	kg
	(3) Weight of reused parts	0.0	kg	0.0	kg
	(4) Weight of 3R material [(2) + (3)]	0.0	kg	29.1	kg
	(5) Consumption of virgin resources [(1) – (4)]	117.8	kg	51.9	kg
	(6) Recyclable weight (3R possible)	0.0	kg	0.0	kg
	(7) Non-recyclable weight [(1) – (6)]	117.8	kg	81.0	kg
E	Power consumption during annual operation (E1)	3.00	kWh	1.68	kWh
	Power consumption in annual standby state (E2)	0	kWh	0	kWh
	Total (Annual power consumption)	9.00	kWh	5.05	kWh
	Lead usage in solder (T1)	2	g	0	g

T	Cadmium usage (T2)	0	g	0	g
	Mercury usage (T3)	0	g	0	g
	Hexavalent chromium usage (T4)	0.05	g	0	g
	PBB usage (T5)	0	g	0	g
	PBDE usage (T6)	0	g	0	g
	HCFC refrigerant	0	g		g

Performance factor

Example of improvement of performance/life	Performance/life index
Increased read rate (product performance speed)	1.5

## Environment – Home Appliances

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In home appliances, we're developing and introducing various products that are energy efficient and make life more comfortable.

NOTE: Many of the products shown on these pages are for the Japanese market only.

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▶ **LED Lighting**

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▶ **Jet Towel Hand Dryers**

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▶ **Room Air Conditioners**

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▶ **Refrigerator**

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▶ **Photovoltaic Module**

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▶ **Photovoltaic Inverter**

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▶ **Eco Cute for Household Use**

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▶ **Eco Cute for Commercial Applications**

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▶ **Ventilator**

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▶ **Energy Recovery Ventilator for Commercial Use**

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▶ **Lossnay Central Ventilator System**

# Environment – LED Lighting

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## LED Lighting— erise LED Downlight Class 150 EL-D1411N/3W

Factor: 8.246

Performance Factor: 3.49

Environmental Impact Factor: 2.363

Diffusion light used to brighten open spaces. This eco-conscious product offers energy savings and a long operating life. The erise LED Downlight Class 150 EL-D1411N/3W delivers the same brightness as our conventional fluorescent downlight (FHT32W) while reducing energy consumption by approximately 38%. With an operating life of 60,000 hours, the need to replace lamps has been substantially reduced.



Detailed environmental data

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▀ EL-D1411N/3W

### **M** Materials: Effective use of resources

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- Operating life of 60,000 hours is approximately six times that of conventional fluorescent downlights, requiring fewer lamp replacements, and helping to substantially reduce waste.

### **E** Energy: Efficient use of energy

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- High-efficiency reflector and improvements in power source efficiency contribute to a high 81.8 lm/W intrinsic energy consumption efficiency
- An approximate 38% decrease in energy consumption compared with conventional fluorescent downlights (FHT32W) significantly reduces CO<sub>2</sub>

### **T** Toxicity: Avoidance of substances that are potentially harmful to the environment

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- Compliant with the European RoHS directive
- Mercury-free light source



## LED Lighting

### Summary data

		Environmental Impact				Product Value
		M: Effective Use of Resources	E: Efficient Use of Energy	T: Avoidance of discharge of environmentally hazardous substances		
Baseline Product	Manufactured in 1990	1	1	1	1.732	1
	BDF63011A(FHT32)					
Evaluated Product	Manufactured in 2011	0.593	0.43	0	0.733	3.49
	EL-D1411N/3W					
Improvements		Reduction in light mass	Contributes to the promotion of the highest energy conservation standards in the industry	Eliminates the use of substances that fall within the scope of the European RoHS directive		
Environmental Impact Factor		$(1/\text{Environmental impact of new product}) / (1/\text{Environmental impact of baseline product})$			2.363	
Performance factor		$(\text{Value added of new product}) / (\text{Value added of baseline product})$			3.49	
Factor X: Performance Factor × Environmental Impact Factor		$(\text{Value added of new product} / \text{Environmental impact of new product}) / (\text{Value added of baseline product} / \text{Environmental impact of baseline product})$			8.246	

\* The product evaluated has essentially the same light (optics) specifications as downlights that use light source equivalent to the conventional FHT32W.

- The evaluated product (EL-D1411N/3W) and the baseline product (BDF63011A FHT32W) have effectively the same light flux. The operating light source life of the evaluated product (LED) is 60,000 hours compared with 10,000 hours for the baseline product (FHT32W).
- While the light source of the baseline product (FHT32W) is within the threshold, it contains trace elements of mercury (consistent with RoHS). Details not presented in the table.
- Annual operating time for both the baseline and evaluated products set at 3,000 hours.

### Environmental Impact Factor

	Baseline Product (Around 1990)		Evaluated product		
M	(1) Weight of product	0.9462	kg	0.8760	kg
	Iron	0.3369	kg	0.1965	kg
	Copper	0.0000	kg	0.0000	kg
	Aluminum	0.2396	kg	0.4456	kg
	Resin (Recycled material)	0.0000	kg	0.0000	kg
	Resin (Non-recycled material)	0.0051	kg	0.1549	kg
	Others	0.0365	kg	0.0760	kg
	(2) Weight of recycled material	0.1610	kg	0.1422	kg
	(3) Weight of reused parts	0.0000	kg	0.0000	kg
	(4) Weight of 3R material [(2) + (3)]	0.1610	kg	0.1422	kg
	(5) Consumption of virgin resources [(1) – (4)]	0.7852	kg	0.7338	kg
	(6) Recyclable weight (3R possible)	0.5765	kg	0.6539	kg

	(7) Nonrecyclable weight [(1) – (6)]	0.3697	kg	0.2221	kg
E	Power consumption during annual operation (E1)	93.0000	kWh	57.6000	kWh
	Power consumption in annual standby state (E2)	0.0000	kWh	0.0000	kWh
	Total (Annual power consumption)	93.0000	kWh	57.6000	kWh
T	Lead usage in solder (T1)	0.0000	g	0.0000	g
	Cadmium usage (T2)	0.0000	g	0.0000	g
	Mercury usage (T3)	0.0000	g	0.0000	g
	Hexavalent chromium usage (T4)	0.0000	g	0.0000	g
	PBB usage (T5)	0.0000	g	0.0000	g
	PBDE usage (T6)	0.0000	g	0.0000	g

Performance factor

Examples of Performance and Operating Life Improvement	Performance and Operating Life Index
Light source operating life Baseline product 10,000h, Evaluated product 60,000h	6
Light source efficiency (lm/W) Baseline product 2200/31=71.0 Evaluated product 1570/12.9=81.8 Average color rendering index Ra Baseline product 85 Evaluated product 70	0.986
Performance factor	3.49

# Environment – Jet Towel Hand Dryers

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## Jet Towel Hand Dryers JT-SB116KN Series

Factor: 3.884

Performance Factor: 1.435

Environmental Load Factor: 2.707

### Eco-Conscious Product with Long Service Life and Low Power Consumption

JT-SB116KN Series Jet Towel hand dryers use a new arc-shaped "wave nozzle" and operate with low power consumption and low noise while eliminating the need for paper towels.



Detailed environmental data

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▶ JT-SB116KN

### **M** Materials: Effective use of resources

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- More compact and lighter through optimal layout of components.
- Brushless DC motor has a long service life of seven years at up to 1,000 uses per day.

### **E** Energy: Efficient use of energy

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- Low power consumption and low noise through the use of a newly developed "wave nozzle."

### **T** Toxicity: Avoidance of substances that are potentially harmful to the environment

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- No use of the six hazardous substances specified in the EU RoHS Directive.

## Jet Towel Hand Dryers

### Summary data

		Environmental load				Value of product
		M: Effective utilization of resources	E: Effective utilization of energy	T: Avoidance of discharge of environmentally hazardous substances		
Baseline Product	1991 product	1	1	1	1.732	1
	JT-16A					
Evaluated product	2010 product	0.61925157	0.16108381	0	0.64	1.435
	JT-SB116KN					
Details of improvement		Reduced size/weight	Improved drying efficiency	No use of substances specified in the EU RoHS Directive		Details: Increased drying efficiency; Reduced noise level
Environmental load factor: A		(1 / Environmental load of new product) / (1 / Environmental load of standard product)			2.707	
Performance factor: B		(Added value of new product) / (Added value of standard product)			1.435	
Factor X: AxB		(Added value of new product / Environmental load of new product) / (Added value of standard product / Environmental load of standard product)			3.884	

### Environmental load factor

		Baseline product (1991 product equivalent)		Evaluated product	
M	(1) Weight of product	18.3	kg	10.2	kg
	Iron	12.9	kg	2.1	kg
	Copper	0.3	kg	0.3	kg
	Aluminum	0.4	kg	0.6	kg
	Resin (Recycled material)	0.0	kg	0.6	kg
	Resin (Non-recycled material)	4.4	kg	4.4	kg
	Others	0.4	kg	2.1	kg
	(2) Weight of recycled material	4.6	kg	1.5	kg
	(3) Weight of reused parts	0.0	kg	0.0	kg
	(4) Weight of 3R material [(2) + (3)]	4.6	kg	1.5	kg
	(5) Consumption of virgin resources [(1) – (4)]	13.7	kg	8.7	kg
	(6) Recyclable weight (3R possible)	7.9	kg	3.9	kg
	(7) Non-recyclable weight [(1) – (6)]	10.4	kg	6.3	kg
E	Power consumption during annual operation (E1)	533.3	kWh	118	kWh
	Power consumption in annual standby state (E2)	125.3	kWh	5.6	kWh
	Total (Annual power consumption)	658.7	kWh	124.8	kWh
	Lead usage in solder (T1)	4.3	g	0	g
	Cadmium usage (T2)	0	g	0	g

	Mercury usage (T3)	0	g	0	g
T	Hexavalent chromium usage (T4)	0.015	g	0	g
	PBB usage (T5)	0	g	0	g
	PBDE usage (T6)	0	g	0	g
	HCFC refrigerant	-	g	-	g

Performance factor

Example of improvement of performance/life	Performance/life index
Drying time: 10 ⇒ 6s	1.67
Sound level: 65 ⇒ 56dB	1.2
Performance factor (average)	1.435

# Environment – Room Air Conditioners

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## Room Air Conditioner ZW Series (Representative Model MSZ-ZW403S)

Factor: 2.645

Performance Factor: 1.13

Environmental Load Factor: 2.340

### Optimal Comfort and Reduced Waste through Functions that Monitor People's Movements

ZW Series room air conditioners are equipped with two infrared sensors, "Eco Move Eye" and "Smart Eye," that monitor sensory temperature to ensure optimal operation. These air conditioners use a hybrid operating system that automatically controls temperature and airflow while monitoring the presence of people in the room in real-time. The air conditioner automatically switches to energy-saving mode when people leave the room, returns to full operation as people return, and switches off when people leave for an extended period. These original sensor technologies help to control air conditioning waste and deliver energy-saving benefits.



Detailed environmental data

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▀ MSZ-ZW403S

### **M** Materials: Effective use of resources

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- Development of original technologies that enable recycling of plastics used in home appliances. Three main plastics, polypropylene (PP), polystyrene (PS) and acrylonitrile-butadiene-styrene (ABS), which have previously proven to be difficult to recycle, can be recovered to a high degree of purity through crushing and separation processes. The recovered plastics are reused in plastic components of products, significantly increasing the usage rate of closed-loop recycled plastic.
- Our unique hydrophilic/hydrophobic coating that can be applied to both metals and plastic is used on parts of the heat exchanger and vents in the interior unit, effectively repelling hydrophilic contaminants, such as lint and dust, and hydrophobic contaminants, such as grease. This feature reduces the adhesion of contaminants to 1/10 the previous level. An automatic filter-cleaning function, combined with the energy savings and reduced deterioration that results from low internal contaminant levels contributes to a longer unit service life.

### **E** Energy: Efficient use of energy

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- Improved efficiency of key air conditioner components, such as the compressor, heat exchanger and fan motor, puts this unit at the top of its class industry-wide in terms of energy efficiency.
- Move Eye senses floor and wall temperatures, as well as people's locations and movements, and automatically adjusts the airflow direction and temperature according to the body temperatures of people in the room to maintain a high degree of comfort while delivering energy savings.
- Equipped with a function that provides energy-saving advice via the remote control, like reminders that the door is not closed, and a function that displays energy savings on the remote control to promote an energy-saving mindset in users.

### **T** Toxicity: Avoidance of substances that are potentially harmful to the environment

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- No use of substances specified in the EU RoHS Directive, Japanese Industrial Standards (JIS) or J-Moss.

## Room Air Conditioners

### Summary data

		Environmental load				Value of product
		M: Effective utilization of resources	E: Effective utilization of energy	T: Avoidance of discharge of environmentally hazardous substances		
Baseline Product	1990 product	1	1	1	1.732	1
	MSZ-4010S					
Evaluated product	2012 product	0.63	0.4	0	0.740	1.13
	MSZ-ZW403S					
Details of improvement			Power consumption in Standby mode: 0W			Evaluation items taken into consideration
Environmental load factor: A		(1 / Environmental load of new product) / (1 / Environmental load of standard product)			2.34	
Performance factor: B		(Added value of new product) / (Added value of standard product)			1.13	
Factor X: AxB		(Added value of new product / Environmental load of new product) / (Added value of standard product / Environmental load of standard product)			2.645	

### Environmental load factor

		Baseline product (1990 product equivalent)		Evaluated product	
M	(1) Weight of product	64.0	kg	47.8	kg
	Iron	28.9	kg	21.2	kg
	Copper	8.9	kg	7.4	kg
	Aluminum	7.5	kg	6.3	kg
	Resin (Recycled material)	0	kg	2.1	kg
	Resin (Non-recycled material)	10.7	kg	7.7	kg
	Others	8.0	kg	4.9	kg
	(2) Weight of recycled material	12.5	kg	11.5	kg
	(3) Weight of reused parts	0	kg	0.0	kg
	(4) Weight of 3R material [(2) + (3)]	12.5	kg	11.5	kg
	(5) Consumption of virgin resources [(1) – (4)]	51.5	kg	36.2	kg
	(6) Recyclable weight (3R possible)	49.9	kg	43.0	kg
	(7) Non-recyclable weight [(1) – (6)]	14.1	kg	4.8	kg
E	Power consumption during annual operation (E1)	3,206	kWh	1,272	kWh
	Power consumption in annual standby state (E2)	12	kWh	0	kWh
	Total (Annual power consumption)	3,218	kWh	1,272	kWh
T	Lead usage in solder (T1)	25	g	0	g
	Cadmium usage (T2)	0	g	0	g
	Mercury usage (T3)	0	g	0	g

Hexavalent chromium usage (t4)	2	g	0	g
PBB usage (T5)	0	g	0	g
PBDE usage (T6)	350	g	0	g
HCFC refrigerant	1,000	g	0	g

Performance factor

Example of improvement of performance/life	Performance/life index
Enhanced maximum heating capacity	1.16
Reduced power consumption with Move Eye (annual average: 40%)	1.1
Performance factor	1.13



# Environment – Refrigerator

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## Refrigerator MR-JX60W

Factor: 2.549

### Smart, Stylish Design and Substantially Increased Capacity through use of Smart Cube, a New Slim Heat-Insulating Structure

Mitsubishi Electric's MR-JX60W refrigerator uses Smart Cube, a new slim heat-insulating structure which enables reduced thickness of doors and exterior panels while maintaining heat insulation performance. This innovation successfully balances the need for thinner installation widths and higher capacity with the need for energy-savings through use of original urethane foam technologies to reduce the thickness of urethane materials and through efficient use of vacuum insulation panels with excellent insulation properties.



Detailed environmental data

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▶ MR-JX60W

### **M** Materials: Effective use of resources

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- Development of original technologies that enable recycling of plastics used in home appliances. Three main plastics, polypropylene (PP), polystyrene (PS) and acrylonitrile-butadiene-styrene (ABS), which have previously proven to be difficult to recycle, can be recovered to a high degree of purity through crushing and separation processes. The recovered plastics are reused in plastic components of products, significantly increasing the usage rate of closed-loop recycled plastic.

### **E** Energy: Efficient use of energy

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- Each compartment is independently structured with its own temperature as well as door opening and closing sensors. This helps to increase efficiency as each compartment is refrigerated on an individual basis. In addition, the "Hybrid Defrost Heater" included in the condenser together with the "Pre-Frost System" increases defrosting time efficiency while promoting greater energy efficiency.

### **T** Toxicity: Avoidance of substances that are potentially harmful to the environment

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- No use of the hazardous substances specified in the EU RoHS Directive or J-Moss, which forms part of the Japan Industrial Standards (JIS).

## Refrigerator

### Summary data

		Environmental load				Value of product
		M: Effective utilization of resources	E: Effective utilization of energy	T: Avoidance of discharge of environmentally hazardous substances		
Baseline product	1998 product	1	1	1	1.732	1
	MR-M37S					
Evaluated product	2012 product	0.6625	0.1505	0	0.679	
	MR-JX60W					
Details of improvement						Evaluation items taken into consideration
Environmental load factor: A		$(1/\text{Environmental load of new product}) / (1/\text{Environmental load of baseline product})$			2.549	
Performance factor: B		$(\text{Added value of new product}) / (\text{Added value of standard product})$				
Factor X: AxB		$(\text{Added value of new product} / \text{Environmental load of new product}) / (\text{Added value of standard product} / \text{Environmental load of standard product})$				

### Environmental load factor

		Baseline product (1998 product equivalent)		Evaluated product	
M	(1) Weight of product	85.0	kg	117.0	kg
	Iron	39.0	kg	50.2	kg
	Copper	3.1	kg	4.6	kg
	Aluminum	0.7	kg	1.9	kg
	Plastics (Recycled material)	0.1	kg	3.9	kg
	Plastics (Non-recycled material)	38.0	kg	37.8	kg
	Others	3.1	kg	11.6	kg
	(2) Weight of recycled material	42.9	kg	60.6	kg
	(3) Weight of reused parts	0	kg	0.0	kg
	(4) Weight of 3R material [(2) + (3)]	42.9	kg	60.6	kg
	(5) Consumption of virgin resources [(1) – (4)]	42.1	kg	49.4	kg
	(6) Recyclable weight (3R possible)	42.9	kg	83.5	kg
	(7) Non-recyclable weight [(1) – (6)]	42.1	kg	26.5	kg
E	Power consumption during annual operation (E1)	1,050	kWh	240	kWh
	Power consumption in annual standby state (E2)	-	kWh	-	kWh
	Total (Annual power consumption)	1,050	kWh	240	kWh
T	Lead usage in solder (T1)	6	g	0	g
	Cadmium usage (T2)	0	g	0	g
	Mercury usage (T3)	0	g	0	g
	Chromium usage (T4)	-	-	-	-

Hexavalent chromium usage (14)	4	g	0	g
PBB usage (T5)	0	g	0	g
PBDE usage (T6)	3.5	g	0	g
HCFC refrigerant	190	g	0	g

Performance factor

Example of improvement of performance / life	Performance / life index
Capacity coefficient (Calculated based on environmental load factor)	1.6129

# Environment – Photovoltaic Module

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## Photovoltaic Module

**PV-TJ235GA6 (for Europe) / PV-UJ235GA6 (for North America, Asia)**

Factor: 1.73

Performance Factor: 1.865

Environmental Load Factor: 0.928

Using four bus bar cells with an expanded module size, we have achieved a maximum output of 235W per module.



### Reasons for Eco-Product Certification

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- Environmentally effective product
- Factor rating of 1.5 or more

### Detailed environmental data

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- ▀ PV-TJ235GA6

### **M** Materials: Effective use of resources

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- Width of new bus bars used in the cell is half that of our previous bus bars, delivering greater efficiency without increasing the amount of material used.
- Optimized frame design approximately doubles the strength of our previous frame.

### **E** Energy: Efficient use of energy

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- Individual cell output improved by adopting four bus bar cells.
- Module size expanded to increase output per module.

### **T** Toxicity: Avoidance of substances that are potentially harmful to the environment

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- Uses lead-free solder to lessen impact on the environment.

## Note

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1. By increasing the number of bus bars from two to four, the internal resistance in each PV cell has been reduced, increasing individual cell output by 3 percent compared to those used in our previous models.  
\* When comparing our 2-bus-bar cell.
2. The number of cells per module has also increased from 50 to 60. This increase, combined with the new four bus bar cells raised power by as much as 24%, compared to our previous models.  
\* When comparing our 190W model to the new 235W model.
3. The newly designed frame, which is approximately twice as strong as our previous frame, enables the module to pass the IEC61215 (2nd Ed.) static load test of 5400Pa despite the larger module size.

## Photovoltaic Module

### Summary data

		Environmental load				Value of product
		M: Effective use of resources	E: Efficient use of energy	T: Avoidance of substances that are potentially harmful to the environment		
Standard product	2001 product	1	1	1	1.732	1
	PV-MR101A					
Evaluated product	2010 product	1.58	1	0	1.866	1.865
	PV-TJ235GA6					
Details of improvement		Reduced weight to output ratio	Increased output per cell	Use of Lead-free solder		Power increase: 126w → 235w
Environmental impact factor		(1/Environmental impact of new product)/(1/Environmental impact of standard product)			0.928	
Performance factor		(Added value of new product)/(Added value of standard product)			1.865	
Factor X: Performance factor × Environmental impact factor		(Added value of new product/Environmental impact of new product)/(Added value of standard product/Environmental impact of standard product)			1.731	

### Environmental Impact Factor

		Standard product		Evaluated product	
M	(1) Weight of product	12.6	kg	19.8	kg
	Iron	0.03	kg	0.06	kg
	Copper	0.16	kg	0.24	kg
	Aluminum	2.67	kg	4.19	kg
	Resin (Recycled material)	0.02	kg	0.13	kg
	Resin (Non-recycled material)	1.05	kg	2.42	kg
	Others	8.65	kg	12.8	kg
	(2) Weight of recycled material	0.53	kg	0.93	kg
	(3) Weight of reused parts	0.02	kg	0.13	kg
	(4) Weight of 3R material [(2) + (3)]	0.55	kg	1.06	kg
	(5) Consumption of virgin resources [(1) – (4)]	12.0	kg	18.8	kg
	(6) Recyclable weight (3R possible)	2.89	kg	4.4	kg
	(7) Nonrecyclable weight [(1) – (6)]	9.7	kg	15.4	kg
E	Power consumption during annual operation (E1)	1		1	
	Power consumption in annual standby state (E2)	0		0	
	Total (Annual power consumption)	1		1	
T	Lead usage in solder (T1)	36	g	0	g
	Cadmium usage (T2)	0	g	0	g
	Mercury usage (T3)	0	g	0	g
	Hexavalent chromium usage (T4)	0.001	g	0	g
	PBB usage (T5)	0	g	0	g
	PBDE usage (T6)	0	g	0	g

Performance factor

Example of improvement of performance/life	Performance/life index
Power increase : 126W → 235W	1.865
Performance factor (average)	1.865

# Environment – Photovoltaic Inverter

## Photovoltaic (PV) Inverter PV-PNS04ATL-GER

Factor 2.33: Performance Factor 2.105:  
Environmental Load Factor 1.107

Mitsubishi Electric PV inverters for photovoltaic power systems feature industry-class maximum power conversion efficiency of 96.2% and maximum input voltage of 700 volts.



Detailed environmental data

▶ PV-PNS04ATL-GER

### **E** Energy: Efficient use of energy

- Generated power is used effectively with 96.2% power conversion efficiency.

### **T** Toxicity: Avoidance of substances that are potentially harmful to the environment

- Eliminated the use of the six substances specified by the EU's RoHS directive.

#### Note

Mitsubishi Electric has developed a new power module for PV inverters sold in Europe. The internal circuitry uses a new system called the "three level inverter system\*" (patent pending), and the filter that adjusts the waveform of the outputted current uses a reactor made of a new material (ferrite core), which stands up to high output and produces minimal loss. Optimally controlling these components has resulted in an industry-class maximum power conversion efficiency of 96.2%.

\* This method reduces loss by switching between high voltage, medium voltage and low voltage.



Cooling structure for long-term reliability and high efficiency.



Large-size displays, enhanced by multiple-indicators with green colored backlight.



Safety enclosure with dust-tight structure.



## Photovoltaic Inverter

### Summary data

		Environmental load				Value of product
		M: Effective utilization of resources	E: Effective utilization of energy	T: Avoidance of discharge of environmentally hazardous substances		
Standard product	2002 product	1	1	1	1.732	1
	PV-PN04D					
Evaluated product	2007 product	1.307	0.859463604	0	1.564	1.47
	PV-PNS04ATL					
	Details of improvement		Achieved the improvement of the conversion efficiency	Uses lead-free solder board Complies with Europe's RoHS Directive		Details: Expanded input voltage range Expanded usage temperature range Water- and dust-resistant structure (IP41)
Environmental load factor: A		(1/Environmental load of new product)/ (1/Environmental load of standard product)			1.107	
Performance factor: B		(Added value of new product)/ (Added value of standard product)			2.105	
Factor X: AxB		(Added value of new product/Environmental load of new product)/(Added value of standard product/Environmental load of standard product)			2.33	

### Environmental load factor

		Standard product (1990 product equivalent)		Evaluated product	
M	(1) Weight of product	13.210	kg	17.920	kg
	Iron	5.370	kg	10.950	kg
	Copper	1.590	kg	1.570	kg
	Aluminum	3.230	kg	1.320	kg
	Resin (Recycled material)	0.000	kg	0.000	kg
	Resin (Non-recycled material)	0.100	kg	0.400	kg
	Others	2.920	kg	3.680	kg
	Reduced weight after conversion into identical function *				
E	(2) Weight of recycled material	2.652	kg	4.259	kg
	(3) Weight of reused parts	0.000	kg	0.000	kg
	(4) Weight of 3R material [(2) + (3)]	2.652	kg	4.259	kg
	(5) Consumption of virgin resources [(1) – (4)]	10.558	kg	13.662	kg
	(6) Recyclable weight (3R possible)	10.190	kg	13.840	kg
	(7) Nonrecyclable weight [(1) – (6)]	3.020	kg	4.080	kg
		Power consumption during annual operation (E1)	544.5	kWh	376.2
	Power consumption in annual standby state (E2)	0.576	kWh	0.576	kWh
	Total (Annual power consumption)				
	Lead usage in solder (T1)	12.000	g	0.000	g
	Cadmium usage (T2)	0.000	g	0.000	g

T	Mercury usage (T3)	0.000	g	0.000	g
	Hexavalent chromium usage (T4)	1.000	g	0.000	g
	PBB usage (T5)	0.000	g	0.000	g
	PBDE usage (T6)	0.000	g	0.000	g
	HCFC refrigerant <sup>2</sup>				
	Others				
	Total				

Factors with 3R viewpoint: Addition method

	Quantitative data				Standard product	Evaluated product	
	Standard product	(Unit)	Evaluated product	(Unit)			
M	2 x Weight-3R-3R possible [(5) + (7)]	-	kg	-	kg	1	1.307
E	Reduction in energy consumption	-	kWh	-	kWh	1	0.859
T	Reduction in hazardous substances	-	g	-	g	1	0
Environmental load (MET resultant value)					1.732	1.564	
Environmental load factor					1.107		

- 1 The weight of the function absent in the standard product, which cannot be expressed as an influence on environmental load or as the added value of the product. It is the weight of the part not subject to evaluation. (Oxygen adding function and ventilation function)
- 2 Evaluation after HCFC refrigerant is added to the environmentally hazardous substances.

Performance factor

Example of improvement of performance/life	Performance/life index
Expanded input voltage range	2.085
Expanded usage temperature range	2.125
Performance factor	2.105

# Environment – Eco Cute for Household Use

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## Eco Cute (Heat Pump Water Heater) for Household Use SRT-HP46W7

Factor: 2.891

Performance Factor: 2

Environmental Load Factor: 1.446

### Towards a Smart Hot-Water Supply System

Mitsubishi Electric Eco Cute extracts heat energy from the surrounding air and uses it to heat water to enable energy savings of one-third compared to our conventional electric water heaters. In addition, Eco Cute realizes cost savings through support for electricity use when demand is off-peak such as during the night.



Detailed environmental data

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▀ SRT-HP46W7

### **M** Materials: Effective use of resources

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- Fewer parts used in the hot water tank unit and use of plastic piping components to realize weight reductions.
- Reduced weight and size of the heat pump unit owing to a revamped heat exchanger and simplified internal configuration.
- Packaging materials reduced through use of cardboard packaging.

### **E** Energy: Efficient use of energy

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- Improved heating efficiency through a smart heating control system that bases actions on past hot-water usage data.
- Improved hot-water supply efficiency through system controls that use hot-water supply assistance and heat-pump heat retention.
- Improved heat-retention efficiency through the use of expanded polystyrene (EPS) insulating materials for the hot-water storage tank.

### **T** Toxicity: Avoidance of substances that are potentially harmful to the environment

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- No use of the hazardous substances specified in the EU RoHS Directive (use of lead-free solder boards, trivalent chrome plating, etc.).

## Eco Cute for Household Use

### Summary data

		Environmental load				Value of product
		M: Effective utilization of resources	E: Effective utilization of energy	T: Avoidance of discharge of environmentally hazardous substances		
Baseline product	1990 product	1	1	1	1.732	1
	SRT-4661F					
Evaluated product	2012 product	1.17	0.24	0	1.198	2
	SRT-HP46W7					
Details of improvement						
Environmental load factor: A		(1/Environmental load of new product) / (1/Environmental load of baseline product)			1.446	
Performance factor: B		(Added value of new product) / (Added value of standard product)			2	
Factor X: AxB		(Added value of new product / Environmental load of new product) / (Added value of standard product / Environmental load of standard product)			2.891	

### Environmental load factor

		Baseline product (1990 product equivalent)		Evaluated product	
M	(1) Weight of product	104.0	kg	120.0	kg
	Iron	83.7	kg	92.2	kg
	Copper	13.1	kg	9.8	kg
	Aluminum	0.0	kg	4.6	kg
	Resin (Recycled material)	0.0	kg	0.0	kg
	Resin (Non-recycled material)	0.6	kg	5.4	kg
	Others	6.6	kg	8.0	kg
	(2) Weight of recycled material	30.9	kg	34.3	kg
	(3) Weight of reused parts	0.0	kg	0.0	kg
	(4) Weight of 3R material [(2) + (3)]	30.9	kg	34.3	kg
	(5) Consumption of virgin resources [(1) – (4)]	73.1	kg	85.7	kg
	(6) Recyclable weight (3R possible)	97.4	kg	112.0	kg
	(7) Non-recyclable weight [(1) – (6)]	6.6	kg	8.0	kg
E	Power consumption during annual operation (E1)	68,651	kWh	16,207	kWh
	Power consumption in annual standby state (E2)	-	kWh	-	kWh
	Total (Annual power consumption)	-	kWh	-	kWh
T	Lead usage in solder (T1)	2.4	g	0	g
	Cadmium usage (T2)	0	g	0	g
	Mercury usage (T3)	0	g	0	g
	Hexavalent chromium usage (T4)	0	g	0	g
	PBB usage (T5)	0	g	0	g
	PBDE usage (T6)	0	g	0	g
	HCFC refrigerant	-	g	-	g

# Environment – Eco Cute for Commercial Applications

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## Eco Cute (Heat Pump Water Heater) for Commercial Applications QAHV-N560B

Factor: 1.77

Performance Factor: 1.00\*

Environmental Impact Factor: 1.77

\* No performance factor evaluation for this product.

### Hot Water Supply that Enhances Ease of Living

With a newly developed inverter-type scroll CO<sub>2</sub> compressor, the QAHV-N560B achieves a COP rating of 4.1 and significantly reduces hot water supply running costs. The CO<sub>2</sub> heat pump and inverter capacity control technologies facilitate an optimum hot water output of up to 90°C.

Received 10th Electric Load Leveling System Award  
Received Ministry of Economy, Trade and Industry,  
Agency for Natural Resources and Energy Director-  
General's Prize



Detailed environmental data

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▶ QAHV-N560B

### **M** Materials: Effective use of resources

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- Heat storage is carried out during nighttime using the hot water tank, facilitating electrical energy load leveling.

### **E** Energy: Efficient use of energy

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- Thermal energy absorbed from the atmosphere heats the water that passes through the heat exchanger. The system produces approximately three to four times the amount of electrical energy used (high efficiency).

### **T** Toxicity: Avoidance of substances that are potentially harmful to the environment

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- The natural refrigerant (CO<sub>2</sub>) used by the QAHV-N560B has an ozone depletion potential of zero and a global warming potential of one. The volume of CO<sub>2</sub> emissions is 40% lower than that of a combustion-based boiler, and the generation of NO<sub>x</sub> and other noxious substances is reduced.

## Eco Cute for Commercial Applications

### Summary data

		Environmental load				Value of product
		M: Effective use of resources	E: Efficient use of energy	T: Avoidance of substances that are potentially harmful to the environment		
Standard product	1997 product	1	1	1	1.73	1
	CAH-500AQ					
Evaluated product	2009 product	37% reduction in product weight	25% reduction in power consumption	99.96% reduction in greenhouse gases used (CO <sub>2</sub> equivalent)	0.98	
	QAHV-N560B					
Details of improvement		Reduced size and weight through incorporating a compact, high-volume CO <sub>2</sub> scroll compressor	Industry top-class energy savings	Switched from refrigerant with high global warming potential, to natural refrigerant		
Environmental impact factor		(1/Environmental impact of new product)/(1/Environmental impact of standard product)			1.77	
Performance factor		(Added value of new product)/(Added value of standard product)			1*	
Factor X: Environmental impact factor × Performance factor		(Added value of new product/Environmental impact of new product)/(Added value of standard product/Environmental impact of standard product)			1.77	

\*No performance factor evaluation for this product.

### Environmental Impact Factor

		Standard product (1990 product equivalent)		Evaluated product	
M	(1) Weight of product	630.0	kg	445.0	kg
	Iron	368.0	kg	270.0	kg
	Copper	146.0	kg	141.0	kg
	Aluminum	47.0	kg	26.0	kg
	Resin (Recycled material)		kg		kg
	Resin (Non-recycled material)	25.0	kg	3.0	kg
	Others		kg		kg
	(2) Weight of recycled material		kg		kg
	(3) Weight of reused parts		kg		kg
	(4) Weight of 3R material [(2) + (3)]		kg		kg
(5) Consumption of virgin resources [(1) – (4)]		kg		kg	
(6) Recyclable weight (3R possible)	561.0	kg	436.0	kg	
(7) Nonrecyclable weight [(1) – (6)]	69.0	kg	9.0	kg	
E	Power consumption during annual operation (E1)	39,489	kWh	29,085	kWh
	Power consumption in annual standby state (E2)	1,004	kWh	259	kWh
	Total (Annual power consumption)	40,493	kWh	29,344	kWh

	Total (annual power consumption)	40,433	kWh	23,344	kWh
	Lead usage in solder (T1)	6	g	0	g
	Cadmium usage (T2)	0.4	g	0	g
	Mercury usage (T3)	0	g	0	g
T	Hexavalent chromium usage (T4)	4.4	g	0	g
	PBB usage (T5)	0	g	0	g
	PBDE usage (T6)	0	g	0	g
	HCFC refrigerant	12,000	g(R22)	0	g

Performance factor

Example of improvement of performance/life	Performance/life index
Expansion of the hot water output temperature range (from 60°C to 90°C)	-

# Environment – Ventilator

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## Ventilator V-08PD7 / V-08PX7 (for Japanese market only)

Factor: 2.13; Performance Factor: 1.18;  
Environmental Load Factor: 1.80

Compact ventilators equipped with the high-performance, compact motor ("MINIMO") and the newly developed "silent wavelet fan" blade for improved performance and energy efficiency.



Detailed environmental data

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▀ V-08PD7 / V-08PX7

### **M** Materials: Effective use of resources

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- Equipped with the "MINIMO" compact motor, which is 70% smaller and lighter than previous motors.

### **E** Energy: Efficient use of energy

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- Increased ventilation air volume by at least 25% by expanding air passageways.
- Up to 24% energy savings from high-density windings based on a structure of separate winding frameworks.

### **T** Toxicity: Avoidance of substances that are potentially harmful to the environment

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- No use of the six substances specified in the EU RoHS directive.



## Summary data

		Environmental load				Value of product
		M: Effective utilization of resources	E: Effective utilization of energy	T: Avoidance of discharge of environmentally hazardous substances		
Baseline product	2005 product	1	1	1	1.73	1
	V-08PD5					
Evaluated product	2013 product	0.41	0.87	0	0.96	1.18
	V-08PD7					
Details of improvement		Reduction in weight by miniaturization of motor	Higher-density winding using block construction	Adoption of lead-free solder		Details: Improvement of ventilation air volume; Reduction in power consumption
Environmental load factor: A		(1/Environmental load of new product)/(1/Environmental load of standard product)			1.80	
Performance factor: B		(Added value of new product)/(Added value of standard product)			1.18	
Factor X: AxB		(Added value of new product/Environmental load of new product)/(Added value of standard product/Environmental load of standard product)			2.13	

## Environmental load factor

		Baseline product (2005 product equivalent)		Evaluated product	
M	(1) Weight of product	0.627	kg	0.466	kg
	Iron	0.238	kg	0.195	kg
	Copper	0.000	kg	0.027	kg
	Aluminum	0.037	kg	0.006	kg
	Resin (Recycled material)	0.000	kg	0.123	kg
	Resin (Non-recycled material)	0.190	kg	0.097	kg
	Others	0.162	kg	0.018	kg
	(2) Weight of recycled material	0.090	kg	0.196	kg
	(3) Weight of reused parts	0.000	kg	0.000	kg
	(4) Weight of 3R material [(2) + (3)]	0.090	kg	0.196	kg
(5) Consumption of virgin resources [(1) – (4)]	0.537	kg	0.270	kg	
(6) Recyclable weight (3R possible)	0.465	kg	0.448	kg	
(7) Non-recyclable weight [(1) – (6)]	0.162	kg	0.018	kg	
E	Power consumption during annual operation (E1)	4.200	kWh	3.650	kWh
	Power consumption in annual standby state (E2)	0.000	kWh	0.000	kWh
	Total (Annual power consumption)	4.200	kWh	3.650	kWh
	Lead usage in solder (T1)	0.500	g	0.000	g
	Cadmium usage (T2)	0.000	g	0.000	g

	Mercury usage (T3)	0.000	g	0.000	g
T	Hexavalent chromium usage (T4)	0.000	g	0.000	g
	PBB usage (T5)	0.000	g	0.000	g
	PBDE usage (T6)	0.000	g	0.000	g
	HCFC refrigerant	0.000	g	0.000	g

Performance factor

Example of improvement of performance/life	Performance/life index
Increase in ventilation air volume	1.23
Improvement in power consumption	1.22
Reduction in noise	1.1
Performance factor	1.183

# Environment – Energy Recovery Ventilator for Commercial Use

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## Energy Recovery Ventilator (LOSSNAY) LGH-50RX5-E for Commercial Use

Factor: 2.73

Performance Factor: 2.40

Environmental Impact Factor: 1.14

Equipped with the Hyper Eco Core, which delivers a total heat exchange efficiency of 66.5%, the LGH-50RX5-E is an Energy Recovery Ventilator that is both environmentally conscious and energy efficient. Thanks to the new ventilation pattern function, this product offers more precise control of ventilation to reduce the air conditioning/heating load caused by ventilation.



### **M** Materials: Effective use of resources

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- Fewer parts, fewer screws, thinner sheet metal.

### **E** Energy: Efficient use of energy

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- Total heat exchange efficiency of 66.5%.

### **T** Toxicity: Avoidance of substances that are potentially harmful to the environment

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- Eliminated the use of the six substances specified by the EU's RoHS directive.

#### **Note**

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With the Hyper Eco Core, a new heat exchanger (Lossnay Core), this ventilator delivers total heat exchange efficiency of 66.5%, which is the leading position in the market. Keeping air conditioning/heating losses to a minimum, the 50RX5-E can save expenses in annual air conditioning/heating compared to a ventilator that simultaneously takes in and exhausts air. In addition, this product offers more flexible operation for individual days through its weekly timer function, while the Extra Low Mode makes it possible to implement 24-hour energy conservation ventilation. These functions provide more precise control of air volume, yielding much better energy-saving ventilation. Moreover, during the summer season, the Night Purge function draws cooler outside air into the room to reduce the load when the air conditioning is started the next morning, thereby boosting energy efficiency.

# Environment – Lossnay Central Ventilator System

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## Lossnay Central Ventilator System VL-20ZMH3-L/-R

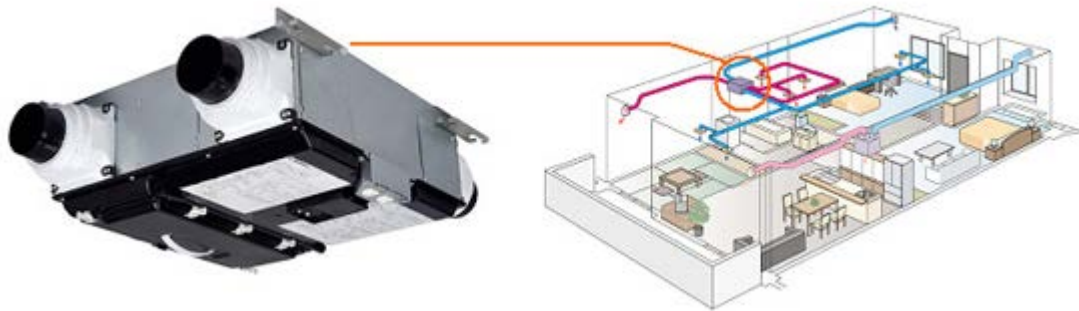
Factor: 2.73

Performance Factor: 2.40

Environmental Impact Factor: 1.14

### A Ventilator System that Recovers Heat from Cooling and Heating Energy Using a Heat Exchanger

The Lossnay Central Ventilator System has air supply and air exhaust functions which can cover the entire household. The air flows exchange cooling or heating energy through a heat exchanger. This product incorporates DC brushless motors powered by a direct current power source on both the air supply and exhaust sides, significantly reducing power consumption compared with conventional models. In addition, the Hyper Eco Element heat exchanger greatly boosts heat exchange efficiency to realize even further energy savings.



Detailed environmental data

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▶ VL-20ZMH3-L/-R

### **E** Energy: Efficient use of energy

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- Lossnay is an energy-saving ventilation system that recycles cooling and heating energy (heat recovery) by means of a heat exchanger. The Lossnay Central Ventilator System is a single unit that ventilates an entire household. The heat exchanger ensures ventilation without sacrificing the comforts of cooling and heating, and its high wind flow ensures that even in large housing complexes and cluster housing with numerous rooms, a single system suffices for one floor.

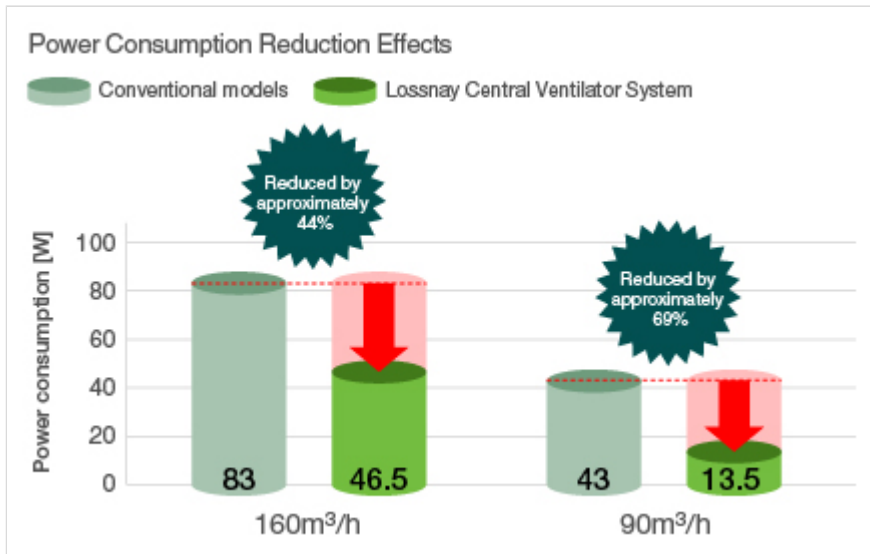
### **T** Toxicity: Avoidance of substances that are potentially harmful to the environment

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- Eliminated the use of the six substances specified by the EU's RoHS directive.

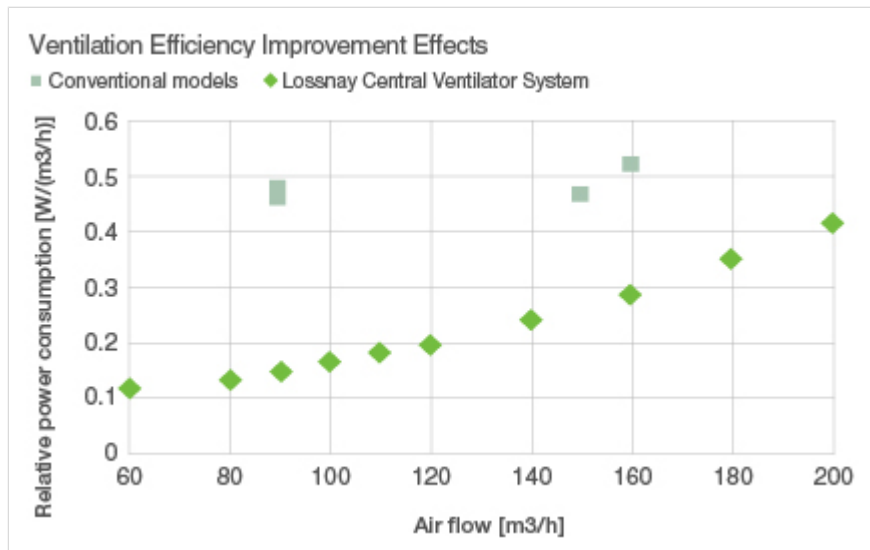
## Note

Both the air supply and exhaust fans are controlled by DC brushless motors powered by a direct current power source, which significantly reduces power consumption compared to conventional Mitsubishi Electric models controlled by AC motors.



The Lossnay Central Ventilator System realizes a significantly higher relative power consumption\* than existing Mitsubishi Electric models, even when driving the required 1 m³/h air feed.

\* Relative power consumption [W/(m³/h)] = ventilator power consumption [W]/ventilator air flow [m³/h]



## Lossnay Central Ventilator System

### Summary data

		Environmental load				Value of product
		M: Effective use of resources	E: Efficient use of energy	T: Avoidance of substances that are potentially harmful to the environment		
Standard product	1997 product	1	1	1	1.732	1
	VL-200ZM					
Evaluated product	2009 product	0.90	0.28	0	0.946	1.206
	VL-20ZMH3-L					
Details of improvement		Switched from steel plate to plastic	Air flow performance improvements	Use of lead-free solder		Items for consideration: <ul style="list-style-type: none"> <li>Improved temperature exchange efficiency</li> <li>Improved enthalpy exchange efficiency</li> </ul>
Environmental impact factor		(1/Environmental impact of new product)/(1/Environmental impact of standard product)			1.83	
Performance factor		(Added value of new product)/(Added value of standard product)			1.206	
Factor X: Environmental impact factor × Performance factor		(Added value of new product/Environmental impact of new product)/(Added value of standard product/Environmental impact of standard product)			2.207	

### Environmental Impact Factor

		Standard product (1990 product equivalent)		Evaluated product	
M	(1) Weight of product	17	kg	14.8	kg
	Iron	12	kg	7.7	kg
	Copper	0	kg	0	kg
	Aluminum	0	kg	0	kg
	Resin (Recycled material)	0	kg	0	kg
	Resin (Non-recycled material)	4	kg	4.5	kg
	Others	1	kg	2.6	kg
	(2) Weight of recycled material	4.2	kg	2.7	kg
	(3) Weight of reused parts	0	kg	0	kg
	(4) Weight of 3R material [(2) + (3)]	4.2	kg	2.7	kg
	(5) Consumption of virgin resources [(1) – (4)]	12.8	kg	12.1	kg
	(6) Recyclable weight (3R possible)	0	kg	0	kg
	(7) Nonrecyclable weight [(1) – (6)]	17	kg	14.8	kg
	Power consumption during annual operation (E1)	734	kWh	208	kWh
E	Power consumption in annual standby state (E2)	0	kWh	13	kWh
	Total (Annual power consumption)	734	kWh	221	kWh
	Lead usage in solder (T1)	2	g	0	g

T	Cadmium usage (T2)	0	g	0	g
	Mercury usage (T3)	0	g	0	g
	Hexavalent chromium usage (T4)	0	g	0	g
	PBB usage (T5)	0	g	0	g
	PBDE usage (T6)	0	g	0	g

Performance factor

Example of improvement of performance/life	Performance/life index
Ventilation air flow: 120m <sup>3</sup> /h → 120m <sup>3</sup> /h	1
Temperature exchange efficiency: 64% → 71%	1.109
Enthalpy exchange efficiency (heating): 51% → 66.5%	1.304
Enthalpy exchange efficiency (cooling): 45% → 63.5%	1.411
Performance factor (Average)	1.206

## Environment – Procurement

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### Introducing a Green Accreditation System to Reduce Environmental Risk

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In April 2006, the Mitsubishi Electric Group introduced a Green Accreditation System based on the Green Procurement Standards Guide established in September 2000. The Group is working to minimize environmental risks by evaluating the status of environmental management system accreditation acquired by suppliers, compliance with statutory and regulatory requirements, and management of chemical substances contained in products, while at the same time certifying suppliers that meet the Company's criteria and standards. When it comes to the status of chemical substance management, all evaluations are conducted taking into consideration aspects such as changes to regulations.

In fiscal 2011, Mitsubishi Electric also added consideration for preserving biodiversity as an assessment criterion of the Green Accreditation System, as a part of our efforts to take into consideration concerns related to preserving biodiversity.

Regarding Japanese and overseas suppliers of manufacturing materials essential to Mitsubishi Electric's manufacturing activities, we have continued to achieve a Green Accreditation rate of 100% and will aim to keep the rate at 100% in the coming years.

➤ **Environment: Group Biodiversity Action Guidelines**

➤ **Environment: Biodiversity-Conscious Procurement**

➤ **Procurement Activities: Green Procurement**



# Environment – Creating a Society in Tune with Nature

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## ▶ **Group Biodiversity Action Guidelines**

Introduction to the Mitsubishi Electric Group Biodiversity Action Guidelines established in May 2010.

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## ▶ **Mitsubishi Electric Outdoor Classroom**

Introduction to the Mitsubishi Electric Outdoor Classroom, an opportunity for employees, their families, and the community to come together, get close to nature, and develop environmental awareness.

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## ▶ **"Satoyama" Woodland Preservation Project**

Introduction to the targets and fiscal 2013 initiatives and achievements of the "Satoyama" woodland preservation project, a volunteer-oriented program that works to restore the natural environment in local areas.

\* To CSR Activities

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## ▶ **Observing and Investigating Biodiversity at Business Sites**

Introduction to the biodiversity observation and investigation initiatives carried out to understand the relationship between business activities and biodiversity.

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## ▶ **Biodiversity-Conscious Procurement**

Introduction to initiatives that take biodiversity into consideration in connection with procurement activities based on the Mitsubishi Electric Group's Green Procurement Standards Guide.

# Environment – Group Biodiversity Action Guidelines

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## Considering Biodiversity in All of Our Business Activities


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All human activity benefits from the workings of the diverse life forms that live on the planet. At the same time, human activity also exerts a significant impact on biodiversity, including damage to ecosystems. Now, at a time when many species face extinction, the preservation of biodiversity is a shared issue for all of humanity.

Mitsubishi Electric formulated its Environmental Vision 2021 in October 2007. This Vision positions respect for biodiversity as one of the Company's basic policies. The policy stems from the strong desire to protect the natural environment and realize a sustainable society through fostering environmental awareness among our employees. Furthermore, we formulated the Mitsubishi Electric Group Biodiversity Action Guidelines in May 2010. These Biodiversity Action Guidelines have two main features: (1) they include the pledge of every Mitsubishi Electric Group employee to understand the relationship between business activities and biodiversity; and (2) they are structured according to each stage of the product lifecycle.

### News Release

May 18, 2010

▶ Mitsubishi Electric Group Establishes Biodiversity Action Guidelines   
(26KB)

## Mitsubishi Electric Group Biodiversity Action Guidelines

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### Respect for Biodiversity

The Earth's ecosystem is made up of diverse living organisms. All aspects of human civilization benefit from this ecosystem, but at the same time, we affect it in both direct and indirect ways. Today, damage to the ecosystem is said to be driving many species to extinction and otherwise eroding biodiversity.

In recognition of this, the Mitsubishi Electric Group has established Biodiversity Action Guidelines, which add to the Group's environmental activities aimed at the creation of a low-carbon and recycling-based society from the perspective of biodiversity conservation. These guidelines define the role of business activities in preserving biodiversity, and outline the Group's efforts toward the development of a sustainable society through its business activities.

### Action Guidelines

#### Resources & Procurement

Recognizing that we utilize globally procured natural resources such as minerals, fuels and plants, we shall aim to preserve biodiversity in Japan and around the world by carrying out green procurement activities.

#### Product Design

In designing our products and services, we shall promote the effective utilization of resources and the efficient use of energy, as well as aim to prevent the emission of substances that pose a risk to the environment.

#### Manufacturing & Transportation

When commencing or making changes to land use, such as when constructing factories or warehouses, we will give due consideration to protecting the biodiversity of the land in question. In manufacturing and transportation, we aim to minimize energy use, waste generation and the emission of chemical substances.

#### Sales, Usage & Maintenance

In our sales activities, we will work to promote better understanding among our customers of the impact that product/service usage and maintenance can have on biodiversity.

#### Collection & Recycling

We will actively develop recycling technologies and apply them to collected end-of-life products.

#### Understanding & Action


We will deepen our understanding of the importance of biodiversity and our relationship to it, and will actively and voluntarily take actions necessary to coexist in harmony with nature.

## Cooperation

All companies in the Mitsubishi Electric Group, including overseas affiliates, will act as one, in cooperation with local communities, NGOs and governments.

## News Release

May 18, 2010

▶ Mitsubishi Electric Group Establishes Biodiversity Action Guidelines   
(26KB)

## Incorporating the Opinions of Experts in Our Action Guidelines

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In formulating Mitsubishi Electric's Biodiversity Action Guidelines and the Relationship between Business Activities and Biodiversity chart, we invited Dr. Ryo Kohsaka, who was then an associate professor at Nagoya City University, to exchange ideas regarding biodiversity, in March 2010. His feedback on our efforts is summarized as follows:

1. Activities are based first upon the emotional desire to cherish living things. The next step is action based on logic.
2. Using indices for management can be effective; however, focusing on the effect of manufacturing on the ecosystem is more important.
3. As a company that procures resources globally, a focus on procurement is vital; begin first by confirming legal compliance.
4. Collaborative relationships with regional communities are essential.

Based on this feedback, we completed steps to implement our guidelines and relational chart, which were announced on May 18, 2010.

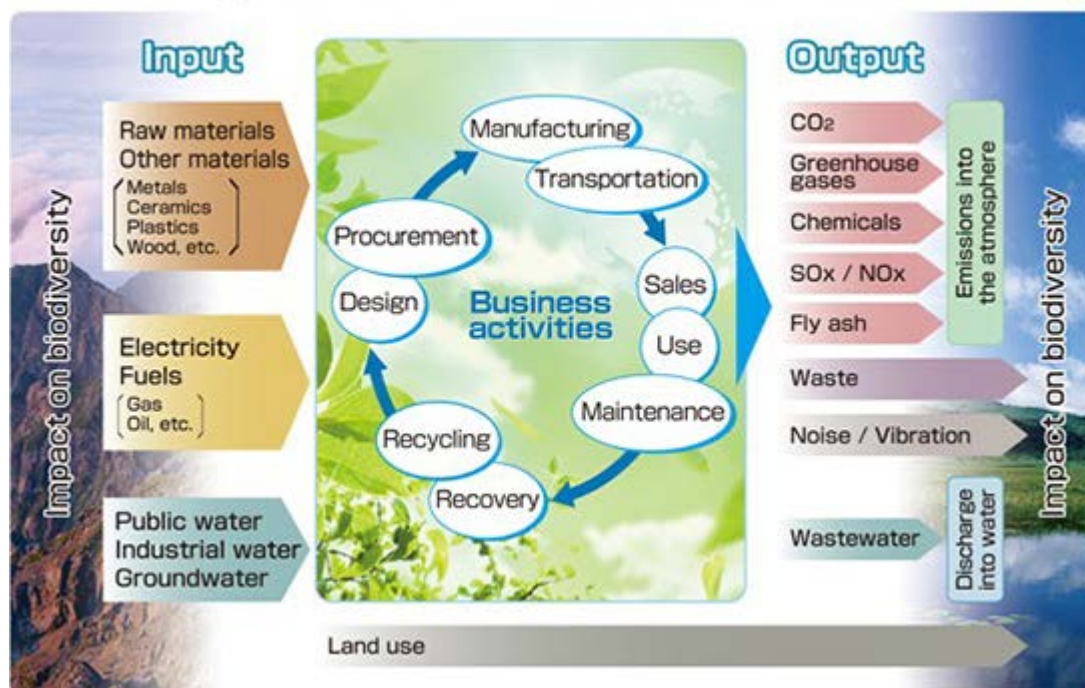
### Environmental Topics: Exchanging Ideas with Experts



## Visualizing the Relationship between Business Activities and Biodiversity while Promoting Wide-Ranging Initiatives

In addition, to deepen employee understanding of biodiversity, we have created a chart that shows the relationship between business activities and biodiversity. Using this chart, we will promote renewed awareness among all business sites both inside and outside Japan of the relationships between their business activities and surrounding regions' ecosystems and natural environment, and link this awareness to concrete actions that contribute to communication with those regions and to the preservation of biodiversity.

### Relationship between Business Activities and Biodiversity



### Activities Linked to the Preservation of Biodiversity

Activity	Purpose	Details
Mitsubishi Electric Outdoor Classroom	Foster environmental awareness among employees	Participants and employees, who serve as leaders, work to improve environmental awareness in natural classroom settings such as woodlands, waterways, parks and seacoasts.
"Satoyama" Woodland Preservation Project	Contribute to society, drawing on the voluntary efforts of employees	Employees strive to restore parks, woodlands, rivers and other natural areas located close to business sites.
Living Creature Studies	Deepen understanding of our impact on the natural environment	Employees observe the natural environment at business sites and surrounding areas while evaluating and improving behavior.
Biodiversity-Conscious Procurement	Reduce procurement-related environmental risks	Employees evaluate suppliers from a variety of perspectives; for example, in terms of the status of environmental initiatives and in terms of management of products that contain chemical substances.

# Environment – Mitsubishi Electric Outdoor Classroom

## Mitsubishi Electric Outdoor Classroom

Mitsubishi Electric Outdoor Classroom is one of the directives of "fostering environmental awareness" aimed at the realization of a society in harmony with nature. These classrooms utilize nearby natural habitats and provide an opportunity for participants and classroom leaders alike to experience nature.

### Contemplating the Necessity of Preserving Nature and Taking Action

The Mitsubishi Electric Group is developing personnel who contemplate what is necessary to preserve nature and then take action; in other words, people who are environmentally aware. We want participants to get in touch with nature so that they can realize the impact humans have on nature, increase their awareness of the importance of preserving nature, and take action to minimize environmental load as much as possible (bottom figure). Biodiversity is essential to the continuation of our business activities. We must be aware that our activities—such as consuming various resources, discharging chemical substances, and producing waste—place a burden on ecological systems on a daily basis. On the other hand, Mitsubishi Electric contributes to reducing the negative impact on water, air, and soil, in addition to reducing environmental load and helping to improve the environment through its products.

However, preserving nature is not achievable through the efforts of Mitsubishi Electric Group alone. We wish to share our environmental awareness with employees' families and community members to increase the number of people who think and act for the sake of environmental preservation in their everyday lives.

The Mitsubishi Electric Group believes a robust and firm foundation for environmental awareness is formed through utilizing the five senses to the fullest. Our outdoor classrooms provide the opportunity for employees, their families, and members of the community to come together and make discoveries about the ecology they live alongside. Launched in October 2006, the Mitsubishi Electric Outdoor Classroom is now in its 10th year, and has come to also provide the opportunity to contribute socially and environmentally, while promoting communication with local community members.

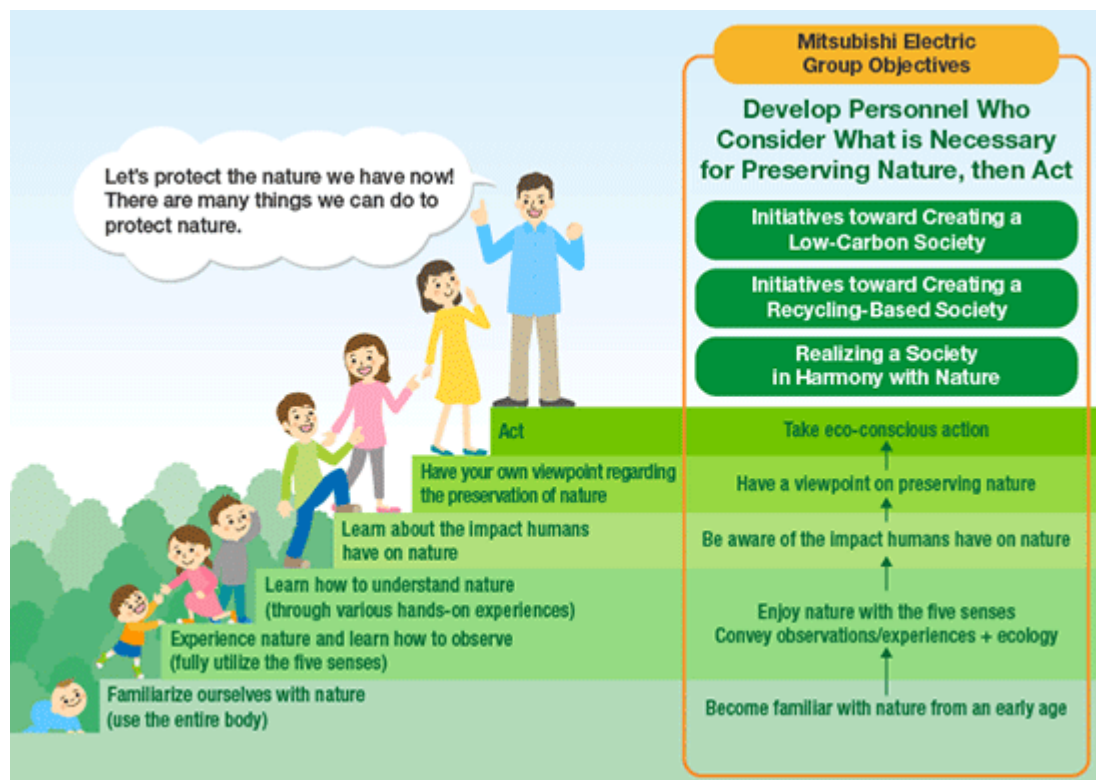


Illustration prepared while referring to a pamphlet introducing the Japan Association for the Promotion of Outdoor Life

## Features of the Mitsubishi Electric Outdoor Classroom

### Employees Responsible for Planning and Managing Programs

In the running of Mitsubishi Electric Outdoor Classrooms, much emphasis is placed on "doing it ourselves." Group employees who have completed an Outdoor Classroom Leader Development Course plan the program and serve as "teachers" (outdoor classroom leaders). The ways in which nature is



experienced, the curriculum, and the timing (season) of the classrooms are all at the discretion of these leaders. The leaders utilize the emotional experiences and discoveries gained through their development course and compile a program of their choice utilizing their own creativity. Mitsubishi Electric also involves the cooperation of local key persons, NPOs, and so on to ensure that our outdoor classrooms leave an even deeper impression on participants. There are many variations of our outdoor classrooms as there are leaders.

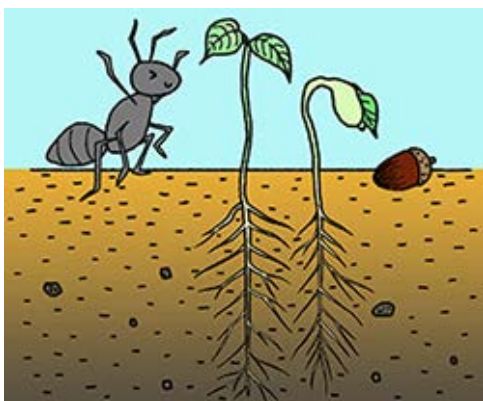
### Turning Fields Near Business Sites into "Classrooms"

Outdoor classrooms are held in various locations including mountains, forests, parks, sea sides, rivers, rice fields, and farms. The outdoor classroom leaders throughout Japan take advantage of the regional characteristics around the business site they work at to make the neighboring natural habitat their classroom. Occasionally, they may also use the grounds of the business site itself as a classroom. Each location has its own unique living organisms, fauna, and smells. Mitsubishi Electric Outdoor Classrooms provide an opportunity for children and adults alike to maximize their five senses to sense the workings of nature and make various discoveries.



#### Children learn the following and more through various experiences

- The cycle whereby trees wither and decompose to become dirt, then seeds fall into the dirt, sprout, and grow into trees again
- The role of an acorn in the forest
- The role of millipedes, sow bugs, and other insects that live under fallen leaves in nature
- The cycle whereby fallen leaves decompose to become fungi, such as mushrooms, then convert back to dirt
- The relationship between various living organisms (food chain, coexistence)





● **Basic Policy and Approach to Environmental Management  
Training of Environmental Personnel**

● **Basic Policy and Approach to Environmental Management  
Group Biodiversity Action Guidelines**

● **Environmental Report 2015  
Mitsubishi Electric Outdoor Classroom**

# Environment – Observing and Investigating Biodiversity at Business Sites

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## Experiencing the Blessings of Nature and Learning about the Relationship Between Business Activities and Biodiversity

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To enable a deeper understanding of the relationship between its business activities and biodiversity, the Mitsubishi Electric Group utilizes a two-pronged approach: business sites investigating biodiversity and employees observing biodiversity firsthand.

### Investigating Biodiversity at Business Sites

Mitsubishi Electric's Information Technology R&D Center in Kanagawa Prefecture, Japan, has been investigating biodiversity at business sites as a new experiment since June 2014. This research receives the cooperation of specialists and is conducted every season within the grounds of the R&D Center and the surrounding areas to observe the local living organisms. Discovered species are recorded and researchers consider why the species have chosen that particular area to live and how the R&D Center is significant to the local living organisms.

Moreover, dialogue is held with local government and key figures to determine what business sites should take into consideration in order to preserve a good environment for the local living organisms. Specifically, the R&D Center invites the department in charge of environmental conservation for Kamakura City, as well as key figures from local universities, museums, and so forth, to evaluate research content and results and offer advice.

The results of the investigations and the contents of discussions are compiled and made publicly available in "[Field Guide – Communications for the Environment](#)" (Japanese language only)



Researching biodiversity within grounds and surrounding areas, Communicating with key persons



A booklet briefly summarizing research and communication results "Field Guide"



## Species of life forms observed

Life forms	No. of varieties observed
Living creatures observed within grounds	405
Birds	24
Insects	45
Plants	335

## Breakdown of native and non-native species

\*1 \*2 \*3

Category	Breakdown
Flora	
Native	45.2%
Newly naturalized	20.4%
Formerly naturalized	0.9%
Prehistoric naturalized	0.5%
Escaped/planted	33.0%
Fauna	
Native	100%
Non-native	0%

\*1 Based on research current as of June 12, 2014.

\*2 Of this, 17% accounted for non-native species requiring caution.

\*3 Species designated as threatened, near-threatened, and diminishing, according to the Red List 2012 compiled by the Ministry of the Environment and the Kanagawa Prefecture Red List 2006, were discovered. (*Quercus phillyraeoides*, *Stewartia pseudocamellia*, *Loropetalum chinense*, *Rhododendron indica*, *Serissa japonica*, *Crinum asiaticum* var. *japonicum*, *Bletilla striata*, Barn swallow, etc.)

## Observing Biodiversity

Concerning the observation of biodiversity, we offer activities designed for employees to experience nature firsthand and understand the relationship between our factories and the surrounding environment. Production is a stage of the manufacturing process in which the issues of consideration for living things and protecting them in our daily work overlap, and is an important setting to understand the relationship between business activities and biodiversity.

Japan's Chubu area is a region of rich natural beauty, where nature preservation activities are popular. In August 2010, Mitsubishi Electric's Chubu Branch Office, Inazawa Works, Nakatsugawa Works, and Nagoya Works—all of which are located in the Chubu region—conducted living organism and aquatic nature observation studies. Discoveries as a result of these activities were compiled in the "Field Guides" and a "Mitsubishi Electric and Water Map" poster. Drawing on the observations of employees as well as comments from participating environmental conservation groups, steps were also taken to produce the "Mitsubishi Electric Experience of Life" booklet. Moreover, Mitsubishi Electric hosted a nature observation meeting at Mount Togoku in the Nagoya region of Aichi Prefecture in fiscal 2012. Harnessing the knowledge of related parties, the company created a "Flower and Berry Calendar," which showcases 145 species of local flora arranged by season.



Observations of living organisms and findings



"Field Guides" compiled from observations of the types of living organisms inhabiting the grounds of factories and

surrounding areas.



The "Mitsubishi Electric and Water Map" poster created as a project uniquely suited to sites in regions with an abundance of water.



The "Mitsubishi Electric Experience of Life" booklet describing observations of living organisms and findings.

▶ See booklet details (in Japanese only)

## Conservation Activities for Locally Unique Species

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As part of Mitsubishi Electric's biodiversity preservation activity, we have incorporated the research of biodiversity at business sites and an activity to improve the quality of natural areas while monitoring conditions in the 8th Environmental Plan (FY2016-2018). This includes the preservation of species unique to the local area at all domestic business sites. We plant trees and grasses unique to the region when constructing new buildings and implementing site usage plans, remove foreign species, and protect rare living organisms. In this way, we also foster a better understanding between employees and local communities.

# Environment – Biodiversity-Conscious Procurement

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## Placing Increased Emphasis on Biodiversity-Conscious Procurement

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In various stages that make up a product's lifecycle, consideration for biodiversity is very important; however, the relation to the Group is indirect. Even so, as a responsible corporate citizen, when procuring and using resources globally it is vital to manage procurement appropriately, taking the biological system into consideration.

Since the time of implementing the Green Procurement program in September 2000, the Mitsubishi Electric Group has continued to introduce initiatives for reducing risk to biological systems. Since April 2006, Mitsubishi Electric has been creating partnerships based on the Green Accreditation System, which requires that suppliers carry out environmental management, etc. In September 2009, we also added an appendix specifically related to preserving biodiversity to the Green Procurement Standards Guide. Since 2010, the initiatives for biodiversity preservation introduced by suppliers in the Green Accreditation System have been checked.



▶ Green Procurement Standards Guide (English, 234KB) 

## CSR – Guideline Comparison Tables

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▣ GRI Guideline Comparison Table

▣ Japan MOE Guideline  
Comparison Table

# CSR – GRI Guideline Comparison Table

## GRI Guideline Comparison Table [Version 3.1]

### 1. Strategy and Analysis

Section	Indicator	Contents
1.1	Statement from the most senior decisionmaker of the organization (e.g., CEO, chair, or equivalent senior position) about the relevance of sustainability to the organization and its strategy.	<a href="#">President's Message</a>
		<a href="#">From the President</a>
1.2	Description of key impacts, risks, and opportunities.	<a href="#">President's Message</a>
		<a href="#">From the President</a>
		<a href="#">Environmental Vision 2021</a>
		<a href="#">Risk Management</a>
		<a href="#">Important Issues in Environmental Management</a>


### 2. Organizational Profi



Section	Indicator	Contents
2.1	Name of the organization.	<a href="#">At-a-Glance</a>
2.2	Primary brands, products, and/or services.	<a href="#">Products</a>
		<a href="#">Business Overview</a>
2.3	Operational structure of the organization, including main divisions, operating companies, subsidiaries, and joint ventures.	<a href="#">At-a-Glance</a>
		<a href="#">Organization &amp; Management</a>
2.4	Location of organization's headquarters.	<a href="#">At-a-Glance</a>
2.5	Number of countries where the organization operates, and names of countries with either major operations or that are specifically relevant to the sustainability issues covered in the report.	<a href="#">Locations Worldwide</a>
		<a href="#">Corporate Strategy</a>
2.6	Nature of ownership and legal form.	<a href="#">At-a-Glance</a>
2.7	Markets served (including geographic breakdown, sectors served, and types of customers/beneficiaries).	<a href="#">Locations Worldwide</a>
		<a href="#">Corporate Strategy</a>
2.8	Scale of the reporting organization, including: Number of employees; Number of operations; Net sales (for private sector organizations) or net revenues (for public sector organizations); Total capitalization broken down in terms of debt and equity (for private sector organizations); and Quantity of products or services provided.	<a href="#">At-a-Glance</a>
		<a href="#">Annual Report</a>
2.9	Significant changes during the reporting period regarding size, structure, or ownership including:  The location of, or changes in operations, including facility openings, closings, and expansions; and Changes in the share capital structure and other capital formation, maintenance, and alteration operations (for private sector organizations).	<a href="#">Corporate News 2014</a>
		<a href="#">Corporate News 2015</a>
2.10	Awards received in the reporting period.	<a href="#">Awards</a>
		<a href="#">Awards</a>

### 3. Report Parameters

Section	Indicator	Contents
Report Profile		
3.1	Reporting period (e.g., fiscal/calendar year) for information provided.	<a href="#">About the Report</a>
		<a href="#">Period and Scope of the Report</a>
3.2	Date of most recent previous report (if any).	June, 2014
		<a href="#">Back Issues</a>
3.3	Reporting cycle (annual, biennial, etc.)	Annual
3.4	Contact point for questions regarding the report or its contents.	<a href="#">Contact</a>
Report Scope and Boundary		
3.5	Process for defining report content, including: Determining materiality; Prioritizing topics within the report; and Identifying stakeholders the organization expects to use the report.	<a href="#">About the Report</a>
3.6	Boundary of the report (e.g., countries, divisions, subsidiaries, leased facilities, joint ventures, suppliers). See GRI Boundary Protocol for further guidance.	<a href="#">About the Report</a>
		<a href="#">Period and Scope of the Report</a>
3.7	State any specific limitations on the scope or boundary of the report.	—
3.8	Basis for reporting on joint ventures, subsidiaries, leased facilities, outsourced operations, and other entities that can significantly affect comparability from period to period and/or between organizations.	—
3.9	Data measurement techniques and the bases of calculations, including assumptions and techniques underlying estimations applied to the compilation of the Indicators and other information in the report.	—
3.10	Explanation of the effect of any re-statements of information provided in earlier reports, and the reasons for such re-statement (e.g., mergers/ acquisitions, change of base years/periods, nature of business, measurement methods).	—
3.11	Significant changes from previous reporting periods in the scope, boundary, or measurement methods applied in the report.	Not applicable
GRI Content Index		
3.12	Table identifying the location of the Standard Disclosures in the report.	<a href="#">GRI Guideline Comparison Table</a>
Assurance		
3.13	Policy and current practice with regard to seeking external assurance for the report. If not included in the assurance report accompanying the sustainability report, explain the scope and basis of any external assurance provided. Also explain the relationship between the reporting organization and the assurance provider(s).	—

#### 4. Governance, Commitments, and Engagement

Section	Indicator	Contents
Governance		
4.1	Governance structure of the organization, including committees under the highest governance body responsible for specific tasks, such as setting strategy or organizational oversight.	<a href="#">Corporate Governance</a>
		<a href="#">Corporate Governance</a>
4.2	Indicate whether the Chair of the highest governance body is also an executive officer (and, if so, their function within the organization's management and the reasons for this arrangement).	<a href="#">Corporate Governance</a>
		<a href="#">Corporate Governance</a>
4.3	For organizations that have a unitary board structure, state the number and gender of members of the highest governance body that are independent and/or non-executive members.	<a href="#">Corporate Governance</a>
		<a href="#">Corporate Governance</a>
4.4	Mechanisms for shareholders and employees to provide recommendations or direction to the highest governance body.	<a href="#">Corporate Governance</a>
		<a href="#">Corporate Governance</a>
4.5	Linkage between compensation for members of the highest governance body, senior managers, and executives (including departure arrangements), and the organization's performance (including social and environmental performance).	—
4.6	Processes in place for the highest governance body to ensure conflicts of interest are avoided.	<a href="#">Corporate Governance</a>
		<a href="#">Corporate Governance</a>
4.7	Process for determining the composition, qualifications, and expertise of the members of the highest governance body and its committees, including any consideration of gender and other indicators of diversity.	—
4.8	Internally developed statements of mission or values, codes of conduct, and principles relevant to economic, environmental, and social performance and the status of their implementation.	<a href="#">Corporate Mission</a>
		<a href="#">Mitsubishi Electric Group Conduct Guidelines</a> 
		<a href="#">Group Environmental Policy</a>
		<a href="#">Group Biodiversity Action Guidelines</a>
		<a href="#">Environmental Statement: Eco Changes</a>
		<a href="#">Environmental Vision 2021</a>
		<a href="#">Aiming to Become a Global Leading Green Company</a>
		<a href="#">7th Environmental Plan (Fiscal 2013–2015)</a>
		<a href="#">Targets and Achievements of the 7th Environmental Plan (Fiscal 2013–2015)</a>
		<a href="#">8th Environmental Plan (Fiscal 2016–2018)</a>
4.9	Procedures of the highest governance body for overseeing the organization's identification and management of economic, environmental, and social performance, including relevant risks and opportunities, and adherence or compliance with internationally agreed standards, codes of conduct, and principles.	<a href="#">Corporate Governance</a>
		<a href="#">Corporate Governance</a>
		<a href="#">Compliance</a>
		<a href="#">Risk Management</a>
		<a href="#">Environmental Management Structure</a>
4.10	Processes for evaluating the highest governance body's own performance, particularly with respect to economic, environmental, and social performance.	—

Commitments to External Initiatives		
4.11	Explanation of whether and how the precautionary approach or principle is addressed by the organization.	<a href="#">Compliance</a>
		<a href="#">Risk Management</a>
		<a href="#">Ensuring Consistent Quality</a>
		<a href="#">Environmental Risk Management</a>
4.12	Externally developed economic, environmental, and social charters, principles, or other initiatives to which the organization subscribes or endorses.	—
4.13	Memberships in associations (such as industry associations) and/or national/international advocacy organizations in which the organization:  Has positions in governance bodies; Participates in projects or committees; Provides substantive funding beyond routine membership dues; or Views membership as strategic.	—
Stakeholder Engagement		
4.14	List of stakeholder groups engaged by the organization.	<a href="#">CSR Report</a>
		<a href="#">Biodiversity Picture Book: "Communing with Nature" (in Japanese only)</a> 
4.15	Basis for identification and selection of stakeholders with whom to engage.	—
4.16	Approaches to stakeholder engagement, including frequency of engagement by type and by stakeholder group.	<a href="#">Responsibility to Customers</a>
		<a href="#">Responsibility to Business Partners</a>
		<a href="#">Responsibility to Shareholders &amp; Investors</a>
		<a href="#">Responsibility to Employees</a>
		<a href="#">As a Corporate Citizen</a>
4.17	Key topics and concerns that have been raised through stakeholder engagement, and how the organization has responded to those key topics and concerns, including through its reporting.	<a href="#">Biodiversity Picture Book: "Communing with Nature" (in Japanese only)</a> 



## 5. Management Approach and Performance Indicators

Section	Indicator	Contents
Economic		
Management Approach		
		<a href="#">President's Message</a>
		<a href="#">From the President</a>
		<a href="#">President's Message</a>
		<a href="#">Corporate Strategy</a>
Economic Performance		
EC1	Direct economic value generated and distributed, including revenues, operating costs, employee compensation, donations and other community investments, retained earnings, and payments to capital providers and governments.	<a href="#">Annual Report</a>
EC2	Financial implications and other risks and opportunities for the organization's activities due to climate change.	—
EC3	Coverage of the organization's defined benefit plan obligations.	<a href="#">Annual Report</a>
EC4	Significant financial assistance received from government.	—
Market Presence		
EC5	Range of ratios of standard entry level wage by gender compared to local minimum wage at significant locations of operation.	—
EC6	Policy, practices, and proportion of spending on locally-based suppliers at significant locations of operation.	<a href="#">Responsibility to Business Partners</a>
EC7	Procedures for local hiring and proportion of senior management hired from the local community at locations of significant operation.	—
Indirect Economic Impacts		
EC8	Development and impact of infrastructure investments and services provided primarily for public benefit through commercial, inkind, or pro bono engagement.	<a href="#">Philanthropic Activities</a> <a href="#">As a Corporate Citizen</a>
EC9	Understanding and describing significant indirect economic impacts, including the extent of impacts.	—
Environmental		
Management Approach		
		<a href="#">Important Issues in Environmental Management</a>
Materials		
EN1	Materials used by weight or volume.	<a href="#">Material Balance</a>
EN2	Percentage of materials used that are recycled input materials.	—
Energy		
EN3	Direct energy consumption by primary energy source.	<a href="#">Material Balance</a>
EN4	Indirect energy consumption by primary source.	—
EN5	Energy saved due to conservation and efficiency improvements.	<a href="#">Reducing CO<sub>2</sub> from Production</a> <a href="#">Targets and Achievements of the 7th Environmental Plan (Fiscal 2013–2015)</a> <a href="#">Environmental Performance Data</a>
EN6	Initiatives to provide energy-efficient or renewable energy	<a href="#">Reducing CO<sub>2</sub> from Product</a>

	based products and services, and reductions in energy requirements as a result of these initiatives.	<a href="#">Usage</a>
		<a href="#">Expanding Our Contributions to Reducing CO<sub>2</sub> from Product Usage</a>
		<a href="#">Environmental Statement: Eco Changes</a>
EN7	Initiatives to reduce indirect energy consumption and reductions achieved.	<a href="#">Reducing CO<sub>2</sub> from Production</a>
		<a href="#">Reducing Emissions of Non-CO<sub>2</sub> Greenhouse Gases</a>
Water		
EN8	Total water withdrawal by source.	<a href="#">Material Balance</a>
		<a href="#">Environmental Performance Data</a>
		<a href="#">Using Water Effectively</a>
EN9	Water sources significantly affected by withdrawal of water.	—
EN10	Percentage and total volume of water recycled and reused.	<a href="#">Environmental Performance Data</a>
		<a href="#">Using Water Effectively</a>
Biodiversity		
EN11	Location and size of land owned, leased, managed in, or adjacent to, protected areas and areas of high biodiversity value outside protected areas.	<a href="#">Important Issues in Environmental Management</a>
EN12	Description of significant impacts of activities, products, and services on biodiversity in protected areas and areas of high biodiversity value outside protected areas.	<a href="#">Creating a Society in Tune with Nature</a>
EN13	Habitats protected or restored.	<a href="#">Biodiversity Picture Book: "Communing with Nature" (in Japanese only)</a> 
EN14	Strategies, current actions, and future plans for managing impacts on biodiversity.	
EN15	Number of IUCN Red List species and national conservation list species with habitats in areas affected by operations, by level of extinction risk.	
Emissions, Effluents, and Waste		
EN16	Total direct and indirect greenhouse gas emissions by weight.	<a href="#">Reducing Greenhouse Gases Emitted in the Value Chain</a>
		<a href="#">Material Balance</a>
		<a href="#">Environmental Performance Data</a>
		<a href="#">Reducing CO<sub>2</sub> from Production</a>
		<a href="#">Reducing Emissions of Non-CO<sub>2</sub> Greenhouse Gases</a>
EN17	Other relevant indirect greenhouse gas emissions by weight.	<a href="#">Reducing Greenhouse Gases Emitted in the Value Chain</a>
EN18	Initiatives to reduce greenhouse gas emissions and reductions achieved.	<a href="#">Reducing CO<sub>2</sub> from Production</a>
		<a href="#">Reducing Emissions of Non-CO<sub>2</sub> Greenhouse Gases</a>
EN19	Emissions of ozone-depleting substances by weight.	<a href="#">Material Balance</a>
EN20	NO, SO, and other significant air emissions by type and weight.	<a href="#">Material Balance</a>
EN21	Total water discharge by quality and destination.	<a href="#">Material Balance</a>
EN22	Total weight of waste by type and disposal method.	<a href="#">Material Balance</a>
		<a href="#">Environmental Performance</a>

		<a href="#">Data</a>
		<a href="#">Initiatives toward Zero Final Waste Disposal Ratio</a>
EN23	Total number and volume of significant spills.	—
EN24	Weight of transported, imported, exported, or treated waste deemed hazardous under the terms of the Basel Convention Annex I, II, III, and VIII, and percentage of transported waste shipped internationally.	—
EN25	Identity, size, protected status, and biodiversity value of water bodies and related habitats significantly affected by the reporting organization's discharges of water and runoff.	—
Products and Services		
EN26	Initiatives to mitigate environmental impacts of products and services, and extent of impact mitigation.	<a href="#">Reducing Use of Resources</a>
		<a href="#">Recycling End-of-Life Products</a>
		<a href="#">Expanding Our Contributions to Reducing CO<sub>2</sub> from Product Usage</a>
		<a href="#">Development of Environmental Technologies</a>
		<a href="#">Plastic Recycling Comes of Age</a>
		<a href="#">Eco Changes</a>
EN27	Percentage of products sold and their packaging materials that are reclaimed by category.	<a href="#">Recycling End-of-Life Products</a>
		<a href="#">Plastic Recycling Comes of Age</a>
Compliance		
EN28	Monetary value of significant fines and total number of non-monetary sanctions for noncompliance with environmental laws and regulations.	<a href="#">Environmental Risk Management</a>
Transport		
EN29	Significant environmental impacts of transporting products and other goods and materials used for the organization's operations, and transporting members of the workforce.	<a href="#">Material Balance</a>
		<a href="#">Environmental Performance Data</a>
		<a href="#">Reducing Greenhouse Gases Emitted in the Value Chain</a>
Overall		
EN30	Total environmental protection expenditures and investments by type.	<a href="#">Environmental Accounting</a>
Social Performance [Labor Practices and Decent Work Performance]		
Management Approach		
		<a href="#">CSR Philosophy</a>
		<a href="#">Compliance</a>
		<a href="#">Responsibility to Employees</a>
Employment		
LA1	Total workforce by employment type, employment contract, and region, broken down by gender.	—
LA2	Total number and rate of new employee hires and employee turnover by age group, gender, and region.	—
LA3	Benefits provided to full-time employees that are not provided to temporary or parttime employees, by significant locations of operation.	—
LA15	Return to work and retention rates after parental leave, by	—

	gender.	
Labor/Management Relations		
LA4	Percentage of employees covered by collective bargaining agreements.	—
LA5	Minimum notice period(s) regarding operational changes, including whether it is specified in collective agreements.	—
Occupational Health and Safety		
LA6	Percentage of total workforce represented in formal joint management–worker health and safety committees that help monitor and advise on occupational health and safety programs.	—
LA7	Rates of injury, occupational diseases, lost days, and absenteeism, and total number of work-related fatalities, by region and by gender.	<a href="#">Ensuring Occupational Safety &amp; Health</a>
LA8	Education, training, counseling, prevention, and risk-control programs in place to assist workforce members, their families, or community members regarding serious diseases.	<a href="#">Ensuring Occupational Safety &amp; Health</a>
LA9	Health and safety topics covered in formal agreements with trade unions.	—
Training and Education		
LA10	Average hours of training per year per employee by gender, and by employee category.	—
LA11	Programs for skills management and lifelong learning that support the continued employability of employees and assist them in managing career endings.	<a href="#">Workforce Diversity</a>
LA12	Percentage of employees receiving regular performance and career development reviews, by gender.	—
Diversity and Equal Opportunity		
LA13	Composition of governance bodies and breakdown of employees per employee category according to gender, age group, minority group membership, and other indicators of diversity.	—
Equal Remuneration for Women and Men		
LA14	Ratio of basic salary and remuneration of women to men by employee category, by significant locations of operation.	—
Social Performance [Human Rights]		
Management Approach		
		<a href="#">Compliance</a>
		<a href="#">Respecting Human Rights</a>
		<a href="#">Responsibility to Business Partners</a>
		<a href="#">Procurement Policy</a>
Investment and Procurement Practices		
HR1	Percentage and total number of significant investment agreements and contracts that include clauses incorporating human rights concerns, or that have undergone human rights screening.	—
HR2	Percentage of significant suppliers, contractors, and other business partners that have undergone human rights screening, and actions taken.	—
HR3	Total hours of employee training on policies and procedures concerning aspects of human rights that are relevant to operations, including the percentage of employees trained.	—
Non-discrimination		
HR4	Total number of incidents of discrimination and corrective actions taken.	—

Freedom of Association and Collective Bargaining		
HR5	Operations and significant suppliers identified in which the right to exercise freedom of association and collective bargaining may be violated or at significant risk, and actions taken to support these rights.	—
Child Labor		
HR6	Operations and significant suppliers identified as having significant risk for incidents of child labor, and measures taken to contribute to the effective abolition of child labor.	—
Forced and Compulsory Labor		
HR7	Operations and significant suppliers identified as having significant risk for incidents of forced or compulsory labor, and measures to contribute to the elimination of all forms of forced or compulsory labor.	<a href="#">Compliance</a>
		<a href="#">Respecting Human Rights</a>
		<a href="#">Responsibility to Business Partners</a>
		<a href="#">Procurement Policy</a>
Security Practices		
HR8	Percentage of security personnel trained in the organization's policies or procedures concerning aspects of human rights that are relevant to operations.	—
Indigenous Rights		
HR9	Total number of incidents of violations involving rights of indigenous people and actions taken.	—
Social Performance [Society]		
Management Approach		
		<a href="#">CSR Philosophy</a>
		<a href="#">Compliance</a>
Local Communities		
SO1	Percentage of operations with implemented local community engagement, impact assessments, and development programs.	—
SO9	Operations with significant potential or actual negative impacts on local communities.	—
SO10	Prevention and mitigation measures implemented in operations with significant potential or actual negative impacts on local communities.	—
Corruption		
SO2	Percentage and total number of business units analyzed for risks related to corruption.	—
SO3	Percentage of employees trained in organization's anti-corruption policies and procedures.	<a href="#">Compliance</a>
SO4	Actions taken in response to incidents of corruption.	—
Public Policy		
SO5	Public policy positions and participation in public policy development and lobbying.	—
SO6	Total value of financial and in-kind contributions to political parties, politicians, and related institutions by country.	—
Anti-Competitive Behavior Add		
SO7	Total number of legal actions for anticompetitive behavior, anti-trust, and monopoly practices and their outcomes.	—
Compliance		
SO8	Monetary value of significant fines and total number of non-monetary sanctions for noncompliance with laws and regulations.	—

Social Performance [Product Responsibility]		
Management Approach		
		<u>CSR Philosophy</u>
		<u>Responsibility to Customers</u>
Customer Health and Safety		
PR1	Life cycle stages in which health and safety impacts of products and services are assessed for improvement, and percentage of significant products and services categories subject to such procedures.	<u>Product Development</u>
		<u>Ensuring Consistent Quality</u>
PR2	Total number of incidents of non-compliance with regulations and voluntary codes concerning health and safety impacts of products and services during their life cycle, by type of outcomes.	<u>Responding to Product-Related Issues</u>
Product and Service Labeling		
PR3	Type of product and service information required by procedures, and percentage of significant products and services subject to such information requirements.	—
PR4	Total number of incidents of non-compliance with regulations and voluntary codes concerning product and service information and labeling, by type of outcomes.	—
PR5	Practices related to customer satisfaction, including results of surveys measuring customer satisfaction.	<u>Increasing Customer Satisfaction</u>
Marketing Communications		
PR6	Programs for adherence to laws, standards, and voluntary codes related to marketing communications, including advertising, promotion, and sponsorship.	—
PR7	Total number of incidents of non-compliance with regulations and voluntary codes concerning marketing communications, including advertising, promotion, and sponsorship by type of outcomes.	—
Customer Privacy		
PR8	Total number of substantiated complaints regarding breaches of customer privacy and losses of customer data.	—
Compliance		
PR9	Monetary value of significant fines for noncompliance with laws and regulations concerning the provision and use of products and services.	—

# CSR – Japan MOE Guideline Comparison Table

## Japan MOE Guideline Comparison Table [Fiscal Year 2012 Version]

### 1. Report Parameters and Summary

Item	Contents
1. Report Profile	
(1) Report boundary and reporting period	<a href="#">About the Report</a>
	<a href="#">Period and Scope of the Report</a>
(2) Organizations coverage ratio and reporting period difference	<a href="#">About the Report</a>
	<a href="#">Period and Scope of the Report</a>
(3) Reporting policies	<a href="#">About the Report</a>
	<a href="#">Period and Scope of the Report</a>
(4) Policies for choosing the type of report	<a href="#">CSR Site Map</a>
	<a href="#">Environment Site Map</a>
	<a href="#">Environmental Sustainability Report</a>
2. Chairman's statement / CEO's statement	
	<a href="#">President's Message</a>
	<a href="#">From the President</a>
3. Summary	
(1) Overview of environmentally focused management	<a href="#">Aiming to Become a Global Leading Green Company</a>
(2) Overview of KPI trends	<a href="#">Environmental Performance Data</a>
(3) Summary of activities to address an individual environmental issue	<a href="#">Targets and Achievements of the 7th Environmental Plan (Fiscal 2013–2015)</a>
4. Material balance	
	<a href="#">Material Balance</a>

## 2. Data on Status of Environment-focused Management

### Information and Indicators on How Environmentally Focused Management (Including Environmental Management) Is Working

Item	Contents
1. Environmental policies, visions and business strategies	
(1) Environmental policies	<a href="#">Group Environmental Policy</a>
	<a href="#">Group Biodiversity Action Guidelines</a>
	<a href="#">Environmental Statement: Eco Changes</a>
(2) Material issues, visions, and business strategies	<a href="#">Environmental Vision2021</a>
	<a href="#">Aiming to Become a Global Leading Green Company</a>
	<a href="#">7th Environmental Plan (Fiscal 2013–2015)</a>
	<a href="#">8th Environmental Plan (Fiscal 2016–2018)</a>
	<a href="#">Important Issues in Environmental Management</a>
2. Organizational systems and governance	
(1) Organizational systems for environmentally focused management	<a href="#">Environmental Management Structure</a>
(2) Environmental risk management system	<a href="#">Environmental Risk Management</a>
(3) Compliance with environmental regulations	<a href="#">Environmental Risk Management</a>
3. Responsiveness of stakeholder issues	
(1) Responsiveness to stakeholder issues	<a href="#">Responsibility to Customers</a>
	<a href="#">Responsibility to Business Partners</a>
	<a href="#">Responsibility to Shareholders &amp; Investors</a>
	<a href="#">Responsibility to Employees</a>
	<a href="#">As a Corporate Citizen</a>
	<a href="#">Biodiversity Picture Book: "Communing with Nature" (in Japanese only)</a> 
	<a href="#">Disclosure and Dissemination of Environmental Information</a>
(2) Philanthropy related to the environment	<a href="#">"Satoyama" Woodland Preservation activities</a>
4. Environmental initiatives in the value chain	
(1) Strategies and environmental policies for the value chain	<a href="#">Environmental Considerations for Value Chain Management</a>
(2) Green purchasing and procurement	<a href="#">Procurement</a>
	<a href="#">Biodiversity-Conscious Procurement</a>
	<a href="#">Green Procurement</a>
(3) Products and services designed for mitigating environmental impacts	<a href="#">Development of Environmental Technologies</a>
	<a href="#">Reducing CO<sub>2</sub> from Product Usage</a>
(4) New environmental technologies and research and development	<a href="#">Development of Environmental Technologies</a>
	<a href="#">Key Technologies</a>
(5) Environmentally conscious transportation	<a href="#">Reducing CO<sub>2</sub> from Logistics</a>
	<a href="#">Reducing the Use of Disposable Packaging Materials</a>



(6) Resource exploitations and real estate development/investment with less environmental impacts	Environmental Accounting
(7) Waste management and recycling	<u>Initiatives toward Zero Final Waste Disposal Ratio</u>
	<u>Recycling End-of-Life Products</u>
	<u>Plastic Recycling Comes of Age</u>
	<u>Tapping into Hidden Deposits of Rare Earth Elements Found in Cities</u>

### 3. Data on Environmental Impact of Business Activities and Related Initiatives

#### Information and Indicators on Environmental Impact of Business Activities and Environmental Initiatives Undertaken to Mitigate Them

Item	Contents
1. Resources used and energy consumption	
(1) Total energy consumption and initiatives to reduce it	<a href="#">Material Balance</a>
	<a href="#">Environmental Performance Data</a>
	<a href="#">Reducing CO<sub>2</sub> from Production</a>
(2) Total materials used and initiatives to reduce them	<a href="#">Material Balance</a>
	<a href="#">Reducing Use of Resources</a>
	<a href="#">Recycling End-of-Life Products</a>
	<a href="#">Reducing the Use of Disposable Packaging Materials</a>
	<a href="#">Plastic Recycling Comes of Age</a>
(3) Water withdrawal and initiatives to reduce it	<a href="#">Material Balance</a>
	<a href="#">Environmental Performance Data</a>
	<a href="#">Using Water Effectively</a>
	<a href="#">Water for Life, Water for Industry</a>
2. Recycled input resources (within the organizational boundary)	
	<a href="#">Using Water Effectively</a>
	<a href="#">Water for Life, Water for Industry</a>
	<a href="#">Recycling End-of-Life Products</a>
	<a href="#">Plastic Recycling Comes of Age</a>
3. Products and services and environmental impacts arising from production	
(1) Total products manufactured or goods sold	<a href="#">Material Balance</a>
(2) Greenhouse gas emissions and initiatives to reduce them	<a href="#">From the President</a>
	<a href="#">Environmental Vision 2021</a>
	<a href="#">7th Environmental Plan (Fiscal 2013–2015)</a>
	<a href="#">Targets and Achievements of the 7th Environmental Plan (Fiscal 2013–2015)</a>
	<a href="#">Reducing CO<sub>2</sub> from Production</a>
	<a href="#">Reducing Emissions of Non-CO<sub>2</sub> Greenhouse Gases</a>
(3) Total water discharge and initiatives to reduce it	<a href="#">Material Balance</a>
	<a href="#">Water for Life, Water for Industry</a>
(4) Effluents and nuisance, and initiatives to reduce them	<a href="#">Material Balance</a>
	<a href="#">Environmental Performance Data</a>
(5) Release and transfer of chemical substances and initiatives to reduce them	<a href="#">Managing Chemical Substances</a>
	<a href="#">Material Balance</a>
	<a href="#">Environmental Performance Data</a>
(6) Total weight of waste generated, waste disposed by land filling or incineration and initiatives to reduce them	<a href="#">Initiatives toward Zero Final Waste Disposal Ratio</a>
	<a href="#">Material Balance</a>
	<a href="#">Environmental Performance Data</a>
(7) Significant spills of hazardous substances and measures taken for preventing them	<a href="#">Environmental Risk Management</a>
4. Conservation of biological diversity and the sustainable use of its components	
	<a href="#">Creating a Society in Tune with Nature</a>

#### 4. Data on Economic and Social Context of Environment-focused Management

##### Information and Indicators on the Economic and Social Contexts of Environmentally Focused Management

Item	Contents
1. Economic Contexts of Environmentally Focused Management	
(1) Economic contexts in an enterprise	<u>Environmental Accounting</u>
(2) Economic contexts in society	<u>Environmental Accounting</u>
2. Social Contexts of Environmentally focused management	
	<u>Compliance</u>
	<u>Responsibility to Employees</u>
	<u>Responsibility to Customers</u>
	<u>Responsibility to Business Partners</u>

#### 5. Miscellaneous Contents to be disclosed

Item	Contents
1. Events after the reporting period	
(1) Events after the reporting period	—
(2) Extraordinary events	—
2. Assurance and other measures to enhance reliability of environmental information	
	—

# CSR – ESG Survey Index

## ESG Survey Index



Messages from Top Management	<a href="#">President's Message (CSR)</a>
	<a href="#">From the President (Environment)</a>
Corporate Mission	<a href="#">Corporate Mission</a>
Organizational Profile	<a href="#">At-a-Glance</a>
Financial Performance	<a href="#">Five-Year Summary</a>
	<a href="#">Results by Business Segment</a>
	<a href="#">Financial Results</a>
	<a href="#">Annual Report</a>
Vision & Strategy	<a href="#">Corporate Strategy</a>
	<a href="#">Environmental Vision 2021</a>
	<a href="#">Message from Public Utility Systems Group</a>
	<a href="#">Message from Energy &amp; Industrial Systems Group</a>
	<a href="#">Message from Building Systems Group</a>
	<a href="#">Message from Electronic Systems Group</a>
	<a href="#">Message from Communication Systems Group</a>
	<a href="#">Message from Living Environment &amp; Digital Media Equipment Group</a>
	<a href="#">Message from Factory Automation Systems Group</a>
	<a href="#">Message from Automotive Equipment Group</a>
	<a href="#">Message from Semiconductor &amp; Device Group</a>
	<a href="#">Message from Information Systems &amp; Network Service Group</a>
CSR Activity Boundaries	<a href="#">About the Report</a>
CSR Management	<a href="#">CSR Philosophy</a>
	<a href="#">Important Issues in Environmental Management</a>

	CSR Activity Fields	Policies/ Regulations	Promotion Structure/ System/ Framework	Initiatives/ Activities Results
Corporate Governance	<ul style="list-style-type: none"> <li>Organizational Governance</li> </ul>	<a href="#">Corporate Governance</a>		–
	<ul style="list-style-type: none"> <li>Transparency (Internal Supervision, Executive Compensation)</li> </ul>	<a href="#">Corporate Governance</a>		–
	<ul style="list-style-type: none"> <li>Information Disclosure</li> <li>Responsibility to Shareholders and Investors</li> </ul>	<a href="#">Responsibility to Shareholders &amp; Investors</a>		

	CSR Activity Fields	Policies/ Regulations	Promotion Structure/ System/ Framework	Initiatives/ Activities Results
Risk Management	<ul style="list-style-type: none"> <li>Organizational Governance (Risk Management System)</li> </ul>	–	<u>Risk Management</u>	–
	<ul style="list-style-type: none"> <li>Preventing Pollution</li> </ul>	<u>Responding to Environmental Risk</u>		
	<ul style="list-style-type: none"> <li>Information Security (in Japan)</li> </ul>	<u>Our Approach to Information Security</u>	<u>Framework and Guidelines</u>	–
	<ul style="list-style-type: none"> <li>Information Security (Global, Clients)</li> </ul>	<u>Global Activities and Contractor Management</u>		–
	<ul style="list-style-type: none"> <li>Information Security (Protection of Personal Information)</li> </ul>	<u>Activities for Personal Information Protection</u>		
	<ul style="list-style-type: none"> <li>Disaster Response and Business Continuity Plan</li> </ul>	<u>Disaster Countermeasures</u>		

	CSR Activity Fields	Policies/ Regulations	Promotion Structure/ System/ Framework	Initiatives/ Activities Results
Compliance	<ul style="list-style-type: none"> <li>Organizational Governance</li> <li>Respect of Laws and Rules</li> <li>Respect of International Codes of Conduct</li> <li>Moral Behavior</li> </ul>	<u>Compliance</u>		


	CSR Activity Fields	Policies/ Regulations	Promotion Structure/ System/ Framework	Initiatives/ Activities Results
Human Rights	<ul style="list-style-type: none"> <li>Due Diligence</li> </ul>	<u>Compliance</u>		
		<u>Corporate Social Responsibility through the Supply Chain</u>	–	<u>Corporate Social Responsibility through the Supply Chain</u>
	<ul style="list-style-type: none"> <li>Respect of Human Rights</li> <li>Non-discrimination</li> <li>Prevention of Child Labor and Forced Labor</li> <li>Protection of Personal Information</li> </ul>	<u>Respecting Human Rights</u>	–	–

	CSR Activity Fields	Policies/ Regulations	Promotion Structure/ System/ Framework	Initiatives/ Activities Results
Consumer Issues / Product Responsibility	<ul style="list-style-type: none"> <li>• Consumer Safety and Hygiene (Prevention of Defects)</li> <li>• Quality Control</li> </ul>	<u>Ensuring Consistent Quality</u>		
	<ul style="list-style-type: none"> <li>• Universal Design</li> <li>• Access to Essential Services</li> </ul>	<u>Providing Easy-to-Use Products</u>	–	<u>Providing Easy-to-Use Products</u>
	<ul style="list-style-type: none"> <li>• Services and Support for Consumers (Customer Satisfaction)</li> <li>• Handling Complaints</li> </ul>	<u>Increasing Customer Satisfaction</u>		
	<ul style="list-style-type: none"> <li>• Consumer Safety and Hygiene (Response at the Time of Defect)</li> </ul>	<u>Responding to Product-Related Issues</u>		<u>Reporting Major Product Issues (in Japanese only)</u>  <u>Accident Reporting Based on the Consumer Product Safety Act (in Japanese only)</u> 

	CSR Activity Fields	Policies/ Regulations	Promotion Structure/ System/ Framework	Initiatives/ Activities Results
Supply Chain Management	<ul style="list-style-type: none"> <li>• CSR Procurement</li> <li>• Green Procurement</li> <li>• Exclusion of Conflict Minerals</li> <li>• Value Chain Social Responsibility</li> </ul>	<u>Corporate Social Responsibility through the Supply Chain</u>	–	<u>Corporate Social Responsibility through the Supply Chain</u>



	CSR Activity Fields	Policies/ Regulations	Promotion Structure/ System/ Framework	Initiatives/ Activities Results
Labor Practices / Occupational Safety and Health	<ul style="list-style-type: none"> <li>• Employment Practices</li> <li>• Non-discrimination</li> </ul>	<u>Workforce Diversity</u>	–	<u>Workforce Diversity</u>
	<ul style="list-style-type: none"> <li>• Promotion of Diversity (Employment of Elderly and Physically Disabled)</li> </ul>	<u>Workforce Diversity</u>		
	<ul style="list-style-type: none"> <li>• Labor Conditions</li> <li>• Communication between Labor and Management</li> </ul>	–	<u>Creating a Fulfilling Workplace</u>	
	<ul style="list-style-type: none"> <li>• Promotion of Work-life Balance (Combining Child-rearing / Nursing Care and Work)</li> </ul>	<u>Maintaining a Favorable Working Environment</u>		
	<ul style="list-style-type: none"> <li>• Training Human Resources</li> <li>• Career Development Support</li> </ul>	–	<u>Supporting Career Development</u>	
	<ul style="list-style-type: none"> <li>• Labor Safety and Hygiene</li> <li>• Promotion of Health</li> <li>• Mental Healthcare</li> </ul>	<u>Ensuring Occupational Safety &amp; Health</u>		

	CSR Activity Fields	Policies/ Regulations	Promotion Structure/ System/ Framework	Initiatives/ Activities Results
Community	<ul style="list-style-type: none"> <li>• Philanthropic Activities (Community Participation, Education, Creating Employment, Culture, Environmental Preservation, Infrastructure Investment)</li> </ul>	<u>As a Corporate Citizen</u>		
		<u>Philanthropic Activities</u>		

	CSR Activity Fields	Policies/ Regulations	Promotion Structure/ System/ Framework	Initiatives/ Activities Results
The Environment	<ul style="list-style-type: none"> <li>Environmental Management</li> </ul>	<a href="#">Group Environmental Policy</a>	<a href="#">Environmental Management Structure</a>	–
		<a href="#">Environmental Statement: Eco Changes</a>		–
		<a href="#">Environmental Vision 2021</a>		–
		<a href="#">Aiming to Become a Global Leading Green Company</a>		–
		<a href="#">Environmental Risk Management</a>		–
		<a href="#">Important Issues in Environmental Management</a>		<a href="#">Important Issues in Environmental Management</a>
		<a href="#">7th Environmental Plan (Fiscal 2013–2015)</a>		<a href="#">Targets and Achievements of the 7th Environmental Plan (Fiscal 2013–2015)</a>
		<a href="#">8th Environmental Plan (Fiscal 2016–2018)</a>		<a href="#">8th Environmental Plan (Fiscal 2016–2018)</a>
	<ul style="list-style-type: none"> <li>Environmental Audits</li> </ul>	–	<a href="#">Data &amp; Charts in Fiscal 2015</a>	
		–	<a href="#">Environmental Audits</a>	
	<ul style="list-style-type: none"> <li>Environmental Education</li> </ul>	–	<a href="#">Training of Environmental Personnel</a>	
	<ul style="list-style-type: none"> <li>Environmental Communication</li> <li>Stakeholder Engagement</li> </ul>	<a href="#">Disclosure and Dissemination of Environmental Information</a>	<a href="#">Disclosure and Dissemination of Environmental Information</a>	
		–	<a href="#">Biodiversity Picture Book: "Communing with Nature" (in Japanese only)</a> 	
	<ul style="list-style-type: none"> <li>Development of Environment-compatible Products</li> <li>Contributions to Environment through Business</li> <li>CSV</li> </ul>	<a href="#">Product Environmental Data</a>	<a href="#">Product Environmental Data</a>	
		–	<a href="#">Development of Environmental Technologies</a>	
–		<a href="#">The Environment</a>		



			<u>and Business</u>
<ul style="list-style-type: none"> <li>Green Procurement</li> </ul>	<u>Procurement</u>		–
	<u>Biodiversity-Conscious Procurement</u>		–
<ul style="list-style-type: none"> <li>Prevention of Air Pollution</li> <li>Prevention of Water Pollution</li> <li>Prevention of Soil Contamination</li> <li>Management of Chemical Substances</li> </ul>	<u>Managing Chemical Substances</u>	<u>Environmental Management Structure</u>	<u>Managing Chemical Substances</u>
<ul style="list-style-type: none"> <li>Use of Sustainable Resources</li> <li>Reducing Use of Resources</li> <li>Reduction of Waste Emissions</li> <li>Reduction of Water Consumption Recycling</li> </ul>	<u>Reducing Use of Resources</u>		<u>Reducing Use of Resources</u>
	–		<u>Recycling End-of-Life Products</u>
	<u>Initiatives toward Zero Final Waste Disposal Ratio</u>		<u>Initiatives toward Zero Final Waste Disposal Ratio</u>
	<u>Reducing the Use of Disposable Packaging Materials</u>		<u>Reducing the Use of Disposable Packaging Materials</u>
	–		<u>Using Water Effectively</u>
<ul style="list-style-type: none"> <li>Climate Change</li> <li>Reducing CO<sub>2</sub> Emissions</li> <li>Reduction of Greenhouse Gas Emissions (SF<sub>6</sub>, PFC, HFC)</li> </ul>	<u>Reducing Greenhouse Gases Emitted in the Value Chain</u>		<u>Reducing Greenhouse Gases Emitted in the Value Chain</u>
	<u>Reducing CO<sub>2</sub> from Product Usage</u>		<u>Reducing CO<sub>2</sub> from Product Usage</u>
	<u>Expanding Our Contributions to Reducing CO<sub>2</sub> from Product Usage</u>		<u>Expanding Our Contributions to Reducing CO<sub>2</sub> from Product Usage</u>
	<u>Reducing CO<sub>2</sub> from Production</u>		<u>Reducing CO<sub>2</sub> from Production</u>
	<u>Reducing Emissions of Non-CO<sub>2</sub> Greenhouse Gases</u>		<u>Reducing Emissions of Non-CO<sub>2</sub> Greenhouse Gases</u>
	<u>Reducing CO<sub>2</sub> from Logistics</u>		<u>Reducing CO<sub>2</sub> from Logistics</u>
<ul style="list-style-type: none"> <li>Biodiversity Conservation</li> </ul>	<u>Group Biodiversity Action Guidelines</u>		–
	<u>Mitsubishi Electric Outdoor Classroom</u>		<u>Mitsubishi Electric Outdoor Classroom</u>
	<u>"Satoyama"</u>		<u>"Satoyama"</u>

		<u>Woodland Preservation Activities</u>	<u>Woodland Preservation Activities</u>
		<u>Observing and Investigating Biodiversity at Business Sites</u>	<u>Observing and Investigating Biodiversity at Business Sites</u>
		<u>Biodiversity Picture Book: "Communing with Nature" (in Japanese only)</u> 	<u>Biodiversity Picture Book: "Communing with Nature" (in Japanese only)</u> 
		<u>Biodiversity-Conscious Procurement</u>	<u>Biodiversity-Conscious Procurement</u>

	CSR Activity Fields	Policies/Regulations	Promotion Structure/ System/ Framework	Initiatives/ Activities Results
Brand Management	<ul style="list-style-type: none"> <li>• Protection of Company's Intellectual Property Rights</li> <li>• Respect for Intellectual Property Rights of Others</li> <li>• Brand Management</li> </ul>	<u>Protection of Intellectual Property Rights</u> <u>Intellectual Property</u>		

	CSR Activity Fields	Policies/Regulations	Promotion Structure/ System/ Framework	Initiatives/ Activities Results
Innovation Management	<ul style="list-style-type: none"> <li>• Research &amp; Development</li> </ul>	<u>Basic Policy</u>	–	<u>Research &amp; Development</u>
			–	<u>ADVANCE Magazine</u>