for a greener tomorrow

Environmental Report 2015

MITSUBISHI ELECTRIC
Changes for the Better

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Environment

Taking definitive action today, to create a greener world tomorrow.

Looking ahead to our 100th anniversary in the year 2021, we aim to become a global, leading green company. We're working toward the creation of a low-carbon, recycling-based society by applying our wide-ranging and advanced technologies, as well as through ongoing actions by our employees.

From the President

True Dedication to Environmental Management

Chinese language version of the above page:

- 中文

Basic Policy and Approach to Environmental Management

Learn more about our policies, vision and management initiatives as we strive to be a global, leading green company.

- Group Environmental Policy
- Environmental Statement: Eco Changes
- Environmental Vision 2021
- Aiming to Become a Global Leading Green Company
- Environmental Management
- Environmental Plan
- Product Environmental Data
- Procurement
- Creating a Society in Tune with Nature

Environmental Report 2015

- Targets and Achievements of the 7th Environmental Plan (Fiscal 2013-2015)
- Important Issues in Environmental Management
- Environmental Considerations for Value Chain Management
- Data & Charts in Fiscal 2015
- Initiatives toward Creating a Low-Carbon Society
- Initiatives toward Creating a Recycling-Based Society
- Managing Chemical Substances
- Development of Environmental Technologies
- Environmental Communication

Chinese language version of Targets and Achievements of the 7th Environmental Plan:

- 第7次环境计划（2012-2014年度）目标与成果

The Environment and Business

Read about the activities and priority environmental issues of each business group, including key policies, initiatives and the contributions that our long-term strategic products are making to the environment and society.

Environmental Topics

We've highlighted some outstanding examples of leading environmental initiatives for a sustainable society.

- New Energy Potential — A Wireless Sensor Powered by Small Vibrations
- Plastic Recycling Comes of Age
- Tapping into Hidden Deposits of Rare Earth Elements Found in Cities
- Kyoto Works Becomes Home to a Family of Ducks
- Water for Life, Water for Industry
- Archives

Environment Site Map

Use this sitemap for an overall view of our extensive environmental activities.

Environmental Sustainability Report

- Environmental Sustainability Report 2015
- 环境行动报告 2015

CSR Related Information

- About the Report
- Back Issues

Topics

New Energy Potential

In 2012, Mitsubishi Electric Engineering Co., Ltd. developed a sensing system that generates electric power utilizing the minor vibrations.

- New Energy Potential — A Wireless Sensor Powered by Small Vibrations

Recycling Rare Earth Magnets from Air Conditioners

Mitsubishi Electric Group developed a system that can efficiently recover rare earth magnets used in the compressors of household room air conditioners and began recycling this precious commodity.

- Tapping into Hidden Deposits of Rare Earth Elements Found in Cities

Eco Changes: An Introduction

An overview of Eco Changes and how we're helping create a greener tomorrow.

- Watch Video

Features

The information hub for environment-related activities of the Mitsubishi Electric Group.

Discover some of the ways we're changing the environment for the better.

A report detailing Mitsubishi Electric's environmental performance and policies in the past fiscal year. (PDF: 1.72MB)

CSR – About the Report

About the 2015 CSR Report

This report provides information about corporate social responsibility (CSR) initiatives by the Mitsubishi Electric Group to help realize a sustainable society. It primarily reports on significant activities, events and changes that occurred in fiscal 2015 (year ending March 31, 2015). Based on the PDCA (plan-do-check-act) approach, in reporting our activities, we tried to go beyond just presenting our principles and the results of activities to date in order to also refer to future policies and issues.

We endeavor to fulfill our responsibility of presenting information to the public in order to broaden our range of communication with stakeholders. We appreciate any and all frank and honest feedback intended to further improve the report.

Structure of the Report

Aiming to fulfill our responsibility of presenting information to the public, the report consists of and discloses information in four main sections of content: CSR Policy, CSR Report, Environment, and Philanthropic Activities. In particular, the CSR Report section reports on our responsibility and conduct toward stakeholders.

The Environment section introduces our activities grounded in Environmental Vision 2021 and a number of unique initiatives expected of a global, leading green company. It also provides easy-to-understand explanatory animated content about our environmental technologies.

Period Covered by the Report

April 1, 2014 – March 31, 2015

* Also includes some information on policies, targets and plans occurring after the close of fiscal 2015.

Scope of the Report

Social Aspects	Primarily covers activities of Mitsubishi Electric Corporation * The range of data compiled is noted individually.
Environmental Aspects	Covers the activities of Mitsubishi Electric Corporation, 112 domestic affiliates, and 79 overseas affiliates (total of 192 companies). * Click here for details.
Economic Aspects	Primarily covers performance of Mitsubishi Electric Corporation, consolidated subsidiaries, and equity method affiliates * Detailed information on economic performance is provided in the Investor Relations site.

References

- Environmental Reporting Guidelines (2012), Ministry of the Environment
- Business Owner Environmental Performance Indicator Guideline (2002), Ministry of the Environment
- Environmental Accounting Guidelines (2005), Ministry of the Environment
- Environmental Reporting Guidelines 2001—With Focus on Stakeholders, Ministry of Economy, Trade and Industry
- Sustainability Reporting Guidelines Version 3.1, Version4, Global Reporting Initiative

Regarding Future Projections, Plans and Targets

This report contains not only statements of past and present fact related to Mitsubishi Electric Corporation and its affiliates (Mitsubishi Electric Group), but also future projections, plans, targets and other forward-looking statements. Such projections, plans and targets constitute suppositions or judgments based on information available as of the time they are stated. Future business activities and conditions may differ from projections, plans and targets due to changes in various external factors.

The Mitsubishi Electric Group conducts business in the form of development, manufacturing and sales in a broad range of areas, and these activities take place both in Japan and overseas. Therefore, the group's financial standing and business performance may be affected by a variety of factors, including trends in the global economy, social conditions, laws, tax codes, litigation and other legal procedures, etc. We would ask readers to keep these points in mind when reviewing this report.

Environment – From the President

Leveraging a wide range of products, we're contributing to solutions for environmental issues such as climate change

In the Mitsubishi Electric Group, we are practicing environmental management with the intention of becoming a global leading green company. However, simply setting a goal means nothing. To receive proper recognition from society, we must maintain our commitment to delivering products and services that simultaneously contribute to ensuring secure, safe, and comfortable lifestyles and a sustainable global environment.

Specifically, climate change is a major threat to maintaining a sustainable global environment. As a countermeasure, countries around the world are introducing initiatives to realize a low-carbon society that produces minimal greenhouse gases. Suppressing the use of electricity consumption is one of the most effective measures to achieve this.

While continuing to meet societal needs for secure, safe, and comfortable lifestyles, we are developing and introducing products and solutions that offer high energy-saving performance. From the generation of electricity to its transmission and application, Mitsubishi Electric manufactures a wide variety of products and possesses technologies that optimize systems utilizing them. Therefore, we are confident that we can provide effective energy-saving solutions in all aspects of society and contribute to the realization of a sustainable global environment.

We believe that conducting business activities as part of our efforts to become a global leading green company will lead the Group to achieving its growth targets of ¥5 trillion yen or more in consolidated sales and 8% or more in operating margins by Fiscal 2021.

Driving forward the 8th Environmental Plan in line with the three pillars of Environmental Vision 2021

Environmental Vision 2021 is the corporate vision introduced to achieve environmental targets by the year that Mitsubishi Electric celebrates the 100th anniversary of its foundation. The main initiatives are based on three pillars: namely, a low-carbon society, a recycling-based society, and respecting biodiversity. In line with these three pillars, Mitsubishi Electric's 8th Environmental Plan (Fiscal 2016–2018) began in April 2015. It is characterized by the following points:

We are reducing the amount of CO_2 emitted when products are used by developing highly energy-efficient products as part of efforts toward realizing a low-carbon society. In particular, we are promoting improvements in the efficiency of motors, which account for nearly half of the electricity consumed in society. We are also expanding the use of silicon carbide (SiC) in power semiconductors, which are used for control devices in motor drives, as SiC has been proven to have extremely low power loss. As for reducing the amount of CO_2 emitted during production, in line with global trends to realize higher efficiency, we have introduced objective management to reduce greenhouse gases by simultaneously controlling the CO_2 generated from energy sources and other greenhouse gases.

To realize a recycling-based society, Mitsubishi Electric is developing recycling businesses utilizing its unique technologies, such as recycling the plastics used in electrical appliances for the home and the recovery of a rare metal from air-conditioning compressors. We are also promoting the cyclic use of production wastes.

Regarding respecting biodiversity, consideration is required during daily business activities. Therefore, in addition to encouraging everyone at our Group sites to improve their awareness, each site is developing communications with local communities and stakeholders in order to preserve local ecosystems.

Strengthening our environmental response at the global level

In order to achieve the growth targets set for fiscal 2021, production at our overseas bases is expected to expand. Accordingly, the 8th Environmental Plan addresses strengthening environmental response at the global level as a common issue for the Mitsubishi Electric Group as a whole.

It goes without saying that preventing environmental accidents is the responsibility of the company, and advanced environmental risk management is required in every region throughout the world. In addition to establishing an environmental management system, it is important to ensure that the company can react appropriately to any accident and minimize damage, and periodically test the response system to ensure that it is operational.

In addition, the reduction of environmental load generated at the time of production should be pursued at the global level. A high level of Mitsubishi Electric expertise developed in Japan is expected to be vital for this. Depending on the region, we may set voluntary standards that are more stringent than local environmental laws in order to keep our performance under control.

Trees bear dense foliage only if they have solid roots and trunks with outreaching branches. Similarly, improving corporate performance and growth should follow steady environmental management activities. We are targeting a higher level of growth as we reduce environmental load and contribute to building a sustainable society.

June 29, 2015

Masaki Sakuyama
President & CEO

Environment – Environmental Report 2015

Targets & Achievements of the 7th Environmental Plan (Fiscal 2013-2015)

An overview and self-evaluation of progress and achievements made by the Mitsubishi Electric Group in fiscal 2014 in comparison to the targets set out in the 7th Environmental Plan.

Chinese language version of the above page:

- 第7次环境计划（2012-2014年度）目标与成果

Important Issues in Environmental Management

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

Environmental Considerations for Value Chain Management

A list of initiatives for each process in the value chain.

Data & Charts in Fiscal 2015

- Period and Scope of the Report
- Material Balance
- Environmental Accounting
- Environmental Performance Data
- Awards

Chinese language version of two of the above pages:

- 关于报告期间与范围
- 物料衡算

Initiatives toward Creating a Low-Carbon Society

- Reducing Greenhouse Gases Emitted in the Value Chain
- Reducing CO_2 from Product Usage
- Expanding Our Contributions to Reducing CO_2 from Product Usage
- Reducing CO_2 from Production
- Reducing Emissions of Non-CO_2 Greenhouse Gases
- Reducing CO_2 from Logistics

Initiatives toward Creating a Recycling-Based Society

- Reducing Use of Resources
- Recycling End-of-Life Products
- Initiatives toward Zero Final Waste Disposal Ratio
- Reducing the Use of Disposable Packaging Materials
- Using Water Effectively

Managing Chemical Substances

Report on the status of chemical substance management under our own Chemical Substance Management System.

Development of Environmental Technologies

Overview of the results of R&D activities for products and services that contribute to environmental conservation.

Environmental Communication

- Disclosure and Dissemination of Environmental Information
- Mitsubishi Electric Outdoor Classroom

Environment – Targets and Achievements of the 7th Environmental Plan (Fiscal 2013–2015)

Targets and Achievements of the 7th Environmental Plan (Fiscal 2013–2015)

- Overview of the 7th Environmental Plan here

 Very good  Good  Almost there  More effort needed

Initiatives Toward Creating a Low-Carbon Society

Reducing CO_2 emissions from production					
Targets of 7th Environmental Plan (Fiscal 2013–2015)	Fiscal 2013	Fiscal 2014	fiscal 2015		
	Results	Results	Target	Results	Self-evaluation
Improve CO_2 emissions per unit of sales to 83% in comparison to fiscal 2011 (▲17%)	96%	90%	83%	87%	

Reducing non-CO_2 greenhouse gases		
Targets of 7th Environmental Plan (Fiscal 2013–2015)	Progress in fiscal 2015	Self-evaluation
Reduce non-CO_2 greenhouse gases (SF_6, PFC, HFC) by 70% in comparison to fiscal 2006	Reduced 79%	

Contribution to reducing CO_2 emissions from product usage		
Targets of 7th Environmental Plan (Fiscal 2013–2015)	Progress in fiscal 2015	Self-evaluation
Reduce CO_2 emissions from product usage by improving product performance: average reduction rate for 84 products: 27%* *Weighted average calculation of all relevant products.	Average reduction rate 33% for 107 products	
Increase amount of contribution to reducing CO_2 emissions from product usage	Contributed to reducing by 78,360,000 tons for 124 products	

Initiatives Toward Creating a Recycling-Based Society

Final disposal ratio			
Targets of 7th Environmental Plan (Fiscal 2013–2015)		Progress in fiscal 2015	Self-evaluation
Mitsubishi Electric	Less than 0.1%	0.001%	
Affiliates (Japan)	Less than 0.1%	0.07%	
Affiliates (Overseas)	Less than 1.0%	0.87%	

Reducing use of resources		
Targets of 7th Environmental Plan (Fiscal 2013–2015)	Progress in fiscal 2015	Self-evaluation
In comparison to fiscal 2001, average reduction rate for 64 products: 39%	Average reduction rate 39% for 64 products	

Strengthening Our Environmental Management Foundation

Prevention of environmental accidents		
Targets of 7th Environmental Plan (Fiscal 2013–2015)	Progress in fiscal 2015	Self-evaluation
Prevention of environmental accidents	0 environmental accidents	

Reduction of environmental liabilities		
Targets of 7th Environmental Plan (Fiscal 2013–2015)	Progress in fiscal 2015	Self-evaluation
Appropriate storage and treatment of PCB waste and devices containing PCB	Completed disposal of 525 units as planned	
Purification of groundwater and soil contamination	Evaluated research results and land usage and soil/ groundwater conditions for a total of 21 cases (17 cases at Mitsubishi Electric and 4 cases at affiliates), all of which were confirmed to have responded appropriately.	

Training of environmental personnel		
Targets of 7th Environmental Plan (Fiscal 2013–2015)	Progress in fiscal 2015	Self-evaluation
Training of key environmental personnel	Carried out training for new people in charge of environmental promotion business in Japan and people in charge of environmental promotion in Thailand and China. Total of 81 people attended classes.	
Promotion of environmental awareness and harmony with the community and nature	Held Mitsubishi Electric Outdoor Classroom 35 times in 32 areas, and fostered 50 outdoor classroom leaders Successfully conducted the Satoyama Woodland Preservation Project in 16 areas.	

Publicity and advertising about environmental contribution		
Targets of 7th Environmental Plan (Fiscal 2013–2015)	Progress in fiscal 2015	Self-evaluation
Publicity and advertising about environmental contribution	Continued to disclose environmental information on websites and in brochures. Expanded environmental communication around the world. Continued corporate advertisement series (Global eco changes) to announce our cutting-edge environmental technologies and products worldwide.	

Expanding Environment-Related Businesses

Expansion of environment–related businesses		
Targets of 7th Environmental Plan (Fiscal 2013–2015)	Progress in fiscal 2015	Self-evaluation
Expansion of environment-related businesses	Based on growth strategy, expanded the scale of products that contribute to realizing a low-carbon society and creating a recycling society in all businesses.	

Creation of products with highly innovative environmental features		
Targets of 7th Environmental Plan (Fiscal 2013–2015)	Progress in fiscal 2015	Self-evaluation
Creation of products with highly innovative environmental features: have each business unit select one or more products	In B-to-C products sector, our room air conditioners were presented the top Energy-saving Award, and in the B-to-B products sector, one of our industrial motors was presented an award for Excellent Energy-saving Equipment. Each business group continued to work on innovative product development.	

7th Environmental Plan Overview

Aiming to maintain the image of a global environmentally advanced company and progressively achieving the objectives of Environmental Vision 2021, through the 7th Environmental Plan the Mitsubishi Electric Group strengthened its initiatives to expand the amount of contribution to reducing CO_2 for both production and product usage.

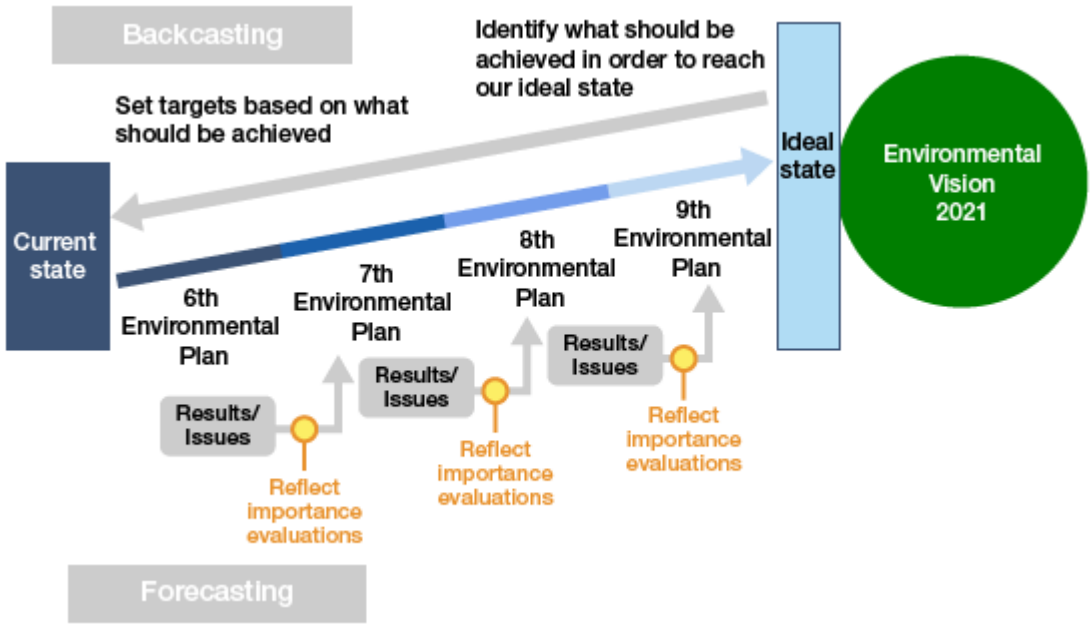
As a result, CO_2 emission during product usage was reduced an average of 33% compared to fiscal 2001, a steady improvement following on the results of 26% reduction reported for the 6th Environmental Plan. The contribution to reduction in product usage was calculated to be 78,360,000 tons, which is equal to 80 times the emissions from production.

In the 8th Environmental Plan implemented from April 2015, proactively aiming to reliably achieve the objectives of Environmental Vision 2021, the Mitsubishi Electric Group has clarified the issues regarding the realization of a low-carbon society, a recycling society, and a society in tune with nature, and will continue to make the utmost effort to resolve each and every one of these issues.

Environment – Important Issues in Environmental Management

Environmental Plan and Environmental Vision 2021

The Mitsubishi Electric Group prepares an environmental plan every three years. Every item (target) in the plan is geared towards achieving the goals of Environmental Vision 2021, which is based on three pillars: "creating a low-carbon society," "creating a recycling-based society" and "respecting biodiversity and fostering environmental awareness." Targets are set using both backcasting and forecasting based on the achievements and issues of the previous environmental plan. In this way, throughout the plan drafting process, we evaluate both "importance to society" and "importance to the Mitsubishi Electric Group.



Environmental Initiatives and Indicators Based on the Environmental Plan

In the 7th Environmental Plan (fiscal 2013~2015), management items accompanied by numerical targets include "reducing CO_2 emissions from production," "reducing non-CO_2 greenhouse gases," "initiatives toward zero final waste disposal ratio," "reducing CO_2 from product usage" and "reducing the influx of resources." These five items are set from the perspectives of management and environmental impact. Of these items, we view reducing CO_2 emissions from production and from products and services, which relate to mitigating the environmental impact that contributes to climate change, as high-priority indicators for business activities in terms of both importance and frequency.

Our management approach for each environmental aspect of the Global Reporting Initiative (GRI) Guidelines Ver. 4 (G4) and explanations corresponding to each aspect (details page) are shown in the table below.

G4 environmental aspect and management approach	Indicators	
Materials	G4-EN1	MATERIALS USED BY WEIGHT OR VOLUME
	G4-EN2	PERCENTAGE OF MATERIALS USED THAT ARE RECYCLED
In business activities and transportation at factories and offices, the Mitsubishi Electric Group procures and uses various common/rare metals, petroleum-derived resins, electric energy, fuel, water and wood resources. For effective utilization towards preventing the depletion of limited resources, high priority is given to reducing the influx of resource and promoting initiatives to realize zero final waste disposal ratio (maximum reuse of waste generated from production), as well as managing these initiatives with respective numerical targets.		
Energy	G4-EN3	ENERGY CONSUMPTION WITHIN THE ORGANIZATION
	G4-EN4	ENERGY CONSUMPTION OUTSIDE OF THE ORGANIZATION

	G4-EN5	ENERGY INTENSITY
	G4-EN6	REDUCTION OF ENERGY CONSUMPTION
	G4-EN7	REDUCTIONS IN ENERGY REQUIREMENTS OF PRODUCTS AND SERVICES

Electricity is the main form of energy used in the production activities of the Mitsubishi Electric Group. In processes that directly use heat energy, we also use fuels such as gas and petroleum. To prevent the depletion of energy resources, efforts are underway to improve the energy consumption efficiency of production lines and utilities. We're also expanding the introduction of demand management and photovoltaic power generation in order to reduce consumption.

To reduce energy consumption during product usage, we're developing products high in energy efficiency and focusing on increasing their use throughout society. In area of transportation (i.e., sales distribution), by improving loading ratios that enable us to reduce the number of trucks on the road, we are making progress in reducing energy consumption.

- Through improving energy consumption efficiency and reducing consumption, we are working to reduce CO_2 emissions. The Mitsubishi Electric Group uses "CO_2 emissions per unit of sales" as an important indicator. For details, please see "Emissions."

Water	G4-EN8	TOTAL WATER WITHDRAWAL BY SOURCE
	G4-EN9	WATER SOURCES SIGNIFICANTLY AFFECTED BY WITHDRAWAL OF WATER
	G4-EN10	PERCENTAGE AND TOTAL VOLUME OF WATER RECYCLED AND REUSED

Management Approach

The water used by the Mitsubishi Electric Group is mainly tap water, industrial-use water and groundwater. As well as understanding the usage status at all sites, we practice the 3Rs (reduce, reuse, recycle) for water and are promoting greater awareness of water stress (i.e., strained water supply/demand conditions) at production sites in Japan and overseas. Regarding the water footprint of products, including the stages of procurement, production and product usage, the possibility of excessive use of water in regions in Japan and overseas has not been verified by the Mitsubishi Electric Group.

Biodiversity	G4-EN11	OPERATIONAL SITES OWNED, LEASED, MANAGED IN, OR ADJACENT TO, PROTECTED AREAS AND AREAS OF HIGH BIODIVERSITY VALUE OUTSIDE PROTECTED AREAS
	G4-EN12	DESCRIPTION OF SIGNIFICANT IMPACT OF ACTIVITIES, PRODUCTS, AND SERVICES ON BIODIVERSITY IN PROTECTED AREAS AND AREAS OF HIGH BIODIVERSITY VALUE OUTSIDE PROTECTED AREAS
	G4-EN13	HABITATS PROTECTED OR RESTORED
	G4-EN14	TOTAL NUMBER OF IUCN RED LIST SPECIES AND NATIONAL CONSERVATION LIST SPECIES WITH HABITATS IN AREAS AFFECTED BY OPERATIONS, BY LEVEL OF EXTINCTION RISK

The Mitsubishi Electric Group does not mine, harvest, cultivate or produce raw materials, and therefore does not directly destroy forests or ecosystems. Our production sites have not been verified to have any significant influence in terms of either scale or frequency. This is because our long-standing factory operations in Japan have been coexisting harmoniously with the natural environment for several decades, and because none of our factories in urban areas are in close proximity to areas of high biodiversity value. Production sites overseas are located in industrial complexes, and there are no plans to newly develop production sites requiring large areas.

We have taken action by preparing the Biodiversity Action Guidelines. To ensure that biodiversity is considered in all of our business activities, these guidelines include the pledge of every Mitsubishi Electric Group employee to understand the relationship between business activities and biodiversity.

Emissions	G4-EN15	DIRECT GREENHOUSE GAS (GHG) EMISSIONS (SCOPE 1)
	G4-EN16	ENERGY INDIRECT GREENHOUSE GAS (GHG) EMISSIONS (SCOPE 2)
	G4-EN17	OTHER INDIRECT GREENHOUSE GAS (GHG) EMISSIONS (SCOPE 3)
	G4-EN18	GREENHOUSE GAS (GHG) EMISSIONS INTENSITY

	G4-EN19	REDUCTION OF GREENHOUSE GAS (GHG) EMISSIONS
	G4-EN20	EMISSIONS OF OZONE-DEPLETING SUBSTANCES (ODS)
	G4-EN21	NOx, SOx AND OTHER SIGNIFICANT AIR EMISSIONS

Operations of the Mitsubishi Electric Group emit four types of greenhouse gases through business activities: CO_2, sulfur hexafluoride (SF_6), perfluorocarbons (PFCs) and hydrofluorocarbons (HFCs). Reducing the emission of these gases is managed through the use of numerical targets. For CO_2 in particular, we are working to reduce emissions through energy-saving activities for production lines and utilities, and increasing the use of renewable energy systems in the form of photovoltaic power generation. Here, "CO_2 emissions per unit of sales" is used as an important indicator. The Mitsubishi Electric Group invests 0.15% of its sales every fiscal year to reduce CO_2 emissions generated during production.

For greenhouse gases emitted upstream and downstream outside of business activities, we are working to reduce emissions generated at the time of product usage and during transportation (sales distribution). The CO_2 emitted when products are being used is dozens to hundreds of times greater than that emitted during production processes. Therefore, developing and disseminating products high in energy efficiency generates a mitigating effect. This is also part of the Mitsubishi Electric Group's growth strategy, where we are using the "average reduction ratio of CO_2 from product usage" as an important indicator. In the area of sales distribution, we are reducing the number of trucks used by improving loading capacity and moving ahead with modal shift initiatives.

Substances that cause atmospheric pollution, including nitrogen oxide (NOx), sulfur oxide (SOx), volatile organic compounds (VOCs) and dust/soot, are being managed on the basis of legal compliance.

Effluents and Waste	G4-EN22	TOTAL WATER DISCHARGE BY QUALITY AND DESTINATION
	G4-EN23	TOTAL WEIGHT OF WASTE BY TYPE AND DISPOSAL METHOD
	G4-EN24	TOTAL NUMBER AND VOLUME OF SIGNIFICANT SPILLS
	G4-EN25	WEIGHT OF TRANSPORTED, IMPORTED, EXPORTED OR TREATED WASTE DEEMED HAZARDOUS UNDER THE TERMS OF THE BASEL CONVENTION 2ND MEETING ANNEX I, II, III, AND VII, AND PERCENTAGE OF TRANSPORTED WASTE SHIPPED INTERNATIONALLY
	G4-EN26	IDENTITY, SIZE, PROTECTED STATUS AND BIODIVERSITY VALUE OF WATER BODIES AND RELATED HABITATS SIGNIFICANTLY AFFECTED BY THE ORGANIZATION'S DISCHARGE OF WATER AND RUNOFF

The Mitsubishi Electric Group conducts thorough management in accordance with local laws and regulations in Japan and overseas to ensure that the water it discharges doesn't cause pollution or damage to the ecosystem and people's lives and cultures due to chemical substances, chemical/nutritional load or suspended solids. If an individual improvement issue arises at a business site, the site is subjected to continual improvement measures within an individual environmental management program. The total volume of water discharged is being minimized by increasing the water recycling ratio.

In order to minimize the final disposal volume of waste, the Mitsubishi Electric Group conducts thorough waste analysis and separation (conversion to valuable resources), exploits waste disposal contractors, works to improve waste transportation efficiency, and has set "final disposal ratio" as an important indicator. Furthermore, in order to prevent waste-based pollution and end-of-life home appliance disposal issues, we ensure strict legal compliance and are taking steps to introduce an electronic manifest system.

Products and Services	G4-EN27	EXTENT OF IMPACT MITIGATION OF ENVIRONMENTAL IMPACTS OF PRODUCTS AND SERVICES
	G4-EN28	PERCENTAGE OF PRODUCTS SOLD AND THEIR PACKAGING MATERIALS THAT ARE RECLAIMED BY CATEGORY

To reduce the environmental impact of its product and services, the Mitsubishi Electric Group promotes Design for Environment activities based on product assessments derived from three perspectives: "effective use of resources," "efficient use of energy" and "avoidance of substances that are particularly

harmful to the environment."
Effective use of resources is an initiative linked to reducing the amount of resources introduced (see "Materials" aspect). Efficient use of energy is an initiative linked to reducing CO_2 emissions resulting from product usage (see "Energy" and "Emissions" aspects).
Avoidance of substances that are particularly harmful to the environment is an initiative linked to preventing atmospheric, water and soil pollution and preserving biodiversity (see "Biodiversity," "Emissions" and "Effluents and Waste" aspects).

Regarding products, in order to design easily recyclable products, we hold Design for Environment technical seminars, which provide an opportunity for feedback on product design. We also develop technologies for recovering and sorting materials, as well as technologies for utilizing recycled materials. End-of-life products recovered under Japan's Home Appliance Recycling Law are processed appropriately and recycled at a Group company.
Regarding packaging, to reduce transportation packaging, we're promoting the use of simpler packaging, expanding the application of returnable containers and packaging, and recycling used packaging.

Compliance	G4-EN29	MONETARY VALUE OF SIGNIFICANT FINES AND TOTAL NUMBER OF NON-MONETARY SANCTIONS FOR NON-COMPLIANCE WITH ENVIRONMENTAL LAWS AND REGULATIONS

To ensure there are no environmental accidents or violations of environmental laws and regulations, we aim to ensure that employees understand and are aware of related laws and regulations. This includes sharing information about recent trends as well as about causes and countermeasures for even the smallest of mistakes. We also conduct regular equipment inspections. At all sites where PCB waste is stored or devices containing PCB are used, inspection/verification of storage/usage conditions is carried out at least once a year together with planning for disposal.

Transport	G4-EN30	SIGNIFICANT ENVIRONMENTAL IMPACT OF TRANSPORTING PRODUCTS AND OTHER GOODS AND MATERIALS FOR THE ORGANIZATION'S OPERATIONS, AND TRANSPORTING MEMBERS OF THE WORKFORCE

The Mitsubishi Electric Group procures raw materials globally, but has not formed a large-scale supply/distribution network for products. Therefore, significant environmental impact as the result of transportation (distribution) has not been verified.

- For energy consumption and CO_2 emissions from transportation (distribution) and reducing the use of packaging materials, please see "Energy," "Emissions" and "Products and Services."

Overall	G4-EN31	TOTAL ENVIRONMENTAL PROTECTION EXPENDITURES AND INVESTMENTS BY TYPE

Regarding total environmental protection expenditures, based on the "Environmental Accounting Guidelines 2005" produced by the Japanese Ministry of the Environment, a summary of environmental capital investment, environmental costs and environmental R&D costs is calculated and announced each year.

Supplier Environmental Assessment	G4-EN32	PERCENTAGE OF NEW SUPPLIERS THAT WERE SCREENED USING ENVIRONMENTAL CRITERIA
	G4-EN33	SIGNIFICANT ACTUAL AND POTENTIAL NEGATIVE ENVIRONMENTAL IMPACT IN THE SUPPLY CHAIN AND ACTIONS TAKEN

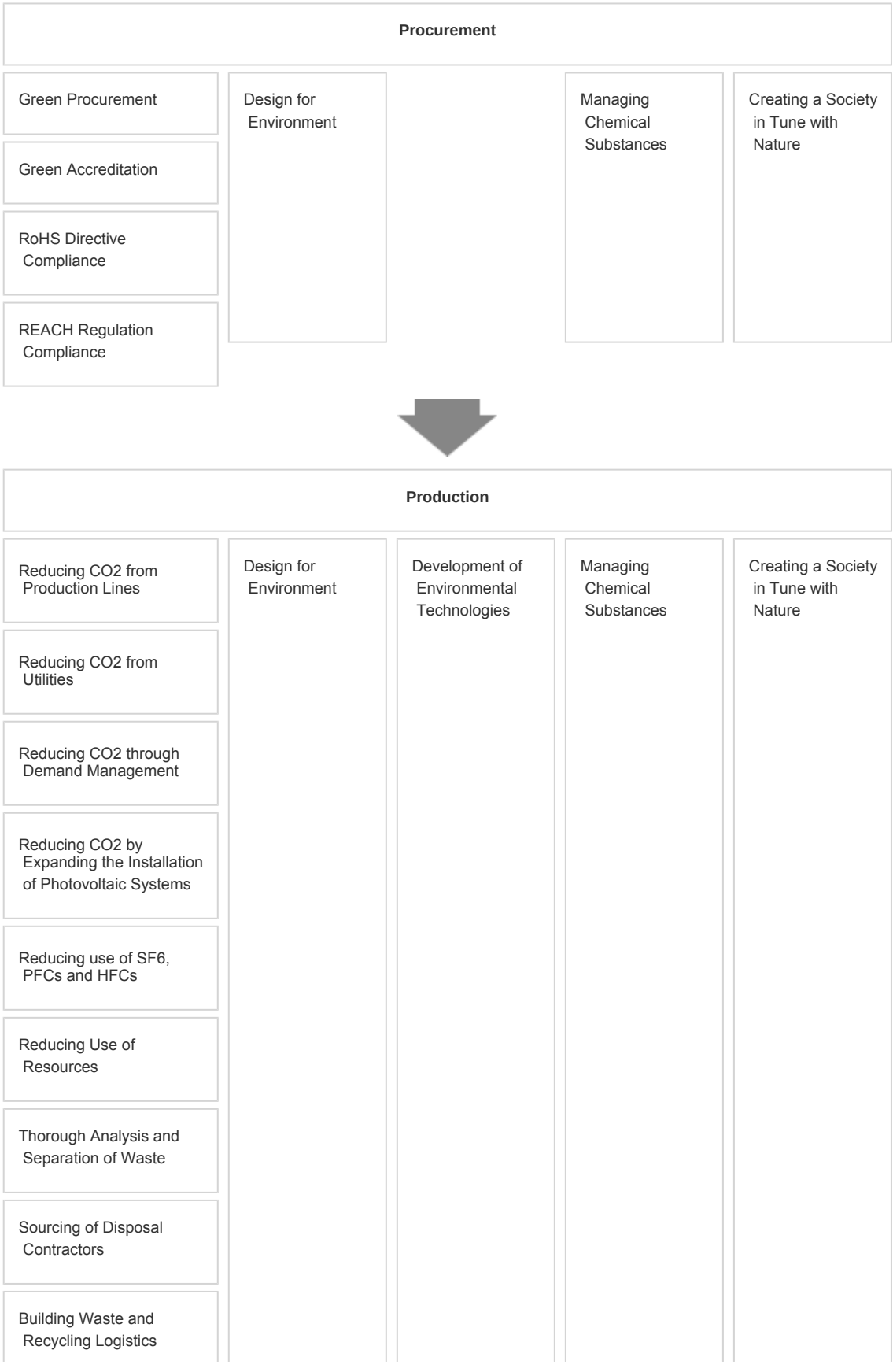
To prevent and mitigate negative environmental impact in supply chains, based on the Green Procurement Standards Guide, the Green Accreditation system was implemented in April 2006 to evaluate our suppliers. A green accreditation rate of 100% is being maintained.

Environmental Grievance Mechanisms	G4-EN34	NUMBER OF GRIEVANCES ABOUT ENVIRONMENTAL IMPACT FILED, ADDRESSED, AND RESOLVED THROUGH FORMAL GRIEVANCE MECHANISMS

Environmental grievances are processed through the Corporate Environmental Sustainability Group.

Environment – Environmental Considerations for Value Chain Management

The Mitsubishi Electric Group promotes various countermeasures that are contributing to the realization of a sustainable society. Examples include initiatives such as reducing greenhouse gas emissions, efficiently using resources, preventing environmental pollution and respecting biodiversity in each process of the value chain, from procurement, manufacturing and delivery to use and disposal/recycling. For a more detailed explanation, click on one of the initiatives listed below.



Systems That Eliminate Wastefulness				
Promoting Water Conservation and Water Recycling				

Delivery

Reducing the Number of Trucks by Improving Load Ratios	Design for Environment	Development of Environmental Technologies		Creating a Society in Tune with Nature
Switching to Rail Transport (modal shift)				
Reducing the Use of Disposable Packaging Materials				

Use

Reducing CO2 from Product Usage through Improved Product Performance	Design for Environment	Development of Environmental Technologies		Creating a Society in Tune with Nature
Expanding Our Contributions to Reducing CO2 from Product Usage				

Disposal/Recycling

Recycling End-of-Life Products	Design for Environment	Development of Environmental Technologies		Creating a Society in Tune with Nature
Promoting the Recycling of Large-scale/High-purity Plastics				
Promoting the Recovery and Recycling of Rare Earth Metals Used by Magnet Manufacturers				

The following page lists the materials balance for the value chain:

Environment: Material Balance

The following page lists the greenhouse gas emissions for the value chain:

Environment: Value Chain Greenhouse Gas Emissions

Environment – Data & Charts in Fiscal 2015

Period and Scope of the Report

Overview of reporting period and scope.

Chinese language version of the above page:

- 关于报告期间与范围

Material Balance

Overview of reporting period and scope.

Chinese language version of the above page:

- 物料衡算

Environmental Accounting

Report on fiscal 2015 totals, calculated under the Environmental Accounting Guidelines (fiscal 2006 edition) issued by Japan's Ministry of the Environment.

Environmental Performance Data

Data on the results of fiscal 2015 activities, examples of domestic and overseas activities related to respecting biodiversity, and participation in exhibitions and events.

Awards

Awards received in Japan and overseas.

Environment – Period and Scope of the Report

Basic Policy and Approach to Environmental Management / Period and Scope of Environmental Report 2015

The report on the 7th Environmental Plan (fiscal 2013 to fiscal 2015) defines important points and substantiates measures based on both the backcasting approach toward achieving Environmental Vision 2021 and the forecasting approach, to express the past progress of environmental plans. Using the PDCA (plan-do-check-act) cycle, the report discusses the targets, activities, and results achieved in fiscal 2015. While some activities reported are not included in the 7th Environmental Plan, we have included these because we believe they are definitely required to achieve a sustainable society. The report ensures that the PDCA cycle for these activities is also understood. The period and scope of the report are noted below.

Period Covered by the Report

April 1, 2014 – March 31, 2015

* Also includes some information on policies, targets, and plans occurring after the close of fiscal 2016.

Scope of the Report

Covers the activities of Mitsubishi Electric Corporation, 112 affiliates in Japan, and 79 overseas affiliates (total of 192 companies).

* Until fiscal 2009, the scope of the report focused on Group companies that had drawn up an environmental plan to ensure a scope of systematic governance from an environmental conservation standpoint. Based on the expanding nature of global environmental management, however, the scope was extended to Mitsubishi Electric Corporation and its major affiliated companies.

Contact Us About the Report

We endeavor to fulfill our responsibility of presenting information to the public in order to broaden our range of communication with stakeholders. We appreciate any and all frank and honest feedback intended to further improve the report.

Inquiries: Click here to send an inquiry

Environment – Material Balance

Overall Environmental Impact

Period: April 1, 2014 - March 31, 2015
Scope of Data Compilation : Mitsubishi Electric Corporation, 112 affiliates in Japan and 79 overseas affiliates (total of 192 companies)

* Up to fiscal 2009, the scope of our report was limited to those companies that had drawn up an environmental plan for governance from an environmental conservation perspective. However, under the policy of expanding global environmental management, we have broadened the scope of the report to cover Mitsubishi Electric, its consolidated subsidiaries, and its affiliated companies.

IN

Materials for Manufacturing				
		Mitsubishi Electric	Affiliates (Japan)	Affiliates (Overseas)
Materials *1		390,000 tons	90,000 tons	320,000 tons
Manufacturing				
Electricity		105 million kWh	330 million kWh	350 million kWh
Natural gas		24,730,000 m3	2,290,000 m3	10,330,000 m3
LPG		1,724 tons	2,121 tons	606 tons
Oil (crude oil equivalent)		3,527 kl	2,685 kl	1,616 kl
Water		7,700,000 m3	1,600,000 m3	1,920,000 m3
	Public water	1,310,000 m3	440,000 m3	640,000 m3
	Industrial water	2,450,000 m3	240,000 m3	1,080,000 m3
	Groundwater	3,940,000 m3	920,000 m3	20,000 m3
	Others	0 m3	0 m3	180,000 m3
Reuse of water		3,280,000 m3	1,330,000 m3	160,000 m3
Controlled chemical substances (amounts handled)		6,107 tons	1,996 tons	5,339 tons
	Ozone depleting substances (amounts handled)	2.8 tons	155 tons	1,088 tons
	Greenhouse gases (amounts handled)	3,255 tons	45 tons	3,808 tons
	Volatile organic compounds (amounts handled)	1,468 tons	1,469 tons	245 tons

*1 Materials: Total value for shipping weight of "Design for the Environment" (DfE) products, plus amount of product packaging materials used, plus total amount of waste.

Emissions (From Manufacturing)				
		Mitsubishi Electric	Affiliates (Japan)	Affiliates (Overseas)
Discharge into water	Water	6,780,000 m3	1,200,000 m3	1,370,000 m3
	Controlled chemical substances	9.6 tons	0.0 tons	34.0 tons
	BOD (biological oxygen demand)	76.5 tons	7.8 tons	24.6 tons
	COD (chemical oxygen demand)	7.4 tons	4.3 tons	42.8 tons
	Nitrogen	43.7 tons	13.0 tons	6.0 tons
	Phosphorus	2.5 tons	0.2 tons	0.7 tons
	Suspended solids	63 tons	3.2 tons	26.5 tons
	n-hexane extracts (mineral)	1 tons	0.2 tons	0.0 tons
	n-hexane extracts (active)	2.3 tons	0.2 tons	0.0 tons
	Total emissions of zinc	0.2 tons	0.0 tons	0.1 tons
Emissions into the atmosphere	Carbon dioxide(CO_2)	513,000 tons–CO_2	162,000 tons–CO_2	284,000 tons–CO_2
	Controlled chemical substances (excluding amounts contained in other waste)	418. 6 tons	198.0 tons	234.0 tons
	Ozone depleting substances	0.0 ODP tons	0.0 ODP tons	0.9 ODP tons
	Greenhouse gases	75,000 tons–CO_2	43,000 tons–CO_2	148,000 tons–CO_2
	Volatile organic compounds	515.8 tons	333.5 tons	26.4 tons
	Sulfur oxide (SOx)	0.4 tons	0.4 tons	5.0 tons
	Nitrogen oxide (NOx)	11.0 tons	3.4 tons	23.0 tons
	Fly ash	0.6 tons	0.8 tons	8.0 tons
Amount of CFCs recovered		3.6 tons	237.1 tons	—
Waste				
Total waste emissions		90,043 tons	64,152 tons	69,673 tons
Amount recycled		80,726 tons	52,452 tons	65,818 tons
Waste treatment subcontracted out		20,638 tons	54,583 tons	66,485 tons
Final disposal		1 tons	48 tons	606 tons
In-house weight reduction		921 tons	0 tons	736 tons
Products				
Weight of all "DfE" Products sold *2		248,000 tons	13,000 tons	116,000 tons
Weight of packaging materials		53,000 tons	8,000 tons	131,000 tons

*2 Products sold: Shipping weight of "Design for the Environment" (DfE) products.

Logistics

IN

Sales and Logistics *3			
	Mitsubishi Electric	Affiliates (Japan)	Affiliates (Overseas)
Fuel for trucks (gasoline)	10,377 kl	1,539 kl	12 kl
Fuel for trucks (diesel)	27,412 kl	4,997 kl	17,717 kl
Fuel for rail (electricity)	1,832 Mwh	411 Mwh	0 Mwh
Fuel for marine transport (bunker oil)	303 kl	0 kl	73,251 kl
Fuel for air transport (jet fuel)	703 kl	43 kl	33,726 kl

*3 Sales and logistics: Figures for overseas affiliated companies include transportation between countries.

OUT

Emissions *4			
	Mitsubishi Electric	Affiliates (Japan)	Affiliates (Overseas)
Carbon dioxide (CO_2)	98,000 tons–CO_2	17,000 tons–CO_2	343,000 tons–CO_2

*4 Emissions: Includes one sales company in Japan. Figures for overseas affiliated companies include transportation between countries.

Products (Customer)

IN

Energy Consumption			
	Mitsubishi Electric	Affiliates (Japan)	Affiliates (Overseas)
Energy consumed during product use *5	38,200 million kWh	4,500 million kWh	23,400 million kWh

*5 Energy consumed during product use: Total energy consumed (estimated value) when using 90 finished products targeted for CO_2 reduction.
The length of use (operating time) is set for each product according to statutory useful life, designed service life, statistical values, etc.

OUT

Emissions			
	Mitsubishi Electric	Affiliates (Japan)	Affiliates (Overseas)
Amount of CO_2 emitted during product use (converted value) *6	19,470,000 tons-CO_2	2,250,000 tons-CO_2	13,920,000 tons-CO_2
Amount of SF_6 emitted during product use (corresponding value) *7	104,000 tons-CO_2	—	—

*6 Amount of CO_2 emitted during product use (converted value): Sum of CO2 emitted when using 90 finished products targeted for CO_2 reduction.
The amount of CO_2 emitted is equal to the energy consumed multiplied by the CO_2 emissions coefficient, for which the value shown in CO_2 Emissions from Fuel Combustion Highlights (2013 Edition) is used.

*7 Amount of SF_6 emitted during product use (corresponding value): Sum of SF_6 gas naturally leaked during the operation of products (6) that use SF_6 gas for insulation. Leakage rate used is the value from JEAC5001-2000. Global warming potential value used is from the 2nd Revised Guidelines of the IPCC.

Recycling

IN

End-of-Life Products *8	
	Mitsubishi Electric
Air conditioners	13,762 tons
Televisions	4,058 tons
Refrigerators	22,768 tons
Washing machines / Clothes dryers	7,645 tons
Personal computers	83 tons

*8 End-of-Life Products: Weight of products recovered from four types of appliances subject to Japan's Home Appliance Recycling Law, plus personal computers.

OUT

Resources Recovered *9	
	Mitsubishi Electric
Metals	28,236 tons
Glass	1,366 tons
CFCs	300 tons
Others	12,426 tons

*9 Resources recovered: Weight of resources recovered from four types of appliances subject to Japan's Home Appliance Recycling Law, plus personal computers.

Environment – Environmental Accounting

Scope and Period of Data Compilation and Basis of Calculation

Scope and Period of Data Compilation

- Period: April 1, 2014 - March 31, 2015
- Scope of Data Compilation: Mitsubishi Electric Corporation, 112 affiliates in Japan and 79 overseas affiliates (total of 192 companies)

* The scope of data compilation is the same as the scope covered in this Environmental Report.

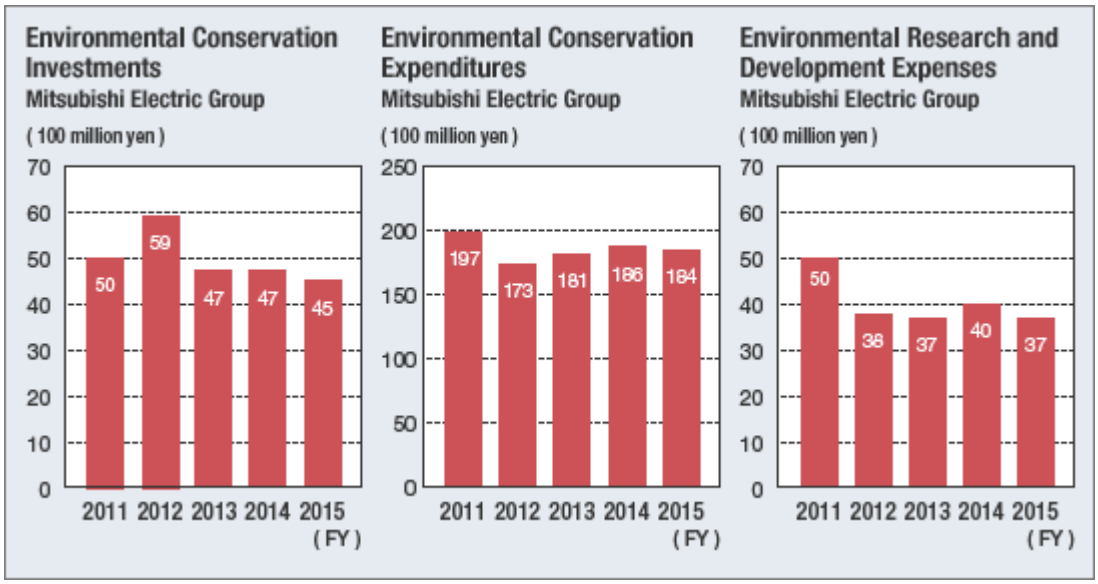
Basis of Calculation

Data is calculated for environmental conservation costs, environmental conservation benefits (environmental performance), and economic benefits from environmental conservation activities (actual profit or cost-saving benefits) in accordance with the Environmental Accounting Guidelines (fiscal 2006 edition) issued by Japan's Ministry of the Environment. Economic benefits are ascertained in terms of real benefits, which consist of earnings and savings, and estimated benefits. Estimated benefits include the economic benefits to customers of using our products, such as lower electricity bills, and environmental improvements produced outside our business sites.

* Environmental conservation costs reflect straight-line depreciation for capital investments made over the past five years and assumed to have useful lives of five years. The annual benefits of earnings and savings attributable to capital investments, too, are assumed to have resulted from investments over the past five years.
* For comparisons to the previous year, the previous year's data has also been revised to reflect changes in the scope/range of data.

Summary of Fiscal 2015

Environmental Conservation Costs



Environmental Conservation Costs

Top figure: Mitsubishi Electric Group / Bottom figure: Mitsubishi Electric / Unit: 100 million yen

Item	Capital Investment	Costs*	Year-on-Year Change	Main Costs
Business area activities	42.5	107.9	(2.0)	–
	26.7	70.0	1.0	
Pollution prevention	5.1	27.2	1.0	Maintenance of wastewater treatment facilities / exhaust treatment facilities (eliminating VOCs, PFCs, smoke, etc.)
	2.7	18.7	0.3	
Global environmental conservation	36.9	47.5	(2.9)	Upgrading air conditioners, introducing LED lighting, upgrading transformers and boilers, incorporating inverter technologies into power generators, upgrading/enhancing the performance of SF_6 gas recovery devices
	24.0	33.2	1.1	
Resource recycling	0.5	33.2	(0.1)	Consigning PCB-related processing, recycling valuable resources, wood-chip recycling processes, maintenance and management of pure water / wastewater recovery treatment
	0.0	18.0	(0.4)	
Upstream and downstream from production	0.8	5.6	0.9	Quality valuation in accordance with RoHS regulations, establishing returnable rack system, consignment fees for recycling packaging containers
	0.8	4.2	1.3	
Management activities	0.1	31.2	1.5	ISO 14001 review (certification acquisition, maintenance, upgrades), participation in environment-related exhibitions, publishing of report on eco-conscious initiatives, collecting environmental data, operation of product content chemical substance management system
	0.0	24.6	1.9	
R&D activities	1.4	36.6	(2.8)	Development of high-efficiency devices, energy-saving regulation compliant residential air conditioners and recycled plastic molding technologies, downsizing of products, development of power distribution systems for offshore wind power generation and refrigerants
	1.4	35.5	(3.4)	
Community activities	0.0	0.3	(0.0)	Satoyama woodland preservation activities, river / local region clean-up, Mitsubishi Electric Outdoor Classroom, greening of offices and peripheral areas
	0.0	0.2	(0.0)	
Environmental damage	0.0	1.8	0.5	Measures for oil-contaminated soil on old factory sites, groundwater measurement/treatment facilities
	0.0	1.8	0.5	
Consolidated total	44.9	183.5	(2.0)	–
Non-consolidated total	29.0	136.2	1.2	

* Includes depreciation of capital investment over the past five years.

Environmental Conservation Benefits (Environmental Performance)

Top figure: Mitsubishi Electric Group / Bottom figure: Mitsubishi Electric / Unit: 100 million yen

Item	Unit	Fiscal 2015	Year-on-Year Change	Year-on-Year Per Net Sales
Total energy used	10,000 GJ	1,919	4	84%
		1,157	(31)	85%
Total water used	10,000 m3	1,122	58	89%
		770	41	93%
Total greenhouse gas emissions	10,000 tons-CO_2	124	5	87%
		58	0	82%

	CO_2 (energy consumption)	10,000 tons-CO_2	95	2	85%
			51	1	89%
	HFC, PFC, SF_6	10,000 tons-CO_2	29	3	92%
			7	0	55%
Total release and transfer of chemical substances into the atmosphere		Tons	876	(10)	83%
			516	(25)	84%
Total wastewater discharged		10,000 m3	936	13	85%
			678	14	90%
Total release and transfer of chemical substances into the water and soil		Tons	44	(6)	74%
			10	2	111%
Total waste discharged		Tons	223,868	29,611	97%
			90,043	7,851	96%
Final disposal		Tons	654	(291)	58%
			1	(1)	38%

Environmental Conservation Benefits

Economic Benefits from Environmental Conservation Activities (Actual Benefits)

Top figure: Mitsubishi Electric Group / Bottom figure: Mitsubishi Electric / Unit: 100 million yen

Item	Amount	Year-on-Year Change	Main Benefits
Earnings	37.8	7.4	Sold the valuable materials resulting from recycling of scrap metal, etc.
	18.9	4.1	
Savings	30.3	0.2	Reduced electricity costs as a result of energy-saving air conditioning and lighting facilities and introducing solar photovoltaic generation systems, reduced use of production and packaging materials, etc. by replacing them with returnable alternatives
	14.6	(0.6)	
Total	68.1	7.6	–
	33.6	3.6	

Economic Benefits from Environmental Consideration in Products and Services (Estimated Benefits)

Top figure: Mitsubishi Electric Group (consolidated basis) / Bottom figure: Mitsubishi Electric / Unit: 100 million yen

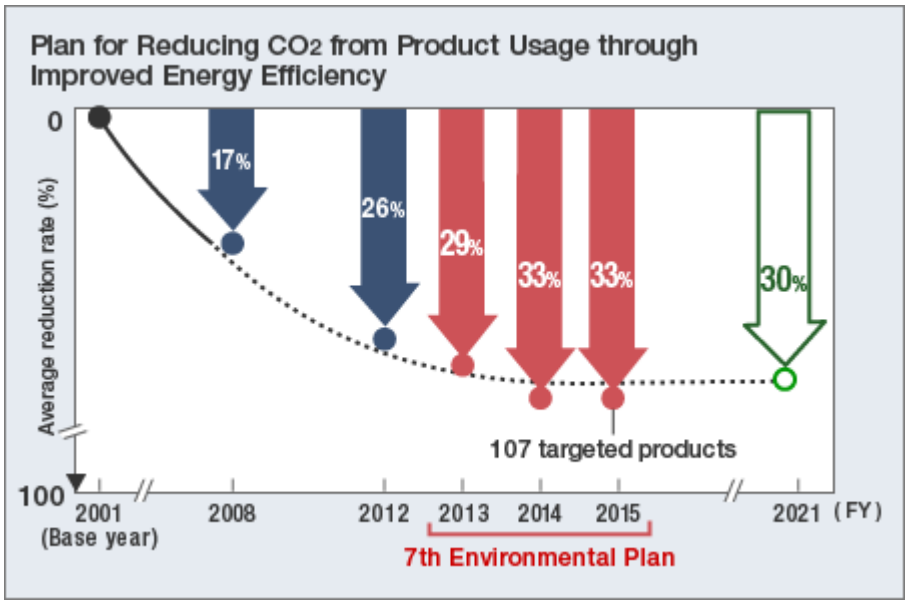
Item	Amount	Main Benefits
Economic benefits to customers	9,605	Reduced electricity costs owing to lower energy consumption of 90 end products that are targeted for reducing CO_2 from product usage.
	6,351	

Environment – Environmental Performance Data

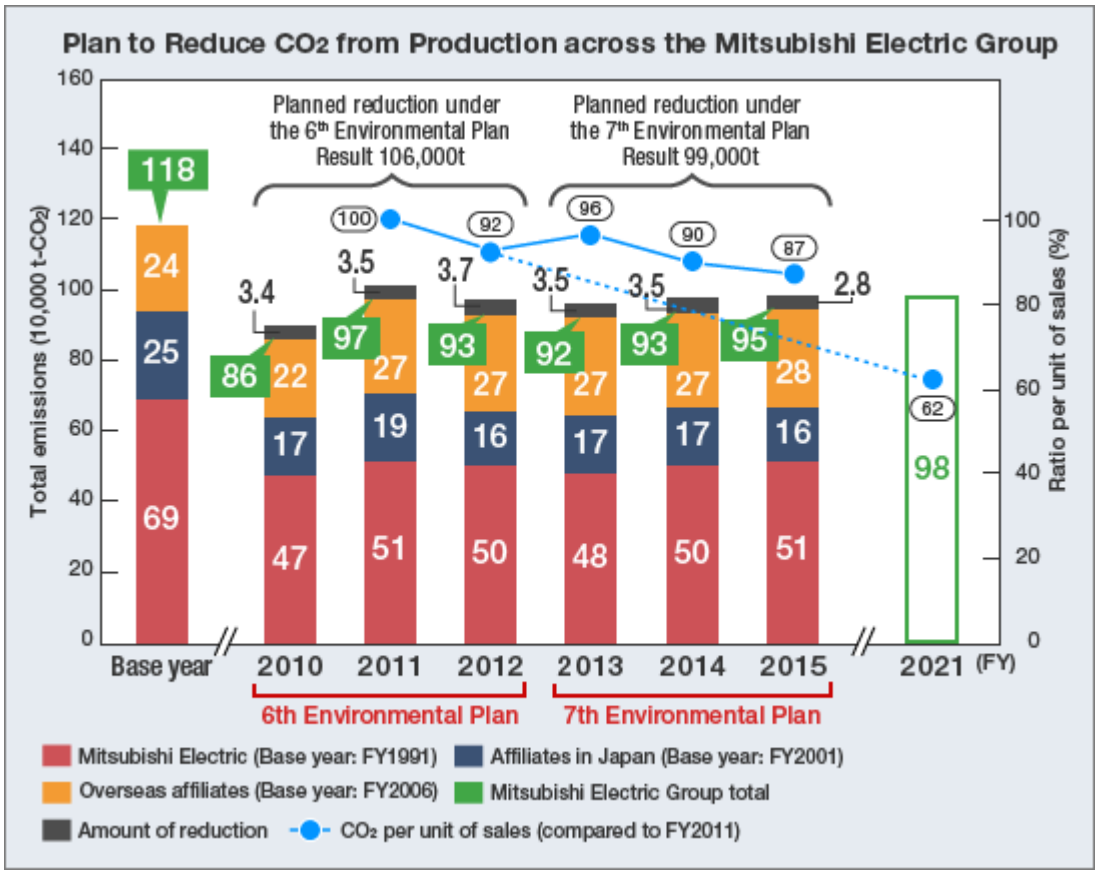
Results of Activities in Fiscal 2015

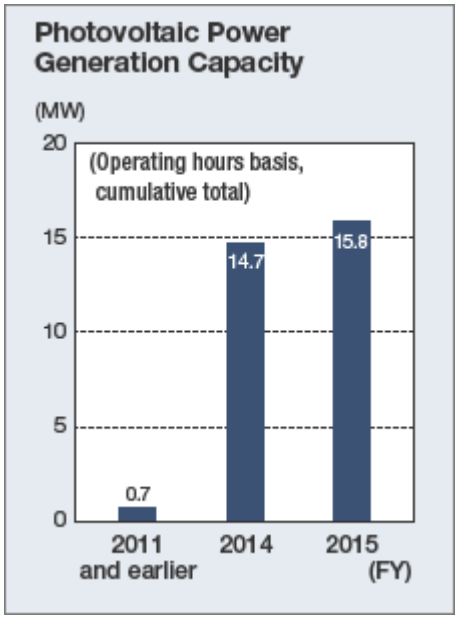
- Plan for Reducing CO_2 from Product Usage through Improved Energy Efficiency
- Plan to Reduce CO_2 from Production across the Mitsubishi Electric Group
- Photovoltaic Power Generation Capacity
- Reduction in Greenhouse Gas Emissions (SF_6, PFCs, HFCs)
- Emissions of Non-CO_2 Greenhouse Gases
- Total CO_2 Emissions in Distribution
- Fiscal 2015 Share of Transport by Mode
- Plan for Reducing Use of Resources
- Japan-wide Recycling of Four Kinds of Mitsubishi Electric Home Appliances
- Final Waste Disposal Ratio Reduction Plan
- Total Waste Output [Mitsubishi Electric]
- Total Waste Output [Affiliates in Japan]
- Total Waste Output [Overseas affiliates]
- Packaging Material Usage and Per Net Shipping Weight
- Breakdown of Water Usage
- Total Water Usage
- Water Recycling Ratio
- Material Balance of Chemical Substances Subject to Regulation
- Environmental Accounting
- Numbers of Classroom Leaders Trained through FY2015
- Numbers of Mitsubishi Electric Outdoor Classroom through FY2015

Reducing CO2 from Product Usage

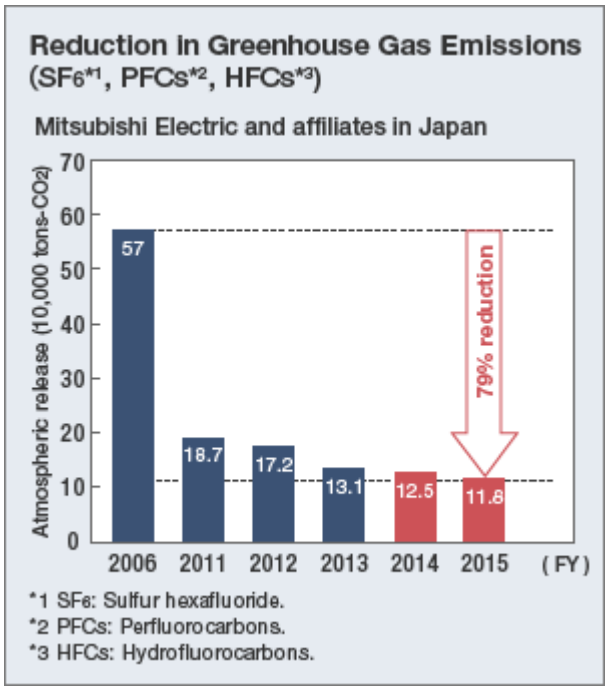


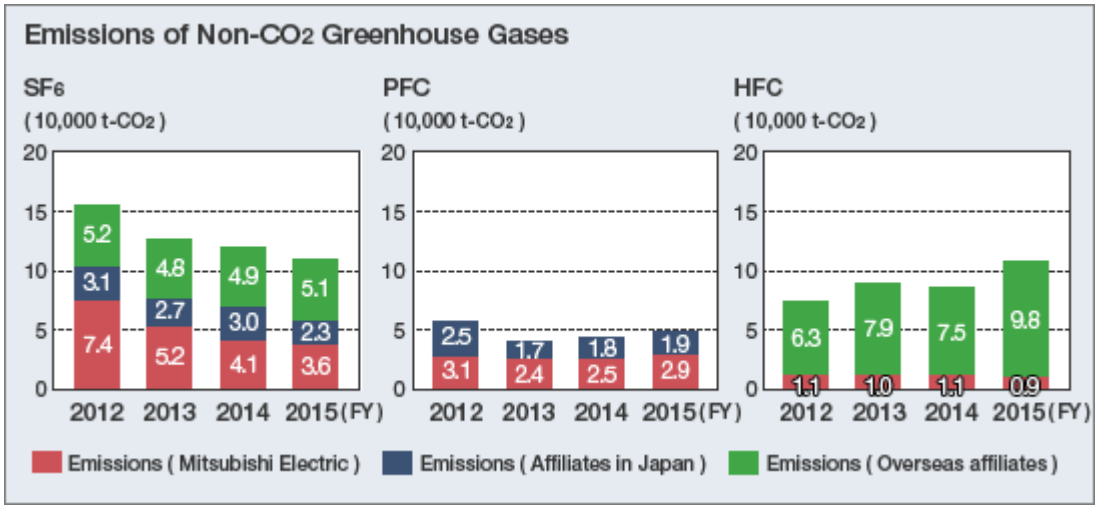
Reducing CO_2 from Production



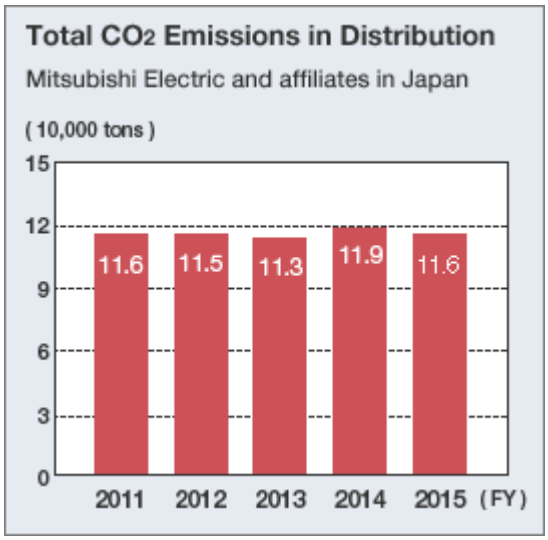


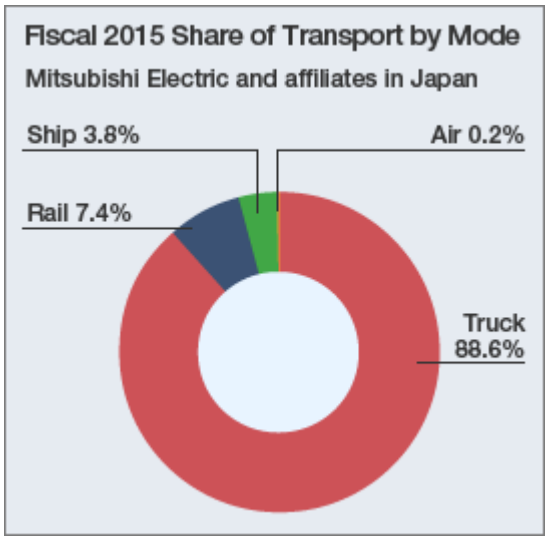
Reducing Emissions of Non-CO_2 Greenhouse Gases



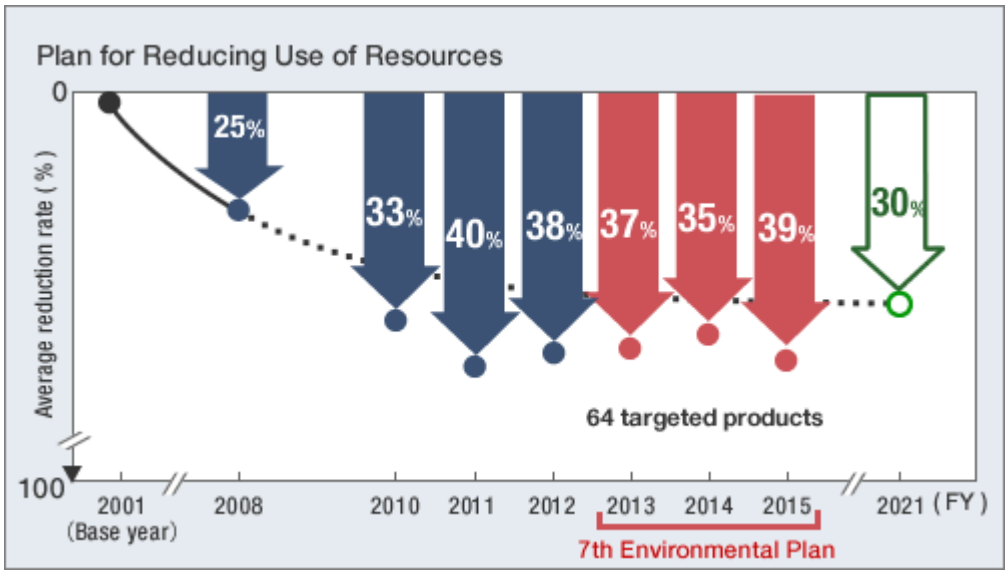


Reducing CO_2 from Logistics

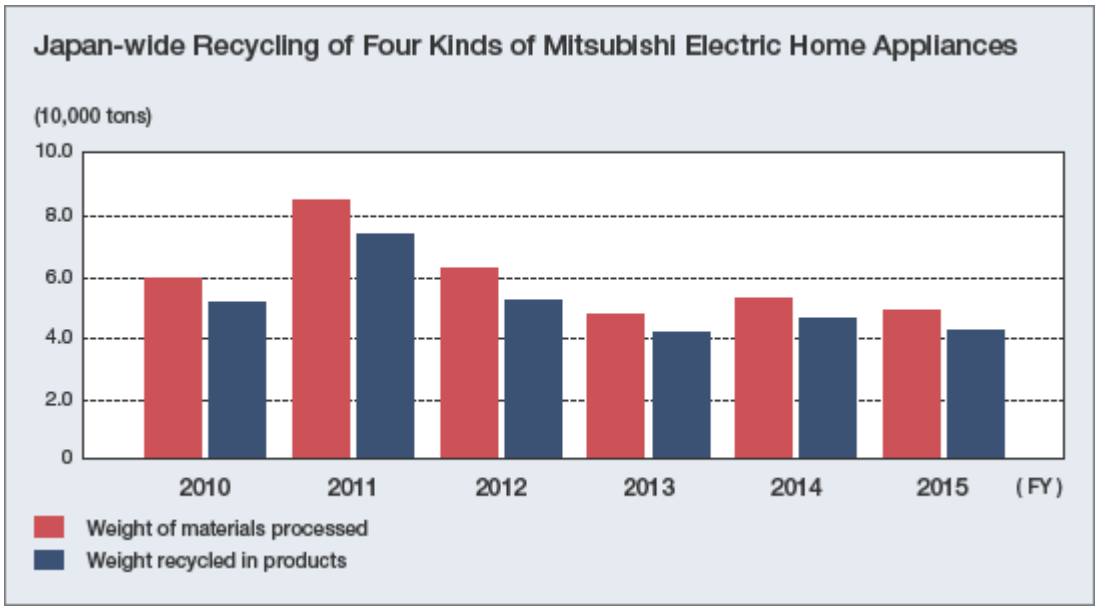




Reducing Use of Resources

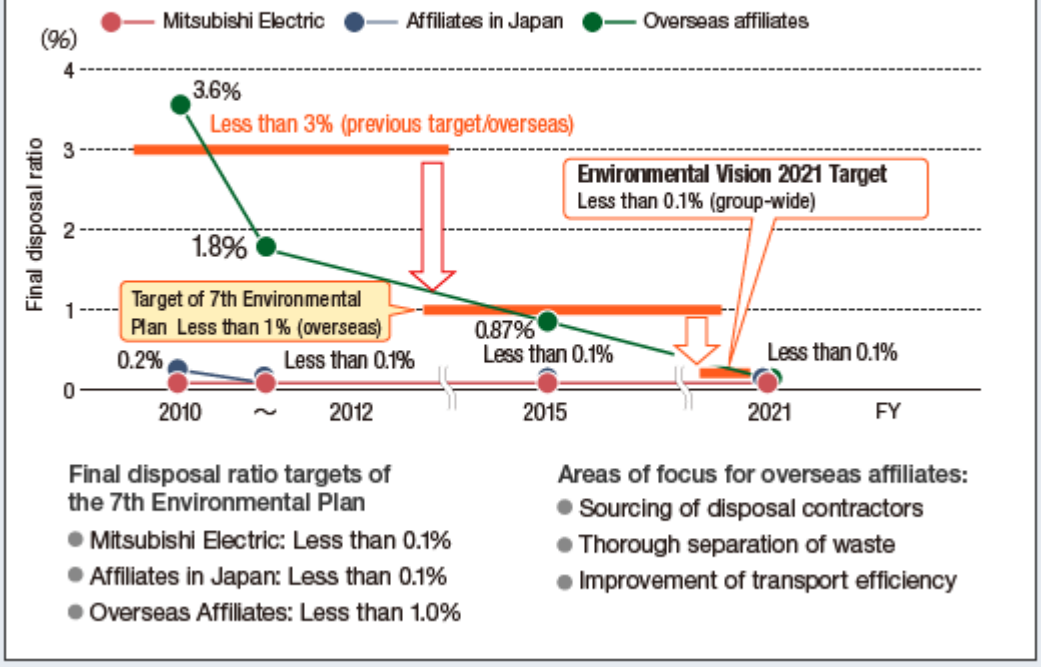


Recycling End-of-Life Products



Initiatives towards Zero Final Waste Disposal Ratio

Final Waste Disposal Ratio Reduction Plan



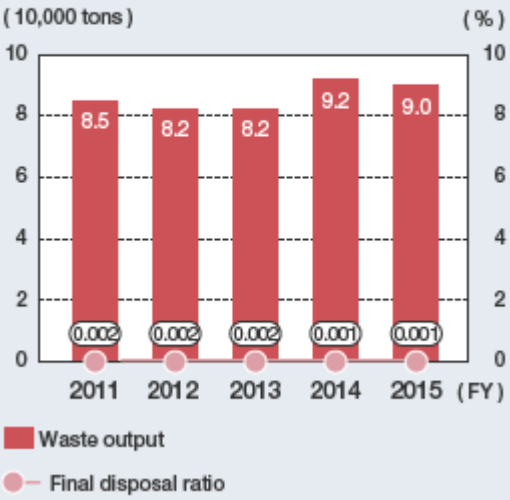
Final disposal ratio targets of the 7th Environmental Plan

- Mitsubishi Electric: Less than 0.1%
- Affiliates in Japan: Less than 0.1%
- Overseas Affiliates: Less than 1.0%

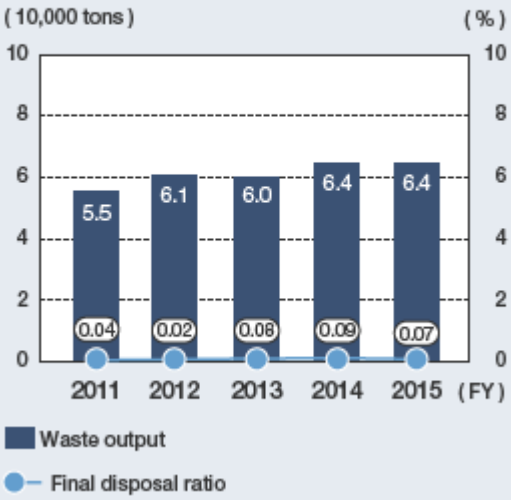
Areas of focus for overseas affiliates:

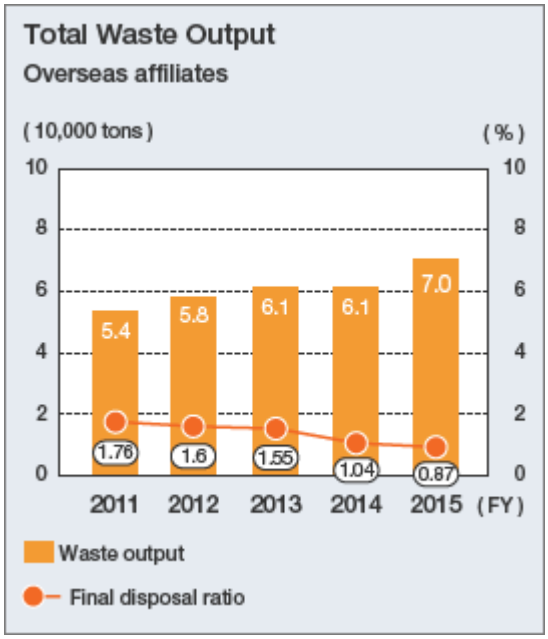
- Sourcing of disposal contractors
- Thorough separation of waste
- Improvement of transport efficiency

Total Waste Output
Mitsubishi Electric

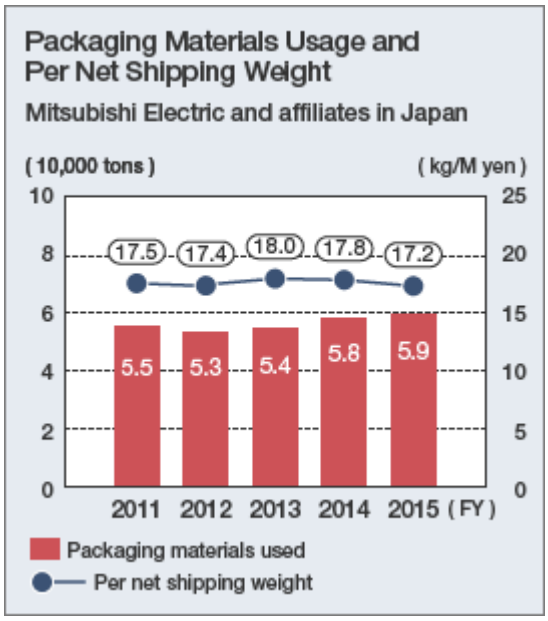


Total Waste Output
Affiliates in Japan

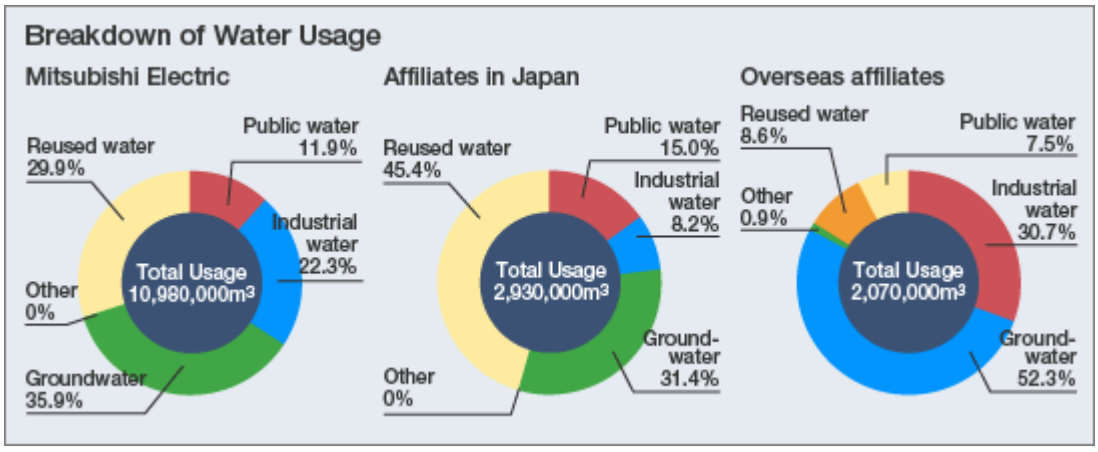


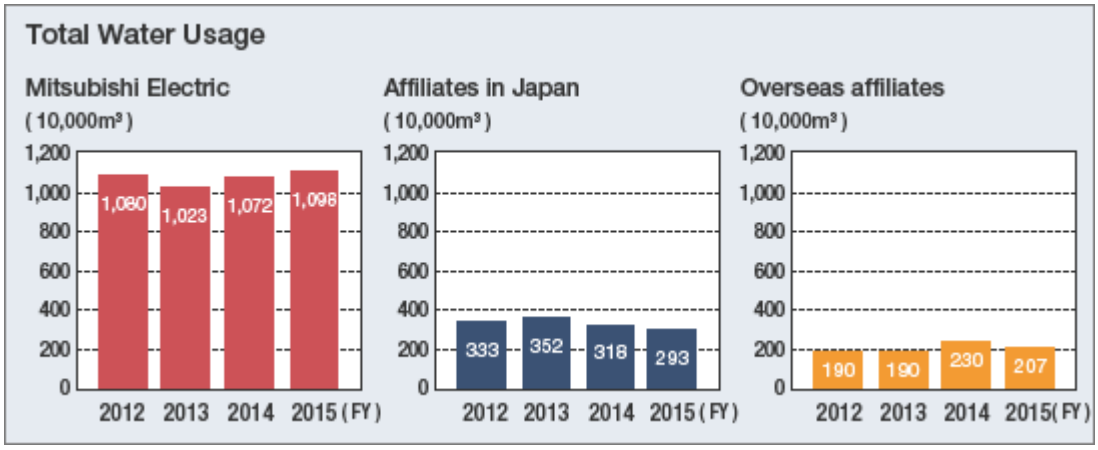


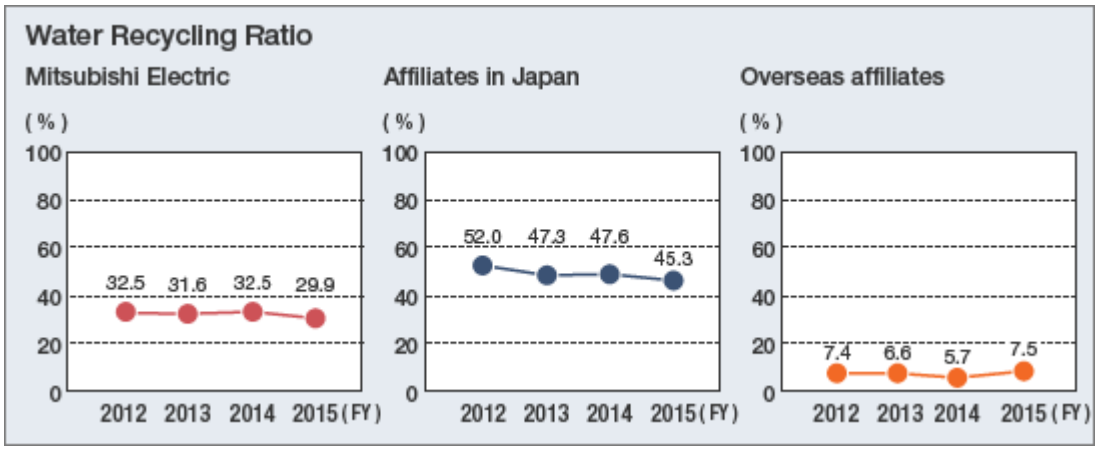
Reducing the Use of Disposable Packaging Materials



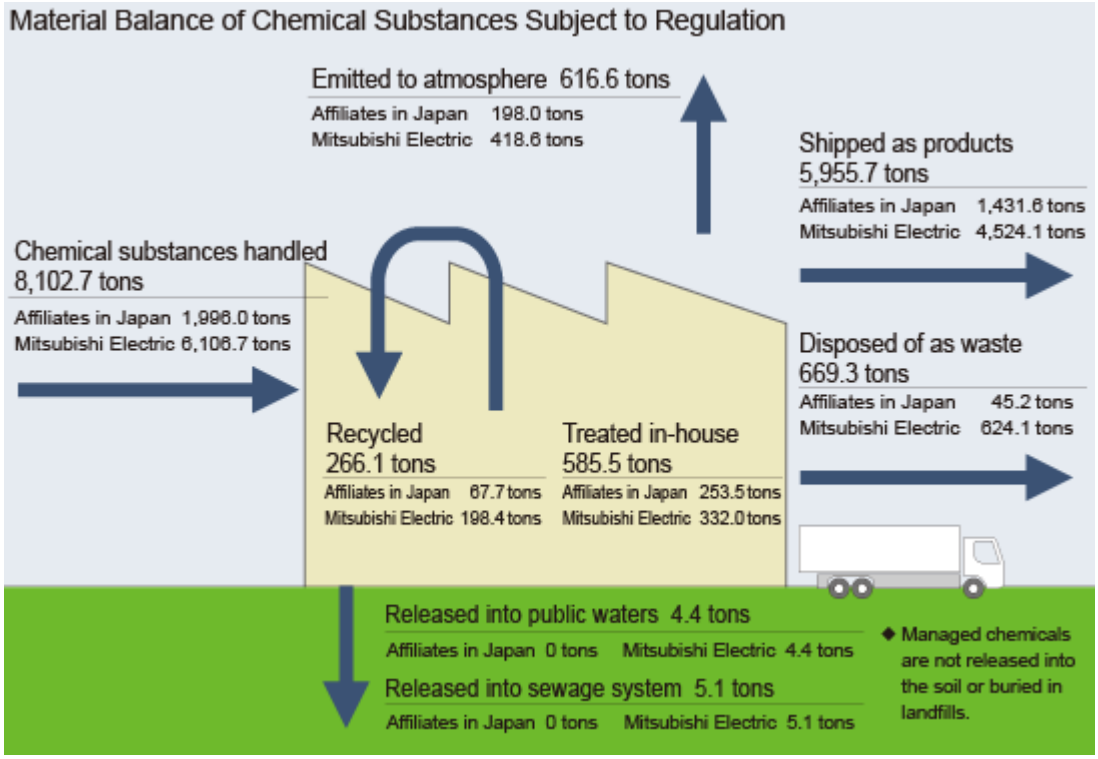
Using Water Effectively



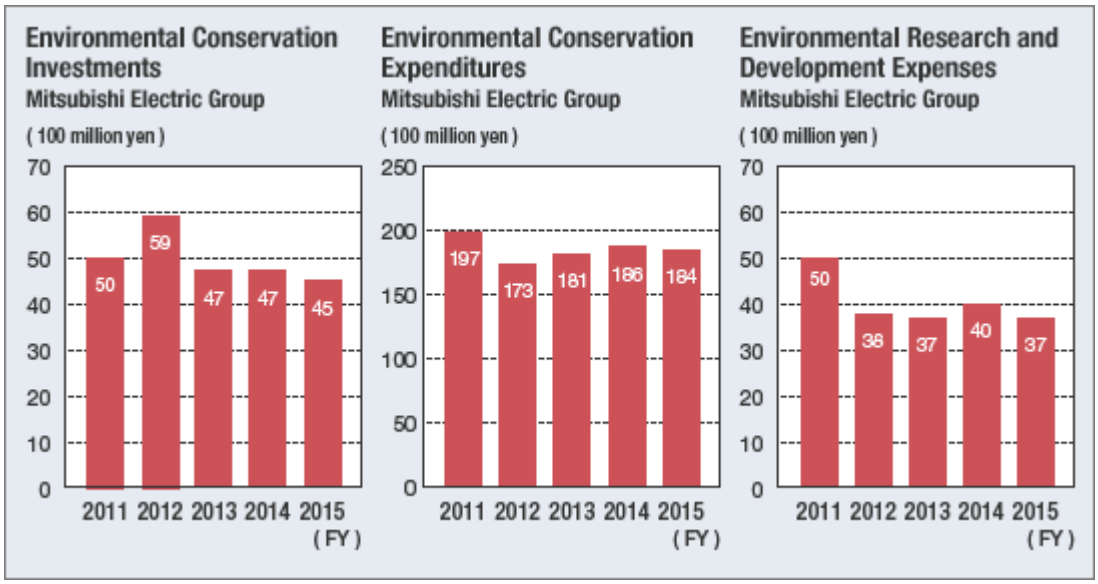




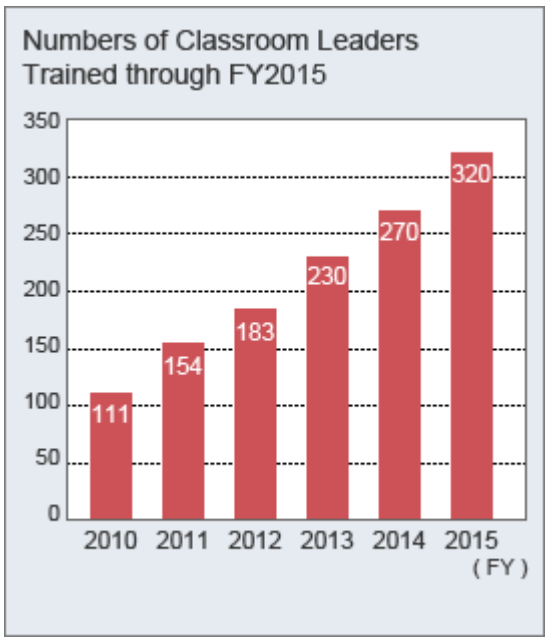
Managing Chemical Substances

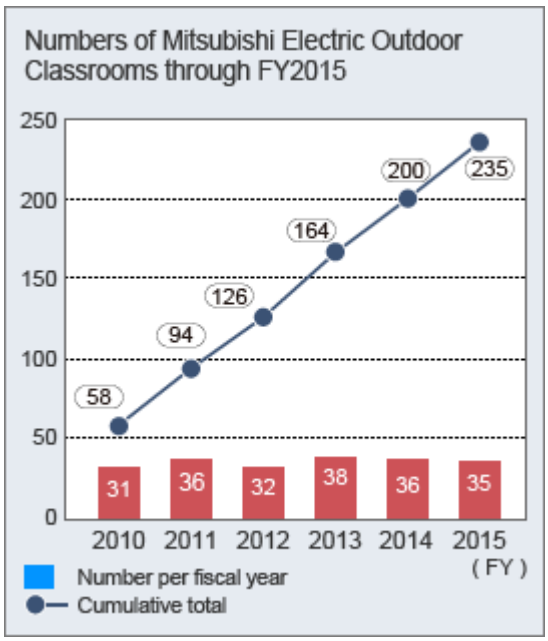


Environmental Accounting



Reducing Mitsubishi Electric Outdoor Classroom





Environment – Awards

Awards

Award	Sponsor	Accomplishment / Product	Recipient Company (Site)
Organization / Business Site Activity			
Fiscal 2014 Promotion of Experiences for Youths Corporate Awards Judging Committee Encouragement Award	Ministry of Education, Culture, Sports, Science and Technology	"Satoyama" Woodland Preservation Project	Mitsubishi Electric Corporation
The Energy Conservation Center, Japan (ECCJ) Kyushu Branch Chief Awards Fiscal 2014 Energy Conservation Promotion Contributor Award	The Energy Conservation Center, Japan (ECCJ)	Fiscal 2014 Energy Conservation Promotion Contributor Award	Mitsubishi Electric Corporation Nagasaki Works
Fiscal 2014 (63rd) Electrical Industry Technology Achievement Awards Manufacturing category Award for Excellence	The Japan Electrical Manufacturers' Association (JEMA)	Improving productivity of tank components for an electrical water heater utilizing micro-bubble washing technology	Mitsubishi Electric Corporation Manufacturing Engineering Center Gunma Works
"Green Curtain Club" Contest Award for Excellence	Shinshiro City, Aichi Prefecture	Green curtain effects / coolness of room / contribution to energy conservation (energy conservation effects) / benefits from creating green curtain, etc.	Mitsubishi Electric Corporation Nagoya Works
Superior Security Responsibility Awards Association Director's Award	Fukuoka Refrigerated Equipment Security Association	Performance in refrigeration security over many years	Mitsubishi Electric Corporation Power Device Works
2014 Good Lighting Award	The Illuminating Engineering Institute of Japan	Power Device Innovation Center	Mitsubishi Electric Corporation Power Device Works
Kumamoto Governor's Award	The High Pressure Gas Safety Institute of Japan, Kumamoto	Superior handling of specific high-pressure gases	Mitsubishi Electric Corporation Power Device Works (Kumamoto)
Fiscal 2013 Japanese Society of Tribologists Technical Award	Japanese Society of Tribologists	Technology for sorting high-purity plastic utilizing friction	Mitsubishi Electric Corporation Advanced Technology R&D Center
Municipal Government Contributor's Awards Social Contribution	Ritto City, Shiga Prefecture	Beautification activities such as cleaning and tree clipping	Mitsubishi Electric System & Service Co., Ltd. Kansai Branch Shiga Service Station
Hyogo Environmentally-Friendly Business Operator's Award	Hyogo Prefecture	Continuance of the "Satoyama" Woodland Preservation Project (Kokayama	Toyo Electric Corporation

		Forest preservation activity)	
Product & Technology Development			
IAUD Award 2014 Product Design Category IAUD Award	International Association for Universal Design	Jet Towel Mitsubishi Electric Hand Dryer	Mitsubishi Electric Corporation Nakatsugawa Works
Fiscal 2014 (8th) Kids Design Awards Designs Contributing to the Safety and Security of Children Product Design Category – General Kids Design Award	Kids Design Association	Jet Towel – New Slim Type Mitsubishi Electric Hand Dryer	Mitsubishi Electric Corporation
16th Power Load Leveling Device/System Awards Heat Pump & Thermal Storage Technology Center of Japan – Chairman's Award	Heat Pump & Thermal Storage Technology Center of Japan	Exhaust Heat Recovery Water Heat Source Heat Pump	Mitsubishi Electric Corporation Refrigeration System Works
2014 Energy Conservation Grand Prize Products and business models category ECCJ Chairman's Prize	The Energy Conservation Center, Japan (ECCJ)	Kirigamine Z Series Household air conditioners	Mitsubishi Electric Corporation Shizuoka Works
Fiscal 2014 (63rd) Electrical Industry Technology Achievement Awards Encouragement Award	The Japan Electrical Manufacturers' Association (JEMA)	Kirigamine ZW/ZXV Series Development of the sole air conditioner able to assess temperature of hands/feet	Mitsubishi Electric Corporation Advanced Technology R&D Center Shizuoka Works
Fiscal 2014 Kanto Region Invention Awards Gunma Governor's Award	Japan Institute for Promoting Invention and Innovation	Storage-type Hot Water Unit Hot water unit	Mitsubishi Electric Corporation Gunma Works
Fiscal 2014 Kanto Region Invention Awards Encouragement Award	Japan Institute for Promoting Invention and Innovation	Mixing Value Unit Integrated Structure Hot water unit	Mitsubishi Electric Corporation Manufacturing Engineering Center, Gunma Works
Fiscal 2014 Excellence in Energy-Conservation Equipment Awards The Japan Machinery Federation Chairman's Award	The Japan Machinery Federation (JMF)	Super Line Premium Series – SF-PR Induction motor applying cutting-edge high-efficiency design technology	Mitsubishi Electric Corporation
2014 R&D 100 Awards (Mechanical Systems)	R&D Magazine	MELFA-3D Vision	Mitsubishi Electric Corporation Nagoya Works
44th Machinery Industry Design Awards Japan Electrical Manufacturers' Association	Nikkan Kogyo Shinbun	MX Series Wire-cut electric-discharge machine	Mitsubishi Electric Corporation Nagoya Works
Fiscal 2014 Good Design Award	Japan Institute of Design Promotion	MELSEC iQ-R Series Programmable controller	Mitsubishi Electric Corporation Nagoya Works
Fiscal 2014 Good Design Award	Japan Institute of Design Promotion	GOT2000 Series Programmable display panel	Mitsubishi Electric Corporation Nagoya Works
Fiscal 2014 Good Design	Japan Institute of	FREQROL-A800	Mitsubishi Electric

Award	Design Promotion	Series Inverter	Corporation Nagoya Works
2014 "Mega" Monozukuri Component Awards Machine Component Award	Monodzukuri Nippon Conference, Nikkan Kogyo Shimbun	High convergence scan optical system (high convergence scan lens, (Aberration correction lens)	Mitsubishi Electric Corporation Nagoya Works
iF Design Award 2015	iF International Forum Design GmbH	MELSEC iQ-R Series Sequencer	Mitsubishi Electric Corporation Nagoya Works
57th 10 New Products Awards Nippon Strength (Nippon Brand) Award	Nikkan Kogyo Shimbun	MP Series (MP1200, MP2400, MP4800) Wire-cut electric-discharge machines	Mitsubishi Electric Corporation Nagoya Works
2014 R&D 100 Awards (Mechanical Systems)	R&D Magazine	FR-700EX Series sensor-less servo drive unit & MM-GRK sensor-less motor	Mitsubishi Electric Corporation Nagoya Works
2014 (63rd) Electrical Industry Technology Achievement Awards Excellence Award	The Japan Electrical Manufacturers' Association (JEMA)	Development of a variable flux motor for hybrid vehicles which eliminates rare earth requirement	Mitsubishi Electric Corporation Advanced Technology R&D Center, Himeji Works

Environment – Initiatives toward Creating a Low-Carbon Society

Reducing Greenhouse Gases Emitted in the Value Chain

International standards such as the Greenhouse Gas (GHG) Protocol and the Basic Guidelines on Accounting for Greenhouse Gas Emissions Throughout the Supply Chain, prepared by Japan's Ministry of the Environment, were referenced to calculate and report the amount of greenhouse gases emitted in fiscal 2015.

Reducing CO2 from Product Usage

Introducing objectives and results of fiscal 2015 initiatives to promote energy-saving products that are helping to create a low-carbon society.

Expanding Our Contributions to Reducing CO2 from Product Usage

An introduction to our contributions to reducing CO_2 from product usage through replacing old products with highly energy-efficient products.

Reducing CO2 from Production

Overview of measures to reduce CO_2 emissions based on a sales unit ratio index target, fiscal 2015 initiatives and achievements, and plans for the future.

Reducing Emissions of Non-CO2 Greenhouse Gases

Report on our use of three greenhouse gases and usage reduction measures and results of fiscal 2015.

Reducing CO2 from Logistics

Overview of the Mitsubishi Electric Group's fiscal 2015 achievements in reducing CO_2 emissions through just-in-time improvements to boost logistics efficiency.

Environment – Reducing Greenhouse Gases Emitted in the Value Chain

Measures to Comply with GHG Protocol Scope 3

The Mitsubishi Electric Group refers to the Greenhouse Gas (GHG) Protocol, international standards relating to accounting for greenhouse gas emissions, and the Basic Guidelines on Accounting for Greenhouse Gas Emissions Throughout the Supply Chain, published by Japan's Ministry of the Environment, for determining how to account for emissions from business activities (Scope 1 and 2 of the GHG Protocol) and indirect emissions from outside the range of our business activities (Scope 3 of the GHG Protocol).

Owing to the fact that CO_2 emissions from "Use of sold products" (Scope 3, Category 11) account for over 80% of emissions in the value chain, the Mitsubishi Electric Group focuses on developing highly energy-efficient products that are linked to reducing CO_2 emissions during product usage. At the same time, we strive to continuously reduce CO_2 emissions from production and the emission of gases with a higher global warming potential than CO_2.

Fiscal 2015 Greenhouse Gas Emissions

Scope / Category	Accounting (10,000 tons-CO_2) (Below : Total emission ratio)	Accounting summary*1
Scope 1 All direct GHG emissions	40 (0.9%)	Direct emissions from using fuel and industrial processes at our company *2
Scope 2 Indirect GHG emissions from consumption of purchased electricity, heat, or steam	84 (1.9%)	Indirect emissions associated with using electricity and heat purchased by our company *3
Scope 3 All indirect emissions not covered in Scope		
Category 1 Purchased goods and services	567 (12.9%)	Emissions associated with activities until material, etc. is manufactured concerning raw ingredients, parts, purchased products, and sales*4
Category 2 Capital goods	59 (1.3%)	Emissions produced from constructing/manufacturing own capital goods
Category 3 Fuel- and energy-related activities	8 (0.2%)	Emissions associated with procurement of fuels from other parties and fuel necessary for generation of electricity, heat, etc.
Category 4 Upstream transportation and distribution	46 (1.0%)	Emissions associated with logistic processes for material, etc. to be delivered to our company concerning raw ingredients, parts, purchased products, and sales *5
Category 5 Waste generated in operations	0.05 (0.0%)	Emissions associated with transporting and processing waste produced by our company*6
Category 6 Business travel	4 (0.1%)	Emissions associated with employee business travel *7
Category 7 Employee commuting	3 (0.1%)	Emissions associated with employees commuting to and from their respective workplaces
Category 8 Upstream leased assets	–	Emissions associated with operation of leased assets hired by our company (excluded if calculated in Scopes 1 and 2)*8
Category 9 Downstream transportation and	–	Emissions associated with the transportation, storage, cargo handling, and retail of products*9

	distribution		
	Category 10 Processing of sold products	–	Emissions associated with the processing of interim products by business operators*9
	Category 11 Use of sold products	3,574 (81.5%)	Emissions associated with the use of products by users (consumers / business operators)
	Category 12 End-of-life treatment of sold products	3 (0.1%)	Emissions associated with the transportation and processing of products for disposal by users (consumers / business operators) *4
	Category 13 Downstream leased assets	–	Emissions associated with operation of leased assets *10
	Category 14 Franchises	(n/a)	Emissions at companies participating in the franchise
	Category 15 Investments	–	Emissions related to investments*9
Total		4,388 (100%)	

*1 Excerpt from the fundamental guidelines published by the Ministry of Environment and Ministry of Economy, Trade and Industry
*2 CO_2, SF_6, PFC, and HFC emissions from use of gas, heavy oil, etc., and product manufacturing
*3 CO_2 emissions from use of electricity, etc.
*4 Excludes some regions
*5 CO_2 emissions from product distribution/circulation (sales distribution)
Subject to accounting: 84 companies (production sites)
*6 CO_2 emissions from transportation of waste (waste distribution)
Subject to accounting: Mitsubishi Electric
*7 Achievements in Japan
*8 Office rentals, etc. are included in Scopes 1 and 2
*9 Currently considering calculation
*10 Leased assets of Mitsubishi Electric products, such as air conditioner systems, are included in Category 11

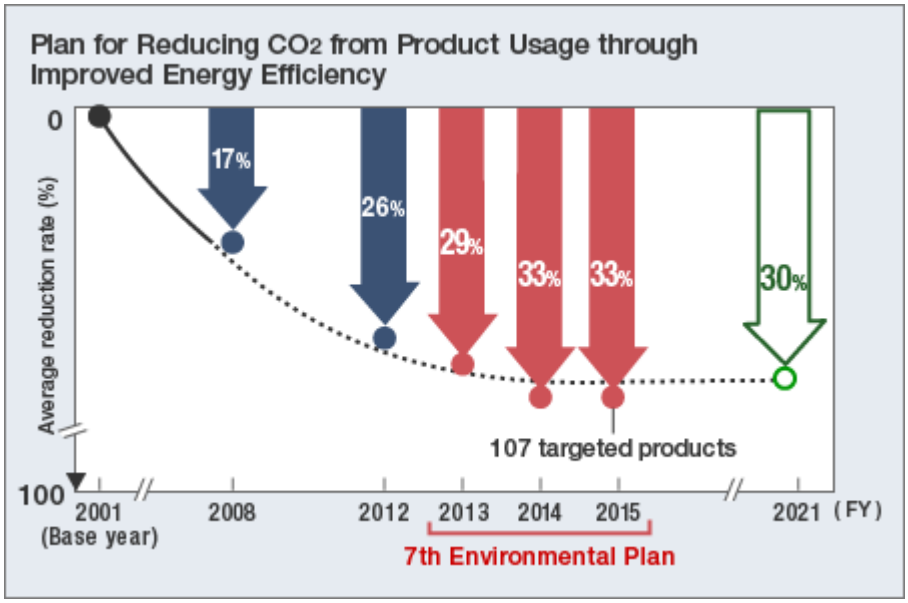
Environment – Reducing CO2 from Product Usage

Targets of the 7th Environmental Plan (Fiscal 2013 to 2015) and Achievements of Fiscal 2015

In Environmental Vision 2021, the Mitsubishi Electric Group set a goal of reducing CO_2 from product usage by 30%.

CO_2 from product usage is viewed in terms of the power consumed by the customer during product usage and is taken as the CO_2 emissions resulting from production of the power consumed. Raising the energy efficiency of products enables reduction of the CO_2 during product usage. As part of the 7th Environmental Plan (fiscal 2013-2015), the Mitsubishi Electric Group aimed to achieve an average CO_2 reduction ratio of 27% (as compared to fiscal 2001) for 84 products. These were specified products that Mitsubishi Electric could take the initiative with regarding design and development. Additionally, based on an analysis of the environmental aspects of these products, it was deemed that a reduction in CO_2 emissions during use was important.

We had already outperformed this target in both fiscal 2013 and 2014 before achieving the goal once again in fiscal 2015. In fiscal 2015, the number of the targeted products totaled 107 (90 end products and 17 interim products), for which the average reduction ratio was 33%.



About the 8th Environmental Plan (Fiscal 2016 to 2018)

In our new three-year plan—the 8th Environmental Plan—we will continue reducing CO_2 from product usage by improving product performance. Our aim is to achieve an average reduction ratio of 35% or higher compared to fiscal 2001 for the 107 products targeted.

Environment – Expanding Our Contributions to Reducing CO_2 from Product Usage

Combined Domestic and Overseas Reduction Contributions: 30.86 Million Tons from 95 End Products and 4.75 Million Tons from 29 Interim Products

Expanding Mitsubishi Electric's contribution to reducing CO_2 from product use is represented by the amount of CO_2 deemed to be reduced as a result of switching from older products (those equivalent to products sold in fiscal 2001) to new, energy-efficient products (those from the fiscal year under review). The calculation is done utilizing two assumptions: the case of contribution from direct reduction in the size of an end product, and the case of contribution from incorporating an interim product in a clients' end product. In order to increase our contribution to reducing CO_2 in this manner, we are improving the energy-saving performance of individual products as a single unit and expanding the scale of sales.

Breakdown of Targeted Products

There are approximately 260 products in the Mitsubishi Electric Group in total. Of those products, 124 are designed and developed under our initiatives and have been specified as having major environmental aspects as products generating CO_2 during use as a result of the product environmental aspect analysis conducted. The level of contributions are monitored and calculated for these products.

For the calculation of contribution to reducing CO_2 emitted, if an industry-specific or public standard product use calculation method exists, that calculation method is applied. If there is no method for calculating product use specified, we establish our own usage scenario and calculate the level of contribution to reducing CO_2. As for interim products, calculation is done by proportionally dividing product weight and sales volume ratio based on the Scope 3 guidelines of the GHG Protocol.

Breakdown of Products with Assessed Amount of Contributions to Reducing CO_2 from Product Usage

Products (number)	Examples of products	Standard/Index considered for calculation
End products (95)	Plant monitoring control systems, railcar air-conditioning systems, onboard information systems (TIS, ATC, TIMS), monitor/protection control systems for power generation plants, particle therapy systems, circuit breakers, elevators, intelligent transport systems (ITS), satellite communications earth station facilities, optic/wireless access systems, air conditioners, televisions, refrigerators, Lossnay, processing machines, robots, lighting fixtures/lamps, IH cooking heaters, etc.	Contribution gained by reducing power consumed by the product
	Energy-saving support equipment, elevator modernization, Lossnay heat exchange amount	Suppression of power used by introducing energy-saving support equipment, contribution gained by upgrading to highly efficient components at the time of renewal, previously wasted energy that is now used by heat exchange
	Circuit breakers, switchgears	Reduction in amount of SF_6 gas leaking (CO_2 equivalent)
	Photovoltaic power generators, turbine generators	Amount of power generated by the generator minus the energy used when generating the power,

		increase in amount of power generated improving generation efficiency
Interim products (29)	Compressors purchased separately from air conditioners	Contribution by incorporating product that reduces power consumption
	Inverters, motors	Contribution by incorporating product that reduces power loss
	Devices	
	Electric power steering, alternators, starters	Contribution of fuel efficiency gained by incorporating product, proportionally divided based on weight
	Combined-cycle thermal power generator	Reduction of fossil fuel use by updating old thermal power generators, contribution by proportionally dividing CO_2 emission reduction based on sales amount

* Of the products targeted for calculating total CO_2 emissions and contributions to reducing CO_2 emissions, 63% are for domestic use and account for more than 70% of the products sold in Japan. The remaining 37% of the products are for overseas and includes some product components that are sold overseas (sales of more than 70% of interim products including devices and inverters, and end products such as air conditioners).
* For the products using electricity, the CO_2 emission factor by country and region listed in CO_2 Emissions from Fuel Combustion Highlights (2013 Edition) is used.
* For thermal power generators, the thermal power-source factor in the calculation method of the Action Plan for a Low-Carbon Society, published by an organization consisting of four electrical/electronic product manufacturers, is used.
* For other energy use and greenhouse gases, the factor in the "Greenhouse Gas (GHG) Emissions Accounting and Reporting Manual," published by Japan's Ministry of the Environment and Ministry of Economy, Trade and Industry, is used.

About the 8th Environmental Plan (Fiscal 2016 to 2018)

In our new three-year plan—the 8th Environmental Plan (fiscal 2016 to 2018)—we set the goal of 92 million tons for the 124 products targeted based on the level of contribution to reducing CO_2 from product use assessed in the 7th Environmental Plan (fiscal 2013 to 2015).

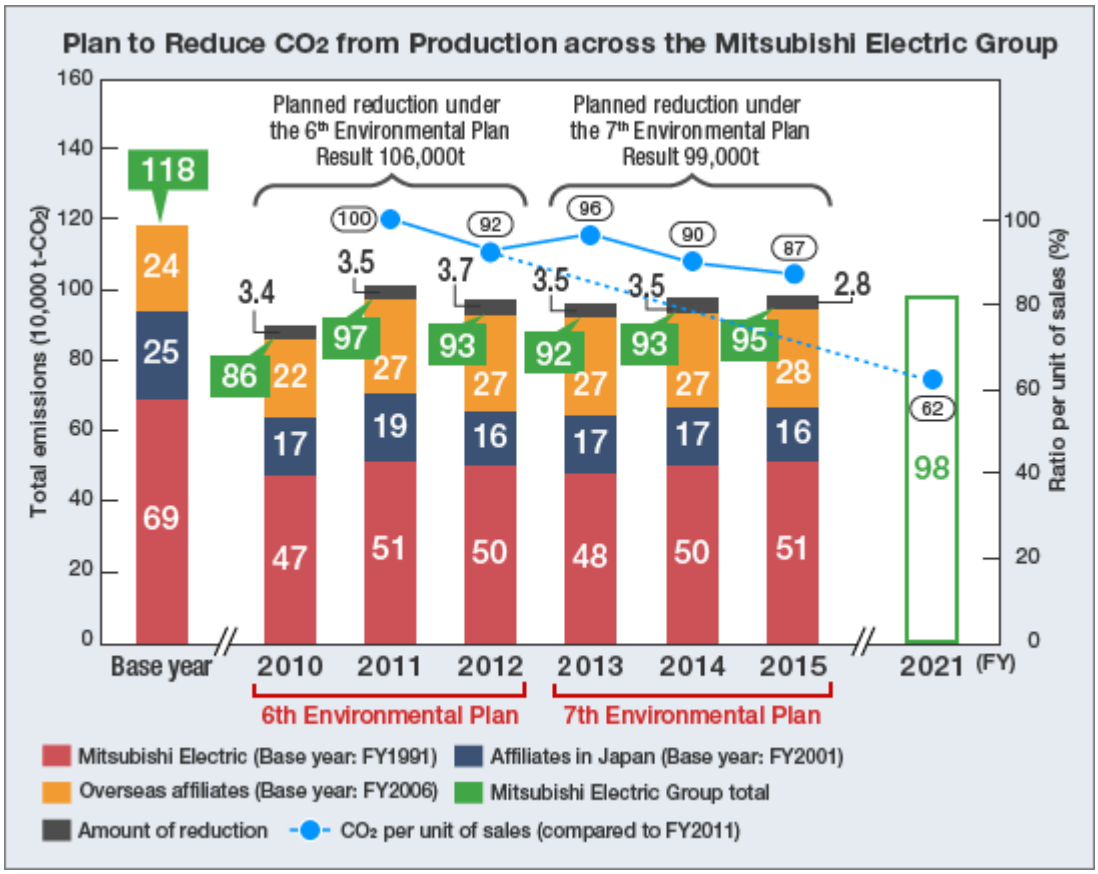
Environment – Reducing CO2 from Production

Targets of the 7th Environmental Plan (Fiscal 2013 to 2015) and Achievements of Fiscal 2015

For the 7th Environmental Plan (fiscal 2013 to 2015), the Mitsubishi Electric Group adopted the management of its goal for reducing CO_2 emissions using a sales unit ratio index. This makes it possible to evaluate reduction efforts correctly regardless of increases or decreases in productivity.

To reach our goal of improving the CO_2 emissions per unit of sales to 83% compared to fiscal 2011 (a reduction of 17%), we reduced CO_2 from production lines "by visualizing the energy wasted during production" and promoting the "use and operation of highly efficient facilities equipment" such as air conditioning and lighting systems. We also promoted "reduction activities through demand management" by introducing monitoring systems that manage and control peak power usage. Additionally, we continually expanded the introduction of photovoltaic generation systems.

As a result, CO_2 emissions amounted to 950,000t in fiscal 2015—outperforming our target of 970,000t for the term—through reduction efforts in Japan. CO_2 emissions per unit of sales also improved by 3% compared to the previous fiscal year. On the other hand, increased output of production facilities for overseas smartphone makers, power generators, and automotive equipment led to a rise in CO_2 emissions at Mitsubishi Electric and overseas affiliates. Consequently, we were unable to cut as much CO_2 emissions as planned, with actual CO_2 emissions per unit of sales of 87% falling short of our target of 83%.



Note

In preparing to announce the 7th Environmental Plan in fiscal 2013, the emission volumes of the base fiscal year and target fiscal year (2021) were revised.

- Base fiscal year: Revised from 1,140,000t to 1,180,000t (added proven values of three newly-targeted semiconductor production sites)
- Fiscal 2021: Revised from 830,000t to 980,000t (increased the forecast for domestic electricity emission factor from 0.33 to 0.42; 830,000t, with the figure derived by reducing the total emissions of the base year by 30%)

Four Measures to Cut CO2 and the Results

In order to make improvements and realize the sales unit ratio set as the goal in the 7th Environmental Plan, CO_2 reduction was promoted based on four perspectives.

The Mitsubishi Electric Group has set the amount of CO_2 emissions reduced as one objective to maintain and continues monitoring its level. In fiscal 2013, emergency power generators were used at all plants in the wake of the tightened supply-demand balance in electricity triggered by the Great East Japan Earthquake. In addition, the operating hours were adjusted at factories in order to reduce peak power demand. On the other hand, reduction in CO_2 emissions declined as a result of longer operating hours and a subsequent increase in fuel use. In fiscal 2014, in an effort to cope with reduced peak power supply and increased production in the summer and winter, operating hours were extended; hence, CO_2 reduction initiatives slowed. In fiscal 2015, higher production—both in Japan and overseas—led to an increase in CO_2 emitted. Consequently, reductions in CO_2 were recorded at 99,000t compared to our target of 121,000t for the three years from fiscal 2013 to 2015.

1. Reducing CO2 from Production Lines

With the goal of reducing CO_2 by 48,000t over the course of three years as set forth in the 7th Environmental Plan, the result for this period was a reduction of 41,000t: 25,000t by Mitsubishi Electric itself, 4,000t by domestic affiliate companies, and 11,000t by affiliate companies overseas.

The Mitsubishi Electric Group has been promoting improvement in production lines by reducing energy loss. In fiscal 2015, we worked to improve heating facilities by increasing the capacity of heat exchangers and reviewing steam piping routes, as well as by introducing accumulators to hydraulic systems and altering the operation of air-conditioning equipment for clean rooms.

Furthermore, in fiscal 2015, we set up a working group consisting of key persons at production technology centers and production bases in order to extend energy-saving measures and technologies that can be shared to all the companies of the Mitsubishi Electric Group. For instance, our initiative for improving the heating facilities mentioned above centered around two pillars: technical improvements / operational changes accompanying the remodeling of facilities, and the visualization of energy. We examined what we could do at individual production bases and introduced suitable technologies for each of them.

In particular, to achieve the visualization of energy, our proprietary products—Eco-Monitor and Eco-Server (measurement)—were used in combination with monitoring systems such as the SA-1. Monitoring energy use and analyzing waste through the exploitation of these products led to the eradication of prematurely switching on, or failing to turn off, electricity.

Introduction of Activities – Mitsubishi Electric (Guangzhou) Compressor Co., Ltd.

At Mitsubishi Electric (Guangzhou) Compressor, a manufacturer of air-conditioning compressors, we reduced energy loss in production lines by cutting motor idling time and recovering exhaust heat, as well as by introducing Mitsubishi Electric's energy-saving equipment. As a result, it achieved substantial energy savings that led to a reduction of CO_2 emitted in fiscal 2015 to 5,821t. The company is on course for meeting the Chinese government requirement for energy reduction by fiscal 2016.

Additionally, the company's accomplishments in energy savings were highly recognized, resulting in Mitsubishi Electric (Guangzhou) Compressor' receiving the highest prize at a nationwide meeting for the presentation of QC groups hosted by the Chinese government.

Mitsubishi Electric (Guangzhou) Compressor Co., Ltd.

2. Reducing CO_2 from Utilities

The goal in the 7th Environmental Plan was to reduce CO_2 by 56,000t over the course of three years, and a reduction of 58,000t was achieved during this period.

The Mitsubishi Electric Group is proceeding with the introduction of highly efficient devices in accordance with its mid-term plan, including upgrading air conditioners, transformers, and hot-water boilers and replacing high-ceiling lighting and mercury-vapor lamps with LED lighting. Whenever new buildings are constructed, high-efficiency devices are chosen and used. In fiscal 2015, energy-saving OA equipment was promoted, while air-conditioning control systems were introduced and became operational. Simultaneously, air-conditioning systems were upgraded and LED lighting was introduced at factories.

As part of the 8th Environmental Plan, starting in fiscal 2016, we are introducing LED lighting to office buildings.

Introduction of Activities – Grid Power System Factory, Ako Works

At the Ako Works, where coils and insulators for transformers are manufactured, it is vital that temperatures and humidity are maintained within operational values 24 hours a day in order to ensure the quality of products. The factory covers as vast a space of more than 100,000m3, a scale that posed an issue as to how to reduce energy consumption by air conditioners and maintain the quality of products at the same time.

The key to improving air-conditioning facilities implemented in fiscal 2015 was how to combine new devices rather than upgrade individual equipment. Steam heaters using paraffin were replaced by air-cooled electric chillers in order to switch fuels and improve efficiency. Meanwhile, the control of temperature and humidity was optimized despite the size of the area. This was done by placing temperature sensors in the factory instead of inside air conditioners, where they are normally found. This ensures precise quality control and comfortable working environments. These initiatives resulted in reducing CO_2 by 598t.

Grid power system factory, Ako Works

3. Reducing CO_2 through Demand Management

Reductions in CO_2 through demand management totaled 4,000t for the three years, compared to the goal of 11,000t set forth in the 7th Environmental Plan.

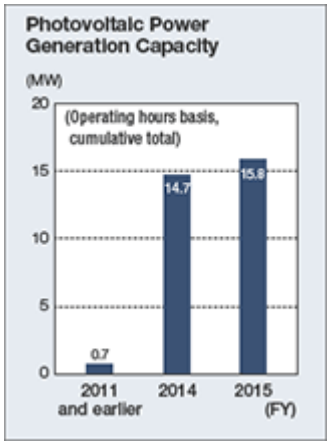
Prompted by the Great East Japan Earthquake, the Mitsubishi Electric Group introduced demand monitoring systems that keep a watchful eye on electricity usage in real time to all of the major user bases (contracted electric power of 500kW or more) in Japan. This makes it possible to visualize electric power distributed and power generated by photovoltaic systems, thereby helping centralize the management of power demand and predict/restrain electricity demand. In fiscal 2015, we continued implementation measures, including introducing highly efficient devices and improving their operation. We continue to promote and strengthen our approach to leveling electricity demand, a new obligation under the revised Rationalization in Energy Use Law.

4. Expanding the Installation of Photovoltaic Systems

The Mitsubishi Electric Group has promoted the enhancement of photovoltaic systems since the Great East Japan Earthquake, and secured a total power generation capacity of 15.8MW for all Group companies in Japan by fiscal 2015. This move resulted in a CO_2 emissions reduction of 15,000t for the three years compared to the 6,000t goal set forth in the 7th Environmental Plan.

The introduction of photovoltaic systems is gathering momentum at overseas affiliates, too. Siam Compressor Industry Co., Ltd., a manufacturer of air conditioning compressors in Thailand, also started introducing the systems in fiscal 2015, and expects to increase the power generation capacity to approximately 1.4MW in fiscal 2016.

We will continue to increase our initiatives to restrain peak power and reduce electricity costs.



Photovoltaic system introduced at Siam Compressor Industry Co., Ltd.

Relation to Targeted Reduction of Total CO2 Emissions (set in Environmental Vision 2021)

Total CO_2 emitted from production				
Total CO_2	Total CO_2 emission predicted for fiscal 2015 under the 7th Environmental Plan	Fiscal 2013	Fiscal 2014	Fiscal 2015
Group overall	970,000 tons	920,000 tons	934,000 tons	947,000 tons
Mitsubishi Electric	510,000 tons	480,000 tons	501,000 tons	506,000 tons
Affiliates in Japan	170,000 tons	170,000 tons	167,000 tons	157,000 tons
Overseas affiliates	290,000 tons	270,000 tons	266,000 tons	284,000 tons

Reduction in CO_2 emitted from production					
Reduction	CO_2 reduction predicted for 3 years under 7th Environmental Plan	Fiscal 2013	Fiscal 2014	Fiscal 2015	3-year total
Group overall	121,000t (3 years)	35,000t (1 year)	35,000t (1 year)	28,000t (1 year)	99,000t
Mitsubishi Electric	69,000t (3 years)	16,000t (1 year)	2,000t (1 year)	19,000t (1 year)	55,000t
Affiliates in Japan	24,000t (3 years)	5,000t (1 year)	4,000t (1 year)	4,000t (1 year)	14,000t
Overseas affiliates	28,000t (3 years)	14,000t (1 year)	11,000t (1 year)	5,000t (1 year)	30,000t

About the 8th Environmental Plan (Fiscal 2016 to 2018)

We have introduced various separate initiatives to reduce CO_2 originating from energy and non-CO_2 greenhouse gases (SF_6, HFCs, PFCs) up until now. However, starting from the new three-year plan—the 8th Environmental Plan (fiscal 2016–2018)—we aim to comprehensively evaluate and manage our contributions to the realization of a low-carbon society and consolidate our efforts to cut all of these gases as activities for reducing CO_2 emitted during production. Our target for total emissions is set at 1,370,000t-CO_2, which is to be achieved through implementation of the following measures:

Measures to reduce CO_2 originating from energy

Upgrading air conditioners, our measures for utilities including LED lighting, elimination of wastes through the visualization of production facilities, use of high-efficiency devices, reductions in heat loss and stand-by electricity

Measures to reduce SF_6, HFCs, and PFCs

Switching to other refrigerant gases with lower global warming potential, creation of processing schemes from gas recovery to recycling and destruction, strengthening countermeasures against gas leakage, early introduction of removal equipment

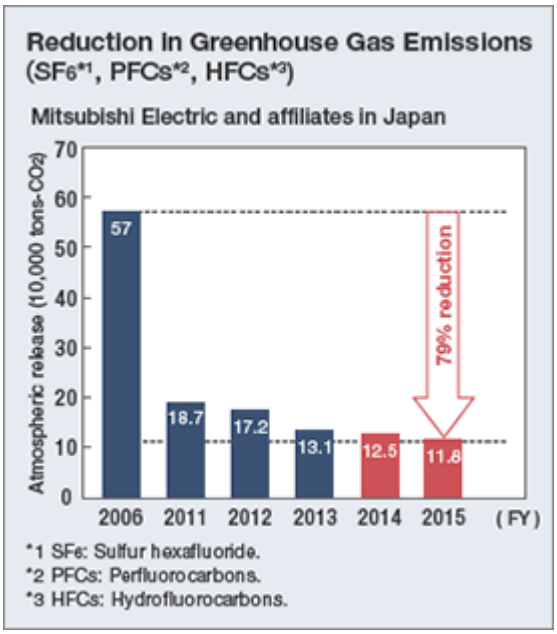
Environment – Reducing Emissions of Non-CO2 Greenhouse Gases

Targets of the 7th Environmental Plan (Fiscal 2013 to 2015) and Achievements of Fiscal 2015

Non-CO_2 greenhouse gases emitted by the Mitsubishi Electric Group during its business activities include sulfur hexafluoride (SF_6, an electrical insulating gas used in gas-insulated switchgear), perfluorocarbons (PFCs, used during the etching process in the production of semiconductors and liquid crystals), and hydrofluorocarbons (HFCs, gases used as refrigerants in air conditioners and refrigerators). As these gases produce a greenhouse effect hundreds or even tens of thousands of times greater than that of CO_2, we are making efforts to reduce their use.

Mitsubishi Electric and its affiliates in Japan set reducing greenhouse gases by 70% compared to the fiscal 2006 level as a target under the 7th Environmental Plan. Although the goal had already been reached by fiscal 2012, efforts have continued, with the result that a 79% reduction was reached in fiscal 2015.

Overseas affiliates, too, have been engaged in reducing greenhouse gases. In the future, while the measures developed in Japan are implemented at overseas bases, the entire Mitsubishi Electric Group will step up their activities worldwide to reduce greenhouse gases.



Comparison of Global-Warming Potential of CO_2, SF_6, PFCs, and HFCs

SF_6	23,900
PFC	6,500-9,200
HFC	140-11,700

* Value for CO_2 = 1

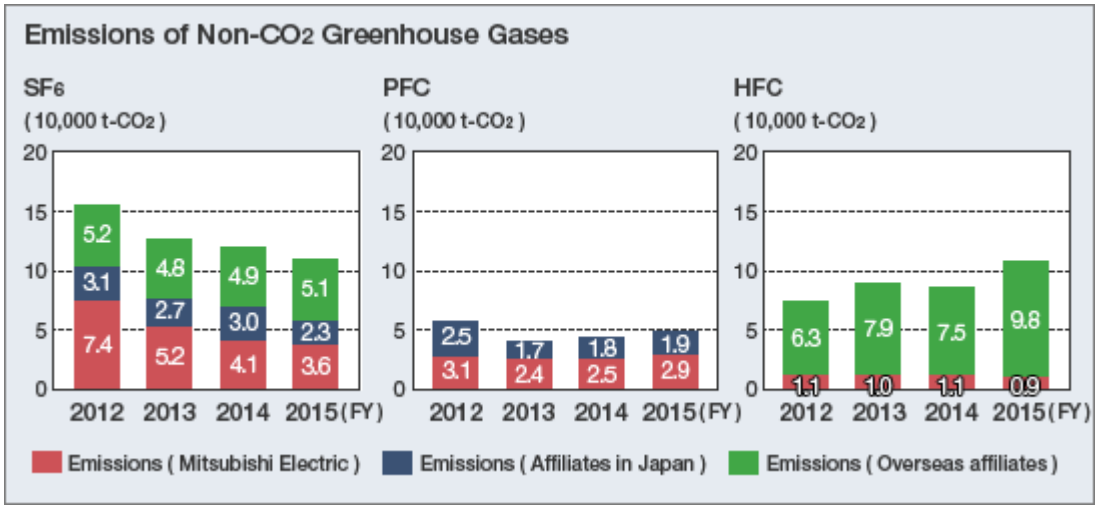
2015 Reduction Results by Greenhouse Gas

With three major policies in the 7th Environmental Plan, namely "improve recovery rates," "enhance operational management," and "leakage prevention using helium leak testing," systematic measures have been implemented, including gas introduction equipment. As a result, we were able to further reduce greenhouse gas emissions at Japanese bases compared to the level in the previous fiscal year.

Regarding the amount of SF_6 emitted in fiscal 2015, gas recovery performance has been improved as a result of redesigning recovery equipment, and the monitoring of daily gas leakage and recovery have been enhanced, resulting in a total of 59,000t-CO_2.

As for the amount of PFCs emitted, the introduction of removal equipment and the practice of replacing PFCs with other gases with lower warming potential are being promoted in a phased manner. As a result, PFC emissions totaled 48,000t-CO_2.

HFC emissions totaled 9,000t-CO_2 thanks to our efforts, including the introduction of gas detoxifying equipment.



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Upgrading air conditioners, our measures for utilities including LED lighting, elimination of wastes through the visualization of production facilities, use of high-efficiency devices, reductions in heat loss and stand-by electricity

Measures to reduce SF_6, HFCs, and PFCs

Switching to other refrigerant gases with lower global warming potential, creation of processing schemes from gas recovery to recycling and destruction, strengthening countermeasures against gas leakage, early introduction of removal equipment

Environment – Reducing CO2 from Logistics

Basic Policies on Logistics

The Mitsubishi Electric Group carries out just-in-time improvement activities to improve logistics. These activities quantify logistics work to make it visible, opening the door to greater efficiency and economy by eliminating irrational, irregular, and wasted efforts. We are also working to reduce environmental impact via "Eco-Logistics" (Economy & Ecology Logistics).

Fiscal 2015 Achievements of the Mitsubishi Electric Group

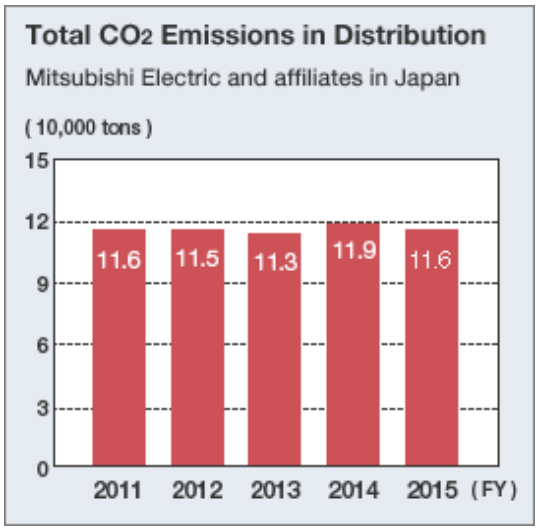
(Mitsubishi Electric and affiliates in Japan)
Shipping volume unit: **0.0310t-CO_2/million yen (7.3% reduction compared to the previous fiscal year)**
CO_2 emitted: **116,000t (4,000t reduction compared to the previous fiscal year)**

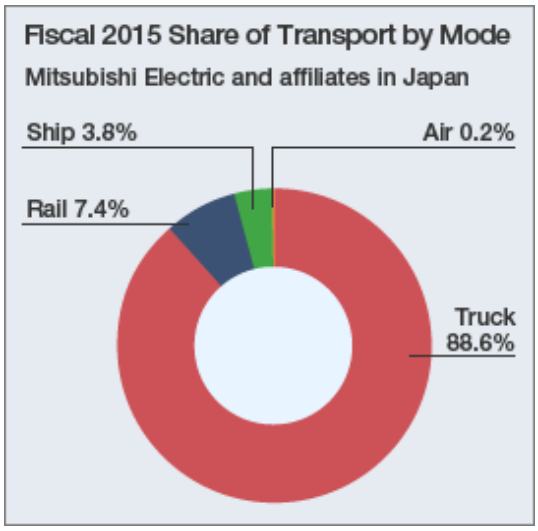
The Company and its affiliates in Japan continued to carry out the following measures throughout fiscal 2015.

- Reviewing transport routes
- Implementing modal shift from truck transport to rail transport
- Reducing the number of trucks by improving load ratios

Thanks to these measures during fiscal 2015, the amount of CO_2 emitted by the Mitsubishi Electric Group fell to 98,000t (down 2,000t, a 2% decrease compared to the previous fiscal year). The amount emitted by affiliates in Japan totaled 17,000t (down 1,000t, a 7% decrease compared to the previous fiscal year).

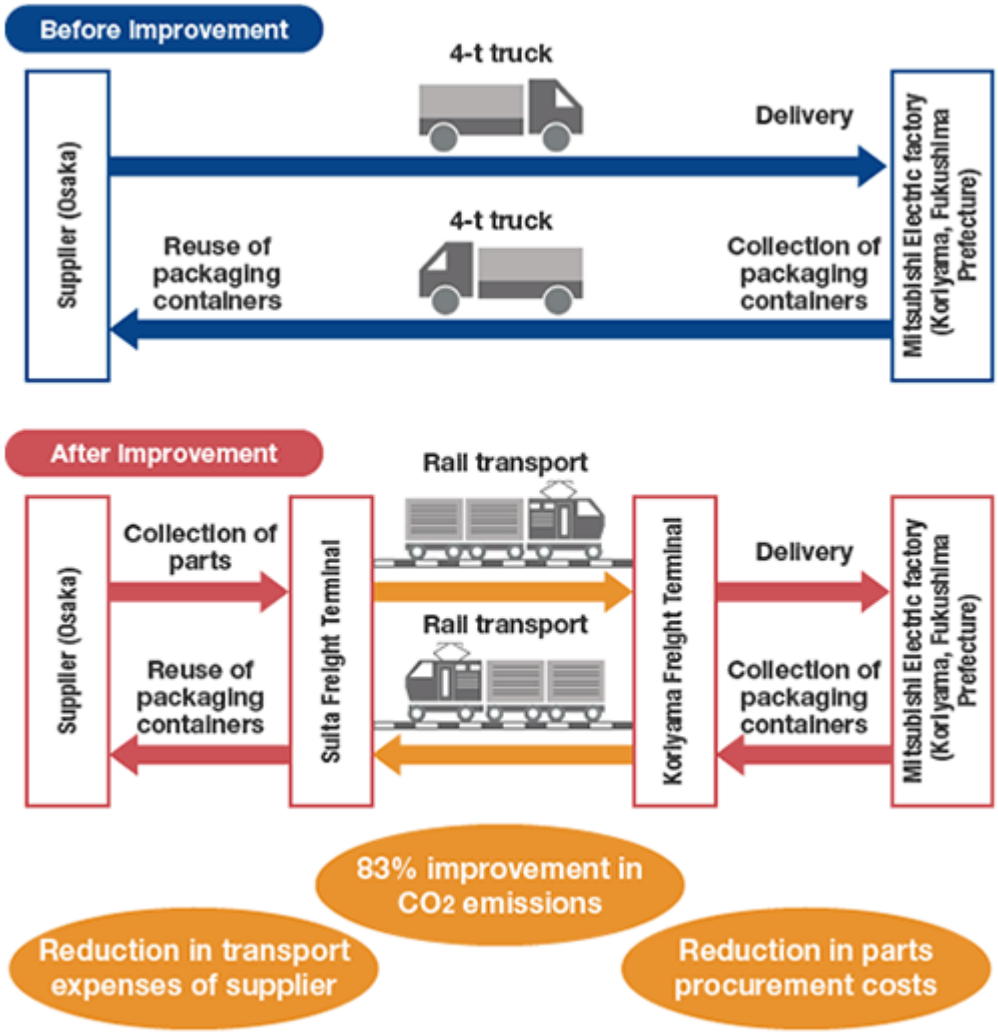
Regarding overseas affiliates, the amount of CO_2 emitted by a total of 22 companies was 343,000t (an increase of 51,0000t compared to the previous fiscal year) due to increased shipments, while shipping volume per unit dropped to 0.364t-CO_2/million yen (down 12% compared to the previous fiscal year).





Introduction of Activities – Promoting a Reduction in CO_2 Emissions through a Modal Shift of Procurement Logistics to Rail Transport

Our factory in Koriyama, Fukushima Prefecture had been using shipment by truck as a means for procuring communication equipment parts from a supplier in Osaka. However, finding a new means of long-haul transport emerged as a pressing issue as a driver shortage became more serious in recent years.
The supplier, our procurement division, and other relevant departments such as logistics worked together to solve this problem. From the viewpoint of reducing CO_2 emissions, it was decided to switch to rail transport. The move led to a reduction in CO_2 emitted to one-sixth of the previous level, as well as decreases in transportation expenses of the supplier and procurement costs of Mitsubishi Electric.



Environment – Initiatives toward Creating a Recycling-Based Society

Reducing Use of Resources

Introducing objectives and results of fiscal 2015 initiatives to reduce the size and weight of products while promoting product recycling in an effort to realize a recycling-based society.

Recycling End-of-Life Products

Objectives and progress of initiatives to collect and recycle four kinds of home appliances and personal computers, and fiscal 2015 achievements.

Initiatives toward Zero Final Waste Disposal Ratio

Priority measures of efficient resource usage and the target for final waste disposal ratio, and fiscal 2015 achievements.

Reducing the Use of Disposable Packaging Materials

Overview of the Mitsubishi Electric Group's goals to reduce resource inputs through the 3Rs applied to packaging materials, and fiscal 2015 initiatives and achievements.

Using Water Effectively

Our views on the effective use of water, and the Mitsubishi Electric Group's achievements in fiscal 2015.

Environment – Reducing Use of Resources

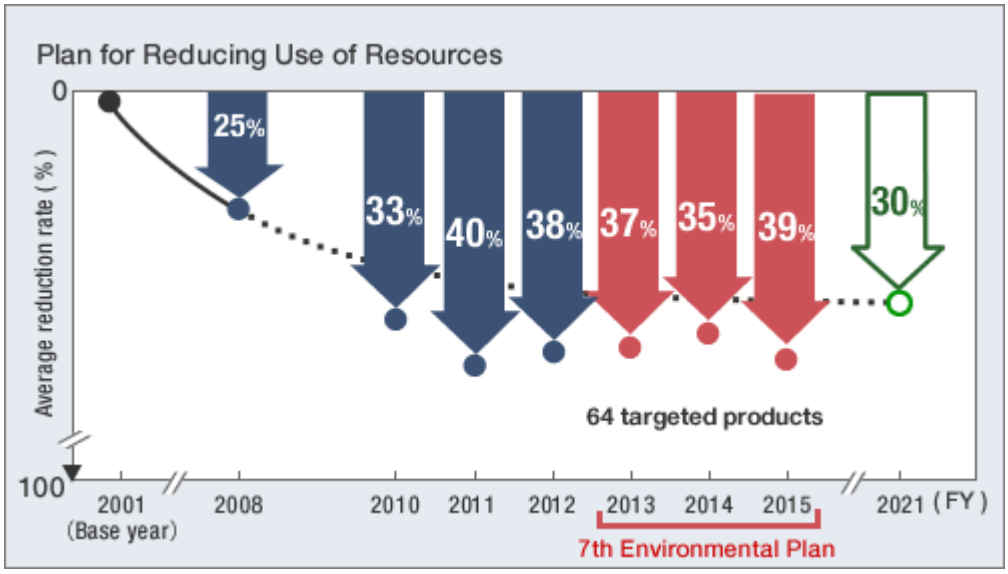
Targets of the 7th Environmental Plan (Fiscal 2013-2015) and Achievements in Fiscal 2015

To help in creating a recycling-based society, the Mitsubishi Electric Group's Environmental Vision 2021 sets targets for reducing our input of resources. We are now undertaking activities to reduce resource input in a number of targeted products that we identified in fiscal 2010. Specifically, we have set a target of an average 39% reduction rate (compared with fiscal 2001) in resource input for 64 products targeted under the 7th Environmental Plan (fiscal 2013-2015). Products manufactured to customer specifications and one-off individually manufactured products are not targeted by these resource input reduction initiatives.

The average reduction rate for the 64 products targeted was 39% in fiscal 2015, reaching the goal. The major factor behind the progress in reduction rates from fiscal 2014 was growth in sales of products that were improved in terms of reducing input of resources among industrial mechatronics products, information communications systems, and electronic devices. The average reduction rate is often affected by business, but we will work to reduce resource inputs steadily for all products in all segments.

Products Making Notable Progress in Resource Reduction in Fiscal 2015 (compared to fiscal 2014)

Gas circuit breakers: 8% improvement in reduction rates
Railcar air conditioners: 6% improvement in reduction rates
Induction cooking heaters: 5% improvement in reduction rates
Automotive fuel pumps: 3% improvement in reduction rates



About the 8th Environmental Plan (Fiscal 2016 to 2018)

The new three-year plan—the 8th Environmental Plan (fiscal 2016–2018)—sets an average reduction rate of 40% in resources input for 64 products compared to the level in fiscal 2001. We will work to achieve the target, which has been incorporated into our product development plans.

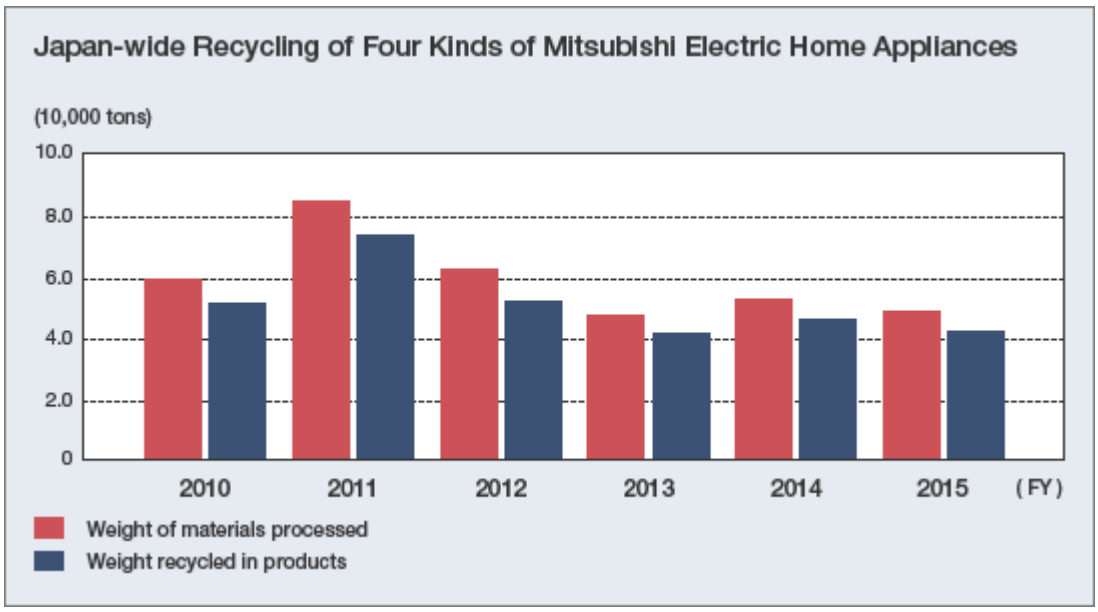
Environment – Recycling End-of-Life Products

Recycling Four Kinds of Home Appliances

Japan's Home Appliances Recycling Law* makes the collection and recycling of four kinds of appliances mandatory: air conditioners, television sets (CRT, LCD and plasma models), refrigerators/freezers, and washing machines / tumble dryers.

In 1999, Mitsubishi Electric commenced operations at a recycling plant, Hyper Cycle Systems Corporation (HCS), the first in the industry. By the end of fiscal 2015, HCS had recycled 670,000t of material. The results for the collection and recycling of four kinds of Mitsubishi Electric home appliances in fiscal 2015 are shown in the accompanying graph.

* Home Appliance Recycling Law (April 2001): This law obliges stakeholders to collect and recycle home appliances such as air conditioners, television sets, refrigerators, and washing machines. Manufacturers and importers must recycle steel, copper, aluminum, glass, plastic, and other materials and they are also responsible for setting up a system to recycle their products. The law was amended in December 2008 to also include LCD and plasma televisions, as well as tumble dryers.



Each year, Mitsubishi Electric organizes a program consisting of educational seminars on design for environment technologies together with Hyper Cycle Systems Corporation in order to design products that can be easily recycled. We will continue this program, providing feedback to our product design teams and developing technologies for the selection of recovered materials and the application of recycled materials, thereby enabling us to expand the application of these technologies to products.

The Collection and Recycling of Four Kinds of Home Appliances at Home Appliance Recycling Plants (Fiscal 2015)

	Unit	Air Conditioners	Television Sets		Refrigerators / Freezers	Washing Machines / Tumble Dryers	Total
			CRT	LCD / Plasma			
Recovered units at collection points	1,000 units	308	149	18	329	196	1,002
Handled units	1,000 units	335	144	18	362	211	1,073
Handled weight	Tons	13,762	3,695	362	22,768	7,645	48,235
Recycled weight	Tons	13,100	2,849	324	18,506	7,187	41,969
Recycled ratio (Sold material ratio)	%	95	77	89	81	94	-

Recycling Personal Computers

Mitsubishi Electric promotes the recycling of used computers and monitors. In fiscal 2015, we collected a total of 8,723 household- and industrial-use computers, with recycling ratios reaching statutory targets*1.

For end-of-life household-use computer equipment, we have implemented a plan of marking used computers with a PC Recycle Mark*2 tag to waive the disposal fee. For some products, customers are required to register equipment after purchase in order to get the tag themselves, but the procedure is very straightforward. Mitsubishi Electric has made it possible for customers to obtain recycling tags by sending a postcard or requesting one via the Internet*3. When we receive a disposal request for a product sold in October 2003 or later, we determine whether the product is eligible for a recycling tag to ensure the customer does not pay the recycling fee twice.

There is a risk of data leakage from the hard disk drives of disposed computers. Although computer users have the basic responsibility for preventing data leaks, the companies we have contracted to recycle computers punch holes in the hard disk drives or use a strong magnet to destroy any data physically and magnetically, in order to prevent any confidential data from being leaked. Interested computer owners can also pay for a program to delete all data completely before their used computers are taken away.

Notes

*1 Desktop computers: 50% or more
Notebook computers: 20% or more
CRT displays: 55% or more
Liquid-crystal displays: 55% or more

*2 PC Recycle Mark: The recycle mark stipulated by industry group PC3R Promotion Association was established to promote the 3Rs (reduce, reuse, recycle) among manufacturers, distributors, and importers of computers and monitors. From October 2003 onward, they began targeting household personal computer and monitor users. The tag may be displayed on products at the time of purchase or available afterward through registration.

*3 Because Mitsubishi Electric stopped selling home-use PCs in fiscal 1999, the Recycle Mark is available only for PC displays.

Material Recycling from Used Computers (Household and Industrial Use) (Fiscal 2015)

	Unit	Desktops		Notebooks		CRT Displays		LCDs		Total	
Collected weight	Tons	3.0		0.3		46.9		33.3		83.4	
		Office	Home	Office	Home	Office	Home	Office	Home	Office	Home
		2.0	1.0	0.2	0.1	4.5	42.4	5.0	28.2	11.7	71.7
Collected units	Units	284		102		2,250		6,087		8,723	
		Office	Home	Office	Home	Office	Home	Office	Home	Office	Home
		211	73	66	36	224	2,026	1,275	4,812	1,776	6,947
Handled weight	Tons	3.0		0.3		46.9		33.3		83,4	
Recycled weight	Tons	2.3		0.2		30.9		27.6		61.0	
Recycling ratio	%	78.8		64.4		65.8		83.1		-	

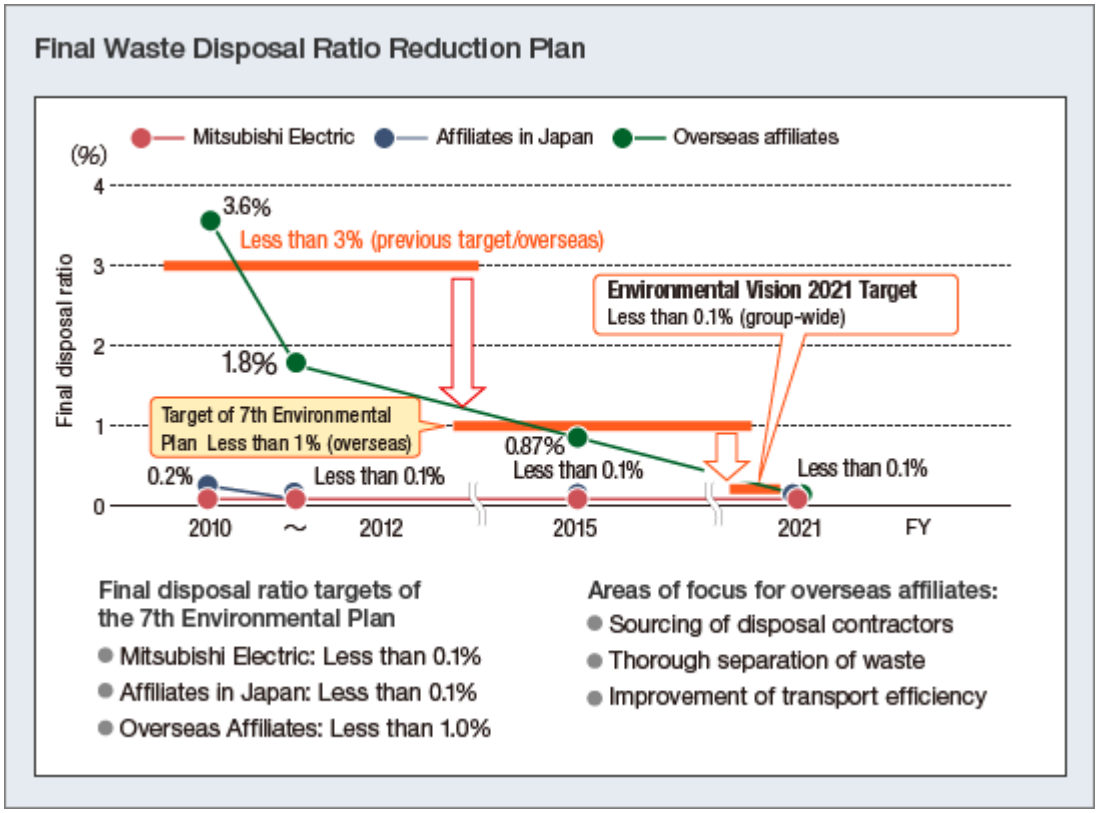
* Including all-in-one computers

Environment – Initiatives toward Zero Final Waste Disposal Ratio

Targets of the 7th Environmental Plan (Fiscal 2013-2015) and Achievements in Fiscal 2015

Mitsubishi Electric and its affiliates in Japan are working to thoroughly analyze and separate waste generated so as to achieve zero final waste disposal. In fiscal 2015, we continued to sustain the previously achieved target of under 0.1% through initiatives such as improving the efficiency of waste transportation and converting waste to materials with commercial value.

For overseas affiliates with high levels of final disposal, we have set a target of under 1.0%. We thoroughly control waste generation, analyze and separate waste at these affiliates, and promote the sourcing of recycling contractors. As a result, the final waste disposal ratio was 0.87%, reaching our goal.



Priority Measures Implemented

1. Thorough Analysis and Separation of Waste

By analyzing and determining types of waste that can be converted to materials of commercial value at our sites, we conducted thorough separation and conversion.

2. Sourcing Disposal Contractors

By sharing information about waste disposal contractors between Mitsubishi Electric and its affiliates in Japan, a higher level of conversion to materials with commercial value was achieved.

At our overseas affiliates, our aim was to mitigate waste generation and conversion to materials with commercial value through thorough separation activities. Accordingly, we confirmed processing conditions for each region and continued collecting information to aid in sourcing waste disposal contractors.

3. Improving Transport Efficiency

Mitsubishi Electric and its affiliates in Japan promoted cooperation between production sites located near each other and more efficient waste (recycling) distribution.

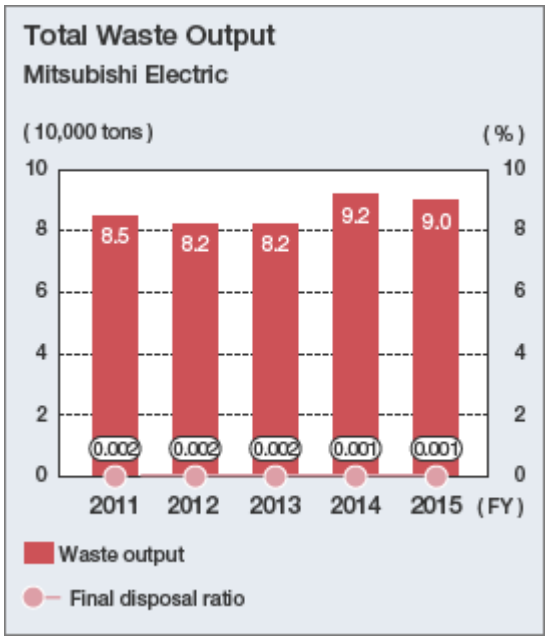
Mitsubishi Electric's Targets and Fiscal 2015 Achievements

Final Waste Disposal Ratio Maintained at Previous Fiscal Year Level of 0.001%, Achieving the Target

As production sites that manufacture different products also generate different types of waste, Mitsubishi Electric addresses waste under the principle of creating plans specific to each site. However, our sites in neighboring regions cooperate in sharing their information and management expertise concerning disposal contractors.

Through such efforts, total waste emissions in fiscal 2015 fell to 90,000t as the result of lower production volumes and recycling scrap metals, thereby enabling us to maintain a final disposal ratio of 0.001%.

Moreover, in fiscal 2015, we expanded the introduction of our waste management system from 26 production bases in fiscal 2014 to their branch offices, thus leading to enhanced legal compliance at sales offices, too.

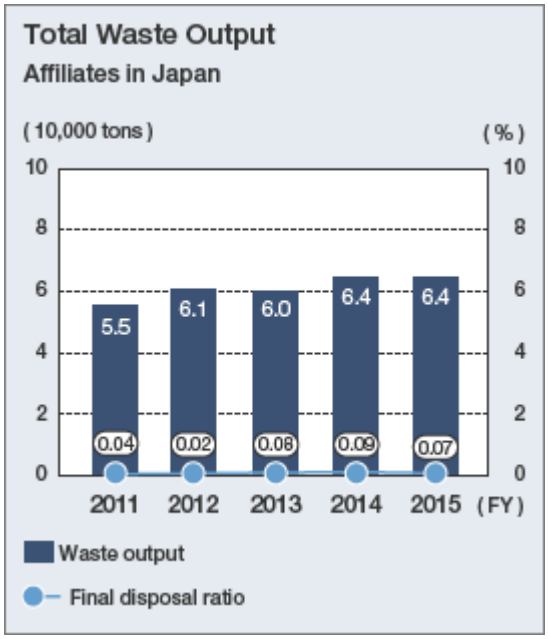


Targets and Fiscal 2015 Achievements for Affiliates in Japan

Final Disposal Ratio Further Improved to 0.07% Compared to Previous Fiscal Year, Achieving the Target

A reduction in waste containing asbestos from discontinued facilities and other factors resulted in a final waste disposal of 64,000t in fiscal 2015 and a final disposal ratio of 0.07%. This is an improvement compared to the previous fiscal year, achieving the target of under 0.1% stipulated in the 7th Environmental Plan.

Additionally, our original waste management system was introduced to 140 affiliates in Japan in fiscal 2015 so as to prevent manifest errors, thus leading to enhanced legal compliance.

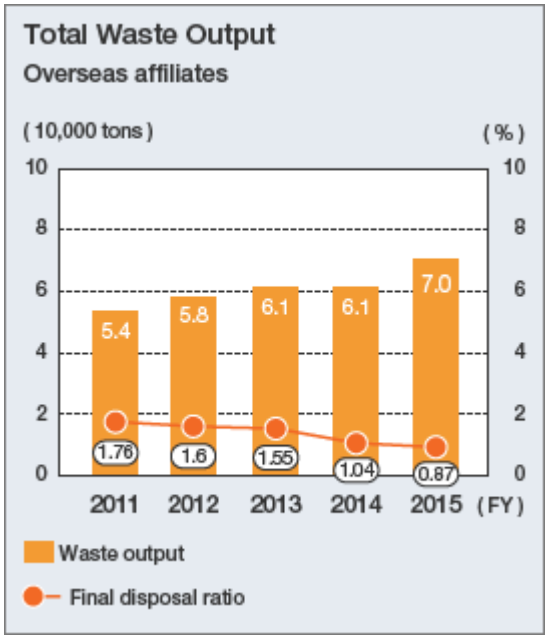


Targets and Fiscal 2015 Achievements for Overseas Affiliates

Final Disposal Ratio of 0.87% Achieves 7th Environmental Plan Target of Under 1.0%

Despite the final waste output rising to 70,000t in fiscal 2015, the final disposal ratio was 0.87%, an improvement of 0.17% from 1.04% in fiscal 2014, thus achieving the 7th Environmental Plan target of under 1.0%.

Regarding overseas affiliates, because laws, regulations, and waste treatment conditions differ among countries and regions, Mitsubishi Electric confirms the processing conditions for each region and develops necessary measures for each overseas affiliate through its auditing activities. To promote recycling, a necessary component in reducing final waste, we share information on best practices, waste separation/collection methods, and waste disposal contractors among our overseas affiliates via ongoing overseas key personnel training. These efforts ensured that we achieved the target.



About the 8th Environmental Plan (Fiscal 2016 to 2018)

For Mitsubishi Electric and its affiliates in Japan, final waste disposal rates have reached the goal. These levels will be maintained over the next three years under the 8th Environmental Plan (fiscal 2016–2018). For overseas affiliates, we are aiming to improve overall performance by selecting priority bases where we should step up efforts for improvement, while affiliates enhance their activities at each location.

The targets for fiscal 2018, the last year of the 8th Environmental Plan, are as follows:

- **Mitsubishi Electric**
  Under 0.1% (maintaining the 7th Environmental Plan target)
- **Affiliates in Japan**
  Under 0.1% (maintaining the 7th Environmental Plan target)
- **Overseas affiliates**
  Under 0.5% (set at half of the 7th Environmental Plan target)

Environment – Reducing the Use of Disposable Packaging Materials

Mitsubishi Electric Group's Fiscal 2015 Achievements

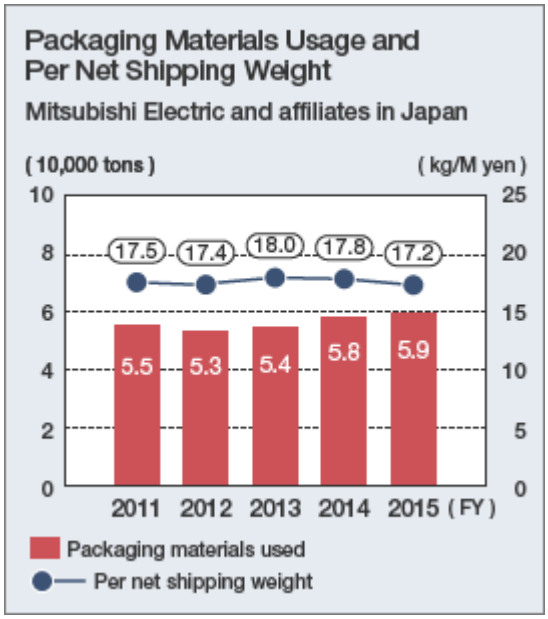
The Mitsubishi Electric Group is improving its logistics work as a part of its just-in-time improvement activities. In this area, we have set a basic principle of reducing the weight of the transport packaging while ensuring safe delivery of our products to customers. Under this concept, we are advancing the 3Rs of packaging: Reduce (simplify packaging), Reuse (expand the use of returnable containers and packaging), and Recycle (recycle used packaging materials).

Mitsubishi Electric and Affiliates in Japan

- **Packaging requirements per volume shipped: 17.2kg/million yen (3.4% reduction compared to previous fiscal year)**
- **Packaging volume used: 59,000t (1,000t increase compared to previous fiscal year)**

For Mitsubishi Electric and affiliates in Japan, packaging requirements per volume of shipment decreased owing to packaging simplification and expanding the use of returnable containers.

At our overseas affiliates, the use of packaging materials by 21 companies totaled 11,900t (an increase of 10,000t compared to the previous fiscal year) as a result of increased shipments. Packaging requirements per volume shipped fell to 140kg/million yen (down 8.5% compared to the previous fiscal year).



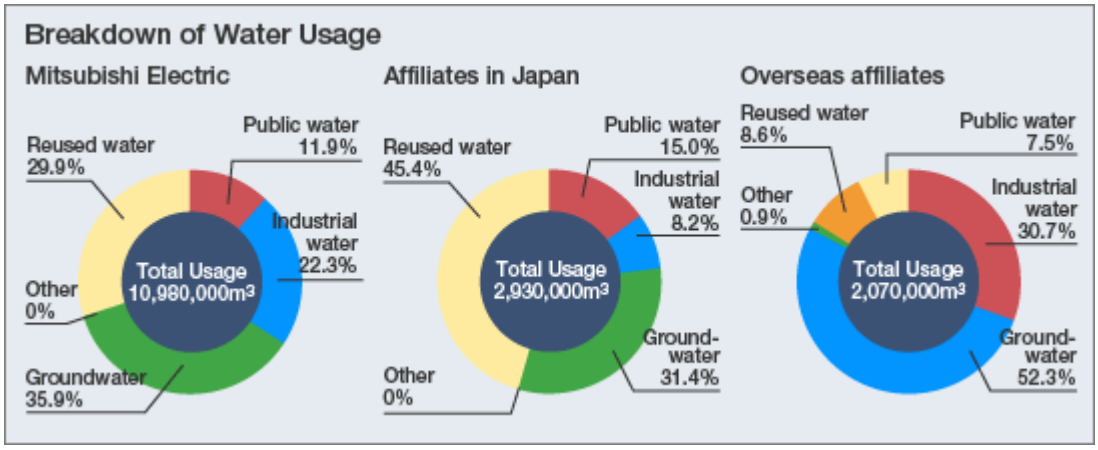
Environment – Using Water Effectively

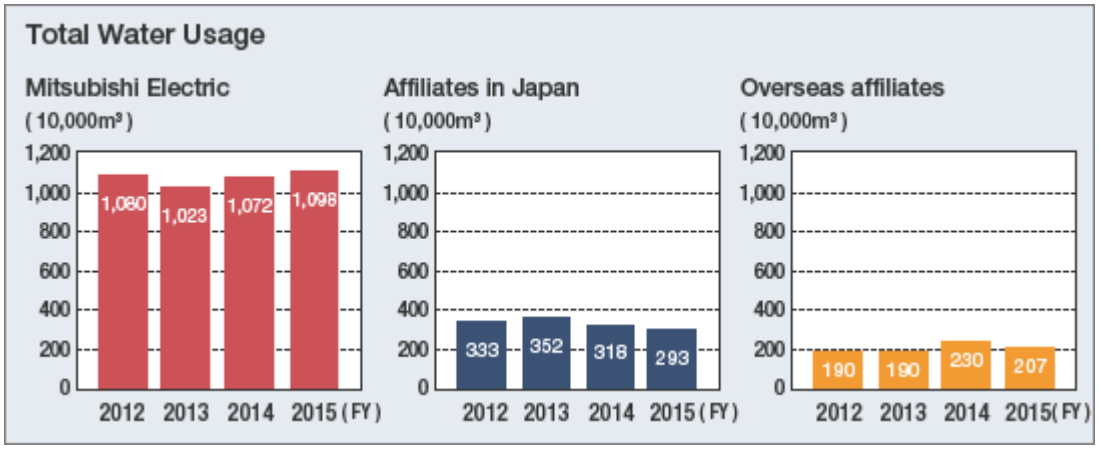
Promoting Water Conservation and Water Recycling in Japan and Overseas

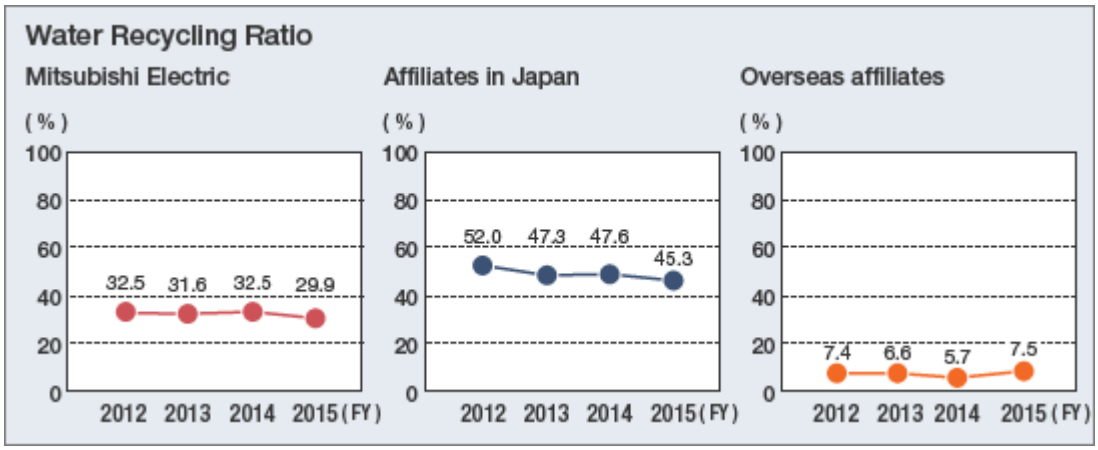
The Mitsubishi Electric Group views public water, industrial water, groundwater, and other sources of water as a valuable resource. We work to assess our water usage at all sites and to conserve and recycle this resource.

In fiscal 2015, Mitsubishi Electric used a total of 10.98 million m3 of water, a 2.4% increase over the 10.72 million m3 used in fiscal 2014. The total volume of water used at our affiliates in Japan was 2.98 million m3, a 7.9% decrease compared to the 3.18 million m3 used in fiscal 2014. The volume of water used at our overseas affiliates totaled 2.07 million m3, a 10% decrease compared to the 2.30 million m3 used in fiscal 2014.

The water recycling ratio was 30.0% for Mitsubishi Electric, 45.0% for affiliates in Japan, and 7.5% for overseas affiliates.







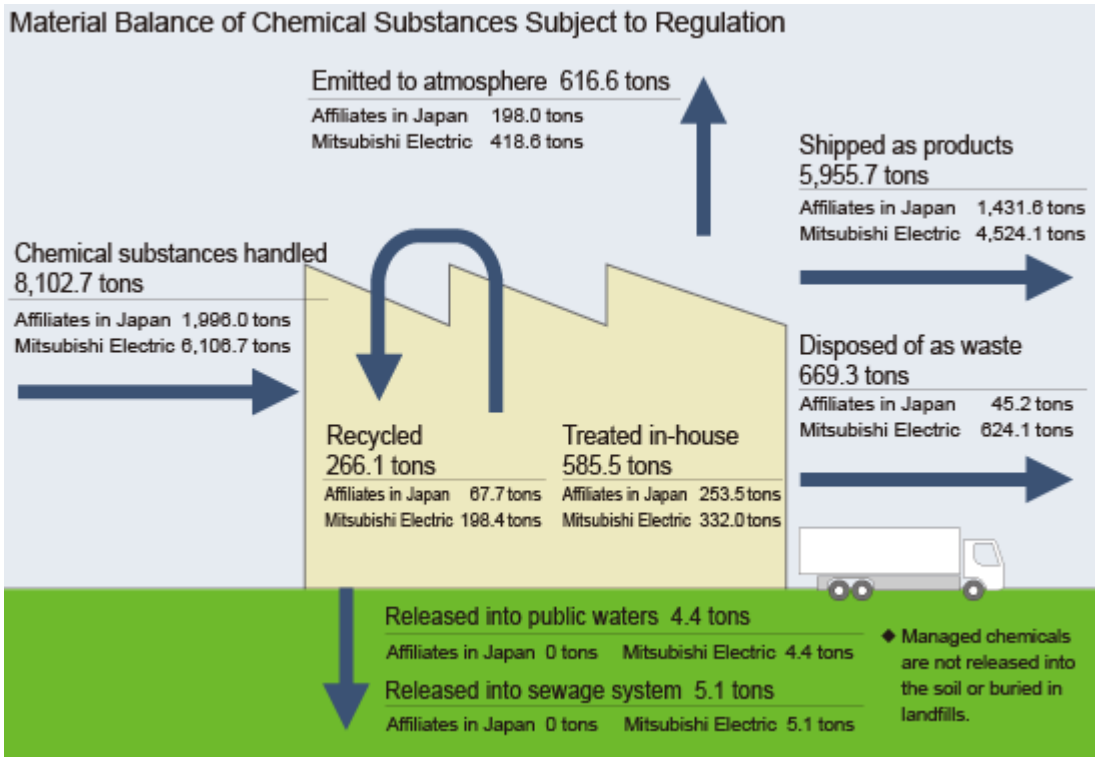
Environment – Managing Chemical Substances

Managing 3,181 Controlled Chemical Substances using Our Own Chemical Substance Management System

Mitsubishi Electric and its affiliates in Japan have been managing chemical substances on a voluntary basis since 1997. These include refrigerant fluorocarbons (HFCs*1 and HCFCs*2) used in air conditioners and refrigerators, volatile organic compounds (VOCs), and the six RoHS substances. Combined with the 462 substances designated under the PRTR Law*3 (PRTR*4) revised in November 2009, the above comprise a current list of 3,181 substances we voluntarily manage under a comprehensive Chemical Substance Management System that includes purchasing information about materials and components.

In fiscal 2015, Mitsubishi Electric used 143 different chemicals totaling 6,107t (fiscal 2014: 144 substances, 7,113t), while affiliates in Japan used 42 substances totaling 1,996t (fiscal 2014: 43 substances, 1,950t). Details on the release and transfer of these substances are shown in the figure below. In the future, we will continue assessing and managing our use of these substances and activities to reduce waste.

*1 HFCs: hydrofluorocarbons.
*2 HCFCs: hydrochlorofluorocarbons.
*3 PRTR Law: Act on Confirmation, etc. of Release Amounts of Specific Chemical Substances in the Environment and Promotion of Improvements to Their Management.
*4 PRTR: Pollutant Release and Transfer Register, a system by which businesses assess and report to authorities the volume of potentially harmful chemical substances released into the environment and the volume transferred within waste. Authorities, in turn, compile and release information on total volumes based upon the reports and other statistics.



Environment – Development of Environmental Technologies

The Mitsubishi Electric Group conducts environmental technology research and development with the aim of providing products and services that will help protect the environment. The results of R&D in fiscal 2015 are as follows.

Water Recycling Technologies

Recycling Industrial Wastewater and Sewage Water at Low Cost

In January 2015, Mitsubishi Electric announced a new water treatment technology. This technology uses electrodes to discharge electricity into a gas/liquid interface,*1 thus generating OH radicals.*2 This oxidizing process is utilized for surface-acting agents and other substances that do not break down readily in chlorine and ozone, breaking them down in carbon dioxide or water. By applying this technology to the treatment and recycling of industrial wastewater and sewage, we are contributing to the realization of a sustainable water-recycling society.

*1 Interface where liquid meets gas such as in the form of wastewater and air.
*2 Hydroxyl radical: an oxygen/hydrogen compound and oxidant with extremely strong oxidizing capability.

News Release

January 27, 2015

- Mitsubishi Electric Develops Novel Water Treatment Technology using Gas/Liquid Interfacial Discharge

Lifestyle Energy-related Technologies

World's First Power Conditioner for "Mix" EV, PV and Commercial Power Developed

In July 2014, Mitsubishi Electric announced four power conditioner models for electric vehicles (EV), the SMART V2H. This product has expanded the concept of applying EV storage batteries as household power sources even further, monitoring EV power, solar power and commercial power respectively. It can charge or discharge the EV battery while adjusting the power supply from other sources, making it the world's first product to optimally control EV power supply.*1*2.

*1 Current as of July 1, 2014. According to Mitsubishi Electric's in-house investigation of Vehicle-to-Home (V2H) systems.
*2 There is no grid connection certification system for this product, and individual grid connection deliberation is required with power companies. Therefore, monitors are available for purchase by way of individual application with Mitsubishi Electric distributors. Moreover, due to this product's specifications, it cannot be installed in regions with snow accumulation, cold regions or regions susceptible to salt damage.

Highly Efficient Power Conditioners for Household Solar Power Generation Systems

Since November 2014, Mitsubishi Electric has gradually launched three new models of a power conditioner for household solar power generation systems. Among the three models, PV-PN44KX incorporates a full-SiC-IPM,*1 in which the power semiconductor device has been entirely converted to SiC (silicon carbide), achieving the industry's highest*2 power conversion efficiency (98.0%) and improved rated output (4.4 kW).

*1 Intelligent Power Module: A high-performance power semiconductor module with a built-in drive circuit and protection circuit.
*2 Current as of July 24, 2014. According to Mitsubishi Electric's investigation into the power conversion efficiency of power conditioners for household use. PV-PN44KX's rated load efficiency as stipulated by JIS C 8961.

New HEMS Product Introduced – Significantly Improved Energy-saving Support and Visualization Function

Mitsubishi Electric launched the HM-ST03—a new HEMS product—in October 2014. In addition to being equipped with an industry-first automatic charging function corresponding with the owner's plans to drive the electric vehicle (EV), the display screen relating to energy status has been enhanced and the visualization function, which also serves as a display unit for solar power generation systems, has been significantly improved. Up to 14 products are connectable with this product—the highest number in the industry*--enabling a more comfortable energy-saving experience.

* Highest number of connectable products in the industry is 14. (Current as of August 19, 2014 and in accordance with Mitsubishi Electric's in-house investigation).

Reusable Energy-related Technologies

Lidar Product Contributing to the Higher Accuracy Forecasting of Wind Power Generation Capacity Developed

In May 2014, Mitsubishi Electric announced its independently developed wind measurement lidar.*1*2 The lidar is a device that uses laser technology to measure wind status from the ground. It is also used in the installation of wind farms. By offering a lidar product that cannot only be used offshore, but also achieves reduced cost and effort compared to the conventionally-mainstream cup-type wind gauges, Mitsubishi Electric is responding to the need for higher accuracy, higher efficiency wind status measurement.

*1 Certified in April 2014 as satisfying the criterion necessary for installation in the wind power industry through a third-party evaluation by the Energy Research Center of the Netherlands (ECN), a research body for reusable energy technologies.
*2 Satisfied the lidar specification conditions required by NORSEWInD, Europe's major offshore wind power R&D project.

News Release

May 28, 2014
- Mitsubishi Electric's Compact Wind Lidar Approved by Dutch Energy Body

Technology to Increase Stability of Solar Power / Wind Power Generation Systems Developed

In fiscal 2015, Mitsubishi Electric announced multiple technologies and products to increase the stability of solar and wind power generation and promote the utilization of reusable energy. In August of 2014, the Company announced the SVC-Diamond™, a self-excitation reactive power compensation device that solves the problem of power grid instability when reusable energy is introduced. Furthermore, in February 2015, we developed a world-first technology that features early detection of DC arc faults* in solar power generation systems, identifies the failing circuit and momentarily isolates it.

* The phenomenon of electrical discharge of a high temperature (several thousand °C) occurring in line with strong light radiation when the circuit with direct current is separated.

News Releases

February 17, 2015
- Mitsubishi Electric Develops DC Arc-fault Circuit Protection Technology for Solar Power Plants

August 25, 2014
- Mitsubishi Electric Develops SVC-Diamond Static Synchronous Compensator

Next-generation Power Semiconductors

Mitsubishi Electric Launches 2 New SiC Modules

In July 2014, Mitsubishi Electric launched the Super-mini Full SiC DIPPFC, a power semiconductor module for household appliance products. The SiC DIPPFC uses silicon carbide (SiC) for both its transistors and diodes. Through the transition to full-SiC, power loss is reduced by approximately 45% and the innovated design contributes to the simplification of circuits. In November, Mitsubishi Electric also launched the Large Hybrid SiC DIPIPM for photovoltaic (PV) systems, which reduces power loss by approximately 25% through using SiC for its diodes.

Expanding Power Semiconductor Product Lineup for EV/PHV

In fiscal 2015, Mitsubishi Electric announced three new power semiconductor modules used in the inverter drives of electric vehicles (EV) and hybrid electric vehicles (HEV). Two J1-Series products and the CT300DJG060, a new J-Series T-PM*1 extra-compact model, were released as samples in October 2014 and February 2015, respectively. The CT300DJG060, in particular, has a highly integrated design that achieves a smaller footprint and weight reduction of approximately 36% and 42%, respectively compared to the Company's conventional products.*2 Conductive loss has also been reduced.*3

*1 Transfer molded-Power Module: Transfer-molded power semiconductor module.
*2 J-Series CT300DJH060 automotive power semiconductor module.
*3 Approximately 12% reduction in collector-emitter saturation voltage compared to our conventional products.*2

News Releases

February 12, 2015
- Mitsubishi Electric to Release Sample J-Series T-PM Extra Compact Type

July 22, 2014
- Mitsubishi Electric to Add Two New Power Modules to J1-Series Lineup

Promoting Lower Loss Power Semiconductor Modules for Inverter Drives

In September 2014, Mitsubishi Electric launched the 1,200V Large DIPIPM™*3 Ver.6 Series and 1,200V Mini DIPIPM™ Series as new power semiconductor modules for the invertor drives of package air conditioners and industrial motors. Compared to our conventional products,*1 these new models reduce loss by 10%.*2 Moreover, in March 2015, we launched the Super-mini DIPIPM™ Embedded with SJ-MOSFET*4 power semiconductor module for inverter drives. Incorporated in the inverters of three new air conditioner models, power loss in the invertor systems has been reduced by approximately 14%.*5

*1 Large DIPIPM Ver. 4 Series (5A-35A rating).
*2 Compared to PSS25SA2FT (25A/1200V) and Mitsubishi Electric's Large DIPIPM Ver. 4 PS22A76 (25A/1200V).
*3 Dual-In-Line Package Intelligent Power Module: An intelligent power semiconductor module equipped with built-in control devices featuring a protection function.
*4 Super-Junction Metal-Oxide-Semiconductor Field-Effect Transistor: MOSFET refers to a field-effect transistor. Compared to conventional power MOSFETs, this device has improved balance between device voltage resistance and on-resistance and can significantly reduce loss.
*5 Compared to Mitsubishi Electric PSM15S92F6 (15A/600V) (Super-mini DIPIPM Embedded with SJ-MOSFET).

News Releases

March 4, 2015
- Mitsubishi Electric to Add Three New Power Semiconductor Modules to Lineup of Super-mini DIPIPM Embedded with SJ-MOSFET

June 30, 2014
- Mitsubishi Electric to Launch 1,200V Large DIPIPM Ver.6 and 1,200V Mini DIPIPM

Launching New Power Semiconductor Products in Various Fields

In fiscal 2015, Mitsubishi Electric released power semiconductors contributing to reduced device power consumption in various fields. In addition to announcing the RD04LUS2, a new high-frequency silicon device used for the power amplifiers of commercial two-way radios, in August and December of the same year we also announced power semiconductor modules for 3-level inverters, such as the PV power conditioner, for application in large-capacity industrial equipment.

News Releases

December 25, 2014
- Mitsubishi Electric to Launch Power Semiconductor Modules for 3-level Inverter

August 28, 2014
- Mitsubishi Electric to Launch 3.6V High-power MOSFET for Commercial Two-way Radio Devices

Environmental Products & Services

ALOS-2 and Himawari-8 Satellite Development Completed

Since Mitsubishi Electric became involved, development has advanced of the ALOS-2, a terrestrial observation satellite for the Japan Aerospace Exploration Agency (JAXA), and Himawari-8, a geostationary meteorological satellite for the Japan Meteorological Agency. Both were completed in fiscal 2015: the former successfully launched on May 24, 2014 and the latter on October 7 of the same year. Both satellites incorporate Mitsubishi Electric's observation and communication technologies, thus offering significantly improved observation accuracy and scope, data processing speed and so on compared to their predecessors. The data obtained is anticipated to be utilized in various fields, including disaster response.

News Releases

August 22, 2014
- Mitsubishi Electric Ready to Deliver Himawari-8 to Tanegashima

May 23, 2014
- Mitsubishi Electric Develops ALOS-2 Satellite System

Communication Laser Reducing Power Consumption in Optical-fiber Communication Devices Developed

In March 2015, Mitsubishi Electric developed a distributed feedback (DFB) laser*2 diode for 25Gbps optical-fiber communication as a light source device for transmission used in high-speed optical-fiber communication with a transfer rate of 100Gbps.*1 Compared to the conventional product,*3 the new product can maintain high output even under high temperatures (+85°C), thus contributing to reduced power consumption of optical-fiber communication devices as device cooling is not required.

*1 Gigabits per seconds: Unit for the communication rate of digital data transmission medium expressed in billions of bits per second.
*2 Distributed feedback laser. Has a diffraction grating within the laser and extracts optic signals of a specific wavelength.
*3 Comparison with ML768K42T, the DFB laser for 310Gbps optic-fiber communications.

News Release

March 19, 2015
- Mitsubishi Electric Develops DFB Laser Diode for 25Gbps Optical-fiber Communication in 100Gbps Systems

High-Efficiency inverter Optimal for Fan/Pump Applications

In July 2014, Mitsubishi Electric launched the FREQROL-F800 Series, a general-purpose inverter product. This series of inverters is equipped with optimal functions for fan and pump applications. In addition to having an improved motor efficiency of approximately 15%*1 due to the newly-developed advanced optimal excitation control, it has also achieved a reduction in hold power of up to 70%*2 due to self-power management through external power supply.

*1 Compared to conventional FR-F700P Series. In the case of a motor rated output of 15kW when motor load torque is at 10% and the FR-F820-15K is combined with a high-efficiency motor (SF-PR 15KW 4P).
*2 Compared to conventional FR-F700P Series when used with V/F control. If FR-F820-37K is used and motor rating output is 37kW.

New Outdoor-Air Processing Unit Increases Energy-saving Performance of Air Conditioners in Buildings

In September 2014, Mitsubishi Electric launched 10 new models of the new product, Lossnay Outdoor-Air Processing Unit for commercial use. The unit comprehensively processes outdoor-air, including full heat exchange ventilation, humidification (heating) and dehumidification (cooling) when used in combination with an outdoor unit of a multi-air conditioner for buildings. By adopting new technologies, this product achieves one of the highest humidification volumes* in the industry and features a variety of energy-saving assist functions to significantly improve the energy-saving effect.

* Current as of July 23, 2014 and in accordance with Mitsubishi Electric in-house investigation. In regards to direct-expansion full heat conversion ventilators for commercial use in Japan with ceiling-embedded humidification and heating. 1.2 times compared to Mitsubishi Electric conventional product, LGH-N50/80/100RDF.

Realization of the World's First Large-Capacity Thermal Power Generator Applying a Hydrogen Indirect Cooling Technique

In December 2014, Mitsubishi Electric completed verification tests of the VP-X Series, a new turbine generator for thermal power stations, and launched the series in April 2015. This product is the first 900MVA-class large-capacity generator in the world*2 to apply the hydrogen indirect cooling technique.*1 In addition to achieving one of the highest cooling efficiency rates in the world (99%) by utilizing our unique technologies, we have reduced the product size by 20% through optimal configuration, improving other environmental performance elements as well.

*1 Hydrogen gas is used to indirectly cool the heat-emitting stator coil. This reduces water consumption compared with cooling methods that use (pure) water.
*2 Current as of December 8, 2014 and according to Mitsubishi Electric in-house investigation.

News Release

December 8, 2014

- Mitsubishi Electric Verifies VP-X High-efficiency Turbine Generator

Environment – Environmental Communication

Disclosure and Dissemination of Environmental Information

A look at the various communications published in fiscal 2015, including disclosures on the results of our environmental initiatives, promotion of Eco Changes, participation in environmental exhibitions, and environment-related advertisements.

Mitsubishi Electric Outdoor Classroom

Here, we introduce fiscal 2015 examples of the Mitsubishi Electric Outdoor Classroom, our own unique program in which employees take the role of teachers educating others on the wonders of nature.

Environment – Disclosure and Dissemination of Environmental Information

Providing Environmental Information Online and through Corporate Publications

Since 1998, Mitsubishi Electric has continuously reported on its environmental objectives and achievements through a combination of detailed data and case studies. Mitsubishi Electric also runs an informative site aimed at elementary school students, through which students can enjoy learning about environmental issues.

Environmental Report Website

- Japanese language website

- Global website

- "Eco-Planet" website for children

Environmental Sustainability Report

Japanese language version

English language version

Chinese language version

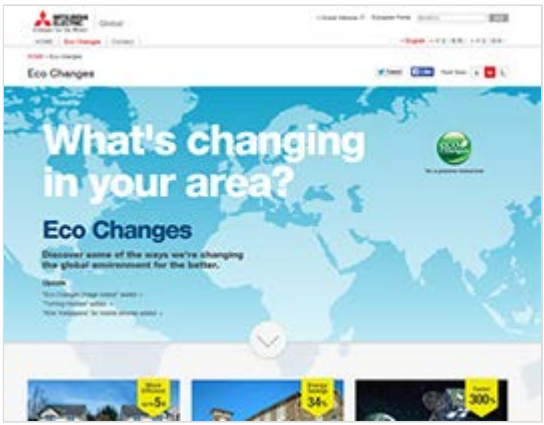
"Eco Changes" Statement

In June 2009, we announced the environmental statement for the Mitsubishi Electric Group in Japan: "Eco Changes – from in the home to outer space." This statement expresses the Group's stance on environmental management. We also launched a dedicated website to introduce a variety of Eco Changes initiatives. The website hosts content from the Eco Changes Lab, by which visitors can learn about Eco Changes through comics and games, making it enjoyable and easy to understand for every age group.

For overseas markets, we established the statement "Eco Changes – for a greener tomorrow" in June 2010 and a separate catch-phrase for China "*jing yu jie neng, jin xin huan bao*," which translates as "experts in energy conservation, dedicated to environmental protection," in April 2012, as part of our broad efforts to roll out environmental communications in areas around the world.

Eco Changes Website

Japanese language website



Global website

Environmental Statement Booklet

Japanese language version

English language version

Chinese language version

Examples of Environmental Communications around the World

Global

A corporate advertising campaign was launched in October 2012 to communicate the advanced environmental technologies and products of Mitsubishi Electric to a global audience. So far, advertisements relating to Eco Changes have primarily focused on our stance as a leading green company. As the next step, the new global corporate advertisements will showcase specific products and technologies, while citing examples and quantitative figures. In fiscal 2015, we released three new Eco Changes corporate videos for overseas release. A video was made on each of the following themes; "Evaluation Facilities for Air Conditioning Cryogenic Systems for Households in Scotland, U.K.", "Air Conditioning Hot/Cold Simultaneous Operation" and "Satellite Himawari". Production of the videos focused on achieving straightforward content through the use of pantomimes and other forms of expression.


Corporate video

China

In April 2012, we launched Eco Changes in China under a new environmental statement, "*jing yu jie neng, jin xin huan bao,*" which translates as "experts in energy conservation, dedicated to environmental protection." Beginning in August 2014, we started a series of corporate advertisements under the theme of "One Mitsubishi Electric Declaration." This advertising campaign declares our stance as a company that provides one-stop solutions from all angles, including the realization of comfortable lifestyles for people, eco-conscious town-building, and leading business support by maximizing the overall strengths of the Mitsubishi Electric Group based on our business activities.

Corporate advertising in China

Asia

In Asia, we have developed ads that emphasize our activities to change the environment around the world through our businesses and products.

Corporate advertising in India

Europe

In the various countries of Europe, corporate advertising is a tool by which we not only introduce our products and businesses, but also promote environmental communication initiatives.

Corporate advertising has been officially launched in Russia

The Americas

In North and South America, Mitsubishi Electric promotes Eco Changes through magazines advertisements, TV commercials, and other forms of media.

Corporate advertising in Brazil

Japan

We promote Eco Changes using a variety of media to help raise its visibility. In addition to releasing a variety of corporate advertisements in fiscal 2015, we began online advertising to generate further interest in our Eco Changes site.

Corporate advertisement for newspapers and magazines

Global corporate advertisement (Japanese version)

- Eco Changes site

Various promotional contents can be viewed in the Promotion Gallery on our Eco Changes site.

- Key Technologies site

This site introduces environmental technologies through easy-to-understand animated videos

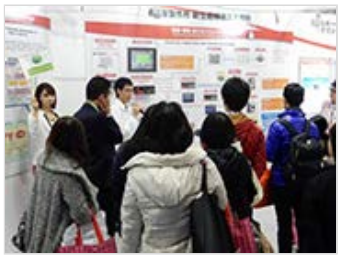
Content on the Eco Changes site

- Kids of Today: Mitsubishi Electric's Eco Changes

Environmental Exhibitions

Eco-Products 2014 (Japan)

Mitsubishi Electric exhibited during Eco-Products 2014, held at Tokyo Big Site on December 11-13, 2014. At this event, we promoted a wide-range of pioneering environmental technologies and products through a combination of model displays and actual demonstrations in the two zones of Building and Factory Energy Conservation and Environmental Technologies for Lifestyle & Society. In the Building and Factory Energy Conservation Zone, we promoted the environmental benefits of utilizing our products at our business sites, such as the results of initiatives by the new production building at Nagoya Works, which commenced operation in 2014 as the latest energy-saving model plant. In the Environmental Technologies for Lifestyle & Society Zone, we gave demonstrations of micro-hydropower generation and featured virtual images that simulated the actual size of artificial satellites, both of which were popular with a wide-range of visitors, from children to businesspeople. In addition, we also held a workshop for children as a continuation of the previous fair. Under the theme of "making electricity from everyday objects" we sparked children's interest in science through a saltwater battery making experiment.


Exhibition booth

Teaching materials used in workshops

Advertisement to encourage attendance

Environment – Mitsubishi Electric Outdoor Classroom

The Mitsubishi Electric Outdoor Classroom is one of the directives of "fostering environmental awareness" which focuses on protecting biodiversity as part of our Environmental Vision 2021. Under the 7th Environmental Plan as well (fiscal 2013-2015), we engaged in the expansion of target locations and development of employee leaders who will promote activities.

Achievements in Fiscal 2015

Overview

In fiscal 2015, Mitsubishi Electric Outdoor Classrooms were held in 32 locations a total of 35 times. The classroom is run with the cooperation of local nurseries, kindergartens, and orphanages, as well as the local government and NPOs.

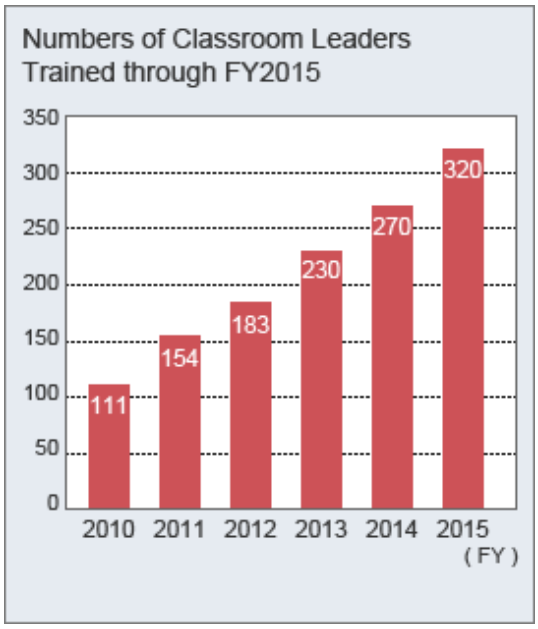
Leader development courses were carried out twice and 50 new outdoor classroom leaders emerged. Up until now, 320 people have participated in our outdoor classrooms. Mitsubishi Electric had planned to hold the outdoor classrooms at all business sites (head office, branches, and plants) by fiscal 2015; however, this target has now been reset to fiscal 2016. From this fiscal year, we are focusing our strengths on leader development and—at the same time—the quality of regional leaders has become much higher, which has the result of heightening the skills of existing leaders.

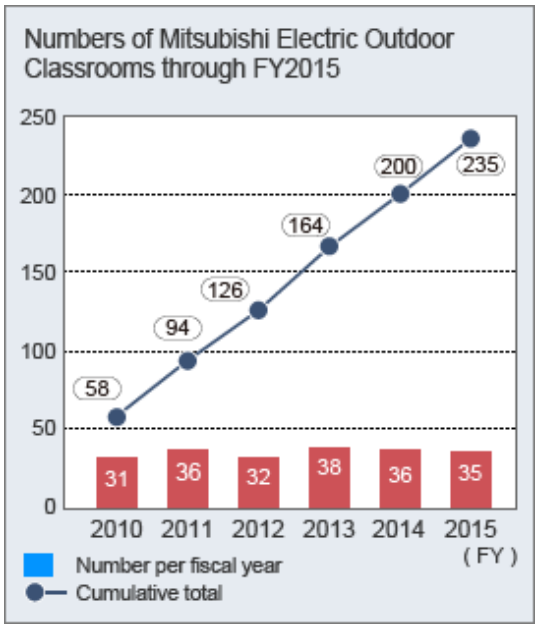
Affiliates in Japan

Affiliates in Japan have been developing outdoor classroom leaders since fiscal 2011, and nine new leaders emerged in fiscal 2015. These leaders participate in Mitsubishi Electric Outdoor Classrooms and promote joint management.



An outdoor classroom held at the "Sea Forest" in Tokyo Bay





Including affiliates in Japan

Basic Policy and Approach to Environmental Management Mitsubishi Electric Outdoor Classroom

Basic Policy and Approach to Environmental Management Training of Environmental Personnel

Environment – Environment Site Map

Mitsubishi Electric's environmental initiatives are introduced in four parts: "Basic Policy and Approach to Environmental Management", "Environmental Report", "The Environment and Business" and "Environmental Topics."

From the President

Key points of Mitsubishi Electric's 7th Environmental Plan, and Environmental Managements to be a global leading green company.

Chinese language version of the above page:

- 领导致辞

Basic Policy and Approach to Environmental Management

Environmental Policy, Vision & Plan

- Group Environmental Policy
- Environmental Statement: Eco Changes
- Environmental Vision 2021
- Aiming to Become a Global Leading Green Company
- Environmental Plan
- Product Environmental Data
- Procurement
- Creating a Society in Tune with Nature

Features and Initiatives of Environmental Management Aiming to

- Important Issues in Environmental Management
- Environmental Management Structure
- Environmental Audits
- Training of Environmental Personnel
- Environmental Risk Management

Environmental Report 2015

Specific Targets and Achievements in Fiscal 2015

- Targets and Achievements of the 7th Environmental Plan (Fiscal 2013–2015)

Chinese language version of the above page:

- 第7次环境计划（2012-2014年度）目标与成果

Initiatives for Environmental Conservation

- Environmental Considerations for Value Chain Management
- Reducing Greenhouse Gases Emitted in the Value Chain
- Reducing CO_2 from Product Usage
- Expanding Our Contributions to Reducing CO_2 from Product Usage
- Reducing CO_2 from Production
- Reducing Emissions of Non-CO_2 Greenhouse Gases
- Reducing CO_2 from Logistics
- Reducing Use of Resources

- Recycling End-of-Life Products
- Initiatives toward Zero Final Waste Disposal Ratio
- Reducing the Use of Disposable Packaging Materials
- Using Water Effectively
- Managing Chemical Substances
- Development of Environmental Technologies

Environmental Communication

- Disclosure and Dissemination of Environmental Information
- Mitsubishi Electric Outdoor Classroom

Product Environmental Performance and Environmental Impact Data

- Energy & Electric Systems
- Industrial Automation Systems
- Information & Communication Systems
- Electronic Devices
- Home Appliances

Scope of Report and Data

- Period and Scope of the Report
- Material Balance
- Environmental Accounting
- Environmental Performance Data
- Awards

Chinese language version of two of the above pages:

- 关于报告期间与范围
- 物料衡算

The Environment and Business

The policy of environmental-based social contribution and initiatives in all business groups.

- Public Utility Systems Group
- Energy & Industrial Systems Group
- Building Systems Group
- Electronic Systems Group
- Communication Systems Group
- Living Environment & Digital Media Equipment Group
- Factory Automation Systems Group
- Automotive Equipment Group
- Semiconductor & Device Group
- Information Systems & Network Service Group

Environmental Topics

- **New Energy Potential — A Wireless Sensor Powered by Small Vibrations**
  Office Building Energy Savings Simulation Technology

- **Plastic Recycling Comes of Age**
  Creating an entirely new and viable eco-business, Japan's first large-scale, high-purity plastic recycling

center. It's the genesis of a sustainable recycling industry, expected to thrive as a mission-critical business for a recycling-based society.

- **Tapping into Hidden Deposits of Rare Earth Elements Found in Cities**

Mitsubishi Electric Group developed a system that can efficiently recover rare earth magnets used in the compressors of household room air conditioners and began recycling this precious commodity.

- **Kyoto Works Becomes Home to a Family of Ducks**

June 2012. Kyoto works, one of our factories discovered a duck was building a nest. In the beginning of July, 7 cute chicks were hatched. Parent duck and chicks moved to paddy field nearby with our staff watching over them.

- **Water for Life, Water for Industry**

Mitsubishi Electric leads Japan in the development and implementation of systems for wastewater treatment in manufacturing, water purification for public consumption, and more effective industrial cleaning processes.

- **Archives**

Environmental Sustainability Report

Environment – The Environment and Business

As a global, leading green company that contributes to creating a more affluent society, Mitsubishi Electric works together with members of the Mitsubishi Electric Group to develop products and technologies that are helping to realize a low-carbon, recycling-based society. These efforts can be witnessed in all areas of business and are an important factor in supporting the Group's growth strategy.

Here, we provide an outline of each business group and their priority environmental issues, and introduce the measures and initiatives implemented to reduce environmental impact.

Public Utility Systems Group

Energy & Industrial Systems Group

Building Systems Group

Electronic Systems Group

Communication Systems Group

Living Environment & Digital Media Equipment Group

Factory Automation Systems Group

Automotive Equipment Group

Semiconductor & Device Group

Information Systems & Network Service Group

Environment – Public Utility Systems Group

Business Overview and Priority Environmental Issues

Providing a Wide Range of Key Products for Social Infrastructure, Including Water Treatment, Roadway, and Rolling Stock Applications

Mitsubishi Electric's Public Utility Systems Group offers an extensive range of products and services used in public utilities and transportation to governments, highway and railway operators, and a host of other companies involved in social infrastructure. These solutions include water treatment plant systems, intelligent transport systems, railway information systems, and electromagnetic products for rolling stock. Our aim is to manufacture products that are smaller, weigh less, provide better performance, and operate with higher efficiency, thereby reducing environmental impact by consuming fewer resources and using less electricity.

In recent years, we have also placed a focus on next-generation infrastructure. Our efforts include introducing solutions to fully optimize the energy used by railways, initiatives for the smart community business, and energy-saving business related to water treatment processes. At sites such as the Kobe Works, Itami Works, Nagasaki Works, and overseas affiliates-where operations include designing and manufacturing products and systems-energy consumption has been reduced by introducing improvements in areas like facilities, testing, and distribution. Initiatives for preventing soil and water pollution, including carefully managing the toxic substances used in painting facilities, have been implemented as well.

Priority Environmental Issues

- Climate change
- Air, water, and soil pollution due to operations and procurement
- Proper management of chemical substances in design and manufacturing

Message from Public Utility Systems Group

Helping Build Next-Generation Social Infrastructure with a Broad Range of Technologies and Continuous R&D in Order to Realize the Vision of a Low-Carbon Society

Mitsubishi Electric's Public Utility Systems Group provides a host of products that serve a vital, long-term role in social infrastructure, including water treatment facilities, roadways, and rolling stock. As part of this, while ensuring high quality and functionality in design/manufacturing, we are continuing to promote a reduction in the use of resources and power through size/weight reductions and higher performance/efficiency as the basis for our aim to realize a low-carbon society.

Takahiro Kikuchi
Executive Officer
In Charge of Public Utility Systems

In recent years, we have seen heightened expectations toward the development of next-generation social infrastructure that makes full use of renewable energies and information and communication technologies (ICT), which supports greater power supply efficiency and optimization. In response, we are working diligently on total energy and environmental solutions for railways.

As part of our commitment to the full optimization of energy consumed by railways utilizing ICT, we have developed new energy technologies, and produce and store energy for train energy management systems (TEMS), station energy management systems (SEMS), factory energy management systems (FEMS), and railway energy management systems (REMS).

We are also focusing on the potential of smart communities, which will achieve stable supplies of energy using a combination of renewable energy and off-grid power sources. Another initiative includes energy-saving water treatment processes such as the development of a new water treatment technology that efficiently generates hydroxyl (OH) radicals*1 via electrical discharge at the gas-liquid interface. The OH radicals are used to treat materials normally difficult to break down in wastewater, and enable effective water treatment using simplified configurations.

Going forward, Mitsubishi Electric's Public Utility Systems Group stands firmly committed to making society safer and more convenient for everyone by making full use of its wealth of proprietary technologies and strengths in technological development.

*1 OH (Hydroxyl) radicals are an oxidant with extremely strong oxidizing capabilities.

Initiatives Contributing to the Environment and Society

Total Energy and Environmental Solutions for Railways

As part of our commitment to the total optimization of energy used by railways, we are helping to realize the vision of a low-carbon society.

- **Production of Inverter Incorporating Large-capacity, Full SiC Power Module for Rolling Stock**
  One of our production initiatives was manufacturing an inverter equipped with a full-SiC power module for use in rolling stock. Compared to the insulated gate bipolar transistor (IGBT) power module used to date, the new module increases regenerative energy, significantly reduces losses during power generation, and is much smaller and lighter than its predecessor. The new product was launched in the market at the end of fiscal 2015.
  - Power loss reduced approximately 55%, volume/weight reduced approximately 65%
  - Energy savings of approximately 30% achieved for overall rolling stock system including electric motors

Inverter with large-capacity, full-SiC power module for rolling stock

- **Production of station auxiliary power system**
  We have produced and introduced to the market a station auxiliary power system that is capable of supplying the regenerative electric power generated when rolling stock is braking directly to a station's electrical facilities (lights, air conditioners, elevators, etc.). This fiscal year, we are planning to develop a hybrid version that combines a storage battery with the power system and a model that is 40% smaller.

- **Traction Energy Control System**
  We are developing the Traction Energy Control System, which uses ICT to control overhead voltage based on a railcar's operating status. This system sends information on railcar position and operations in real-time via an information-communication network to a land-based management system that controls substation output, station auxiliary power systems, and electricity storage systems. The ultimate goal of the solution is to minimize energy consumption across an entire railway system.

Smaller, Lighter Air-conditioning System for Rolling Stock

We introduced smaller-diameter piping and achieved a 20% reduction in heat exchanger size, thereby enabling the production of a more compact air-conditioning system. Additionally, to help prevent global warming caused by depletion of the ozone layer, our aim is to reduce environmental impact by promoting the use of an alternate refrigerant that has a zero ozone-layer depletion factor.

Air-conditioning system for rolling stock

Lightweight Automatic Platform Gates Realized

The size and thickness of the steel plating used for automatic platform gates were reduced, achieving a lightweight design and modified structure without sacrificing passenger safety. We also made improvements in the control method for cutting electrical current to the motor when the doors are closed (not in operation), reducing standby power by approximately 50%.

Highly Efficient, More Compact Ozone Generator Realized

Our ozone generators are being used in advanced water treatment processes and paper pulp bleaching because of their superior oxidation and ability to eliminate bacteria, odors, and colors. The more compact and higher efficiency design was achieved through the use of narrower electrodes and shorter gaps developed for oxygen sources at the air source. This new design results in a 15% cut in system power consumption.

Ozone generator

Development of Water Treatment Technology Utilizing Gas-Liquid Interface Electrical Discharge

Mitsubishi Electric has developed a water treatment technology that uses gas-liquid interface electrical discharge to generate OH radicals. OH radicals are used to treat persistent organic substances in wastewater, and enable the production of water treatment systems with simplified configurations. By applying an electrical discharge process directly to wastewater flowing along an inclined surface, OH radicals are generated at the gas-liquid interface—the boundary between liquid and gas—and in the liquid itself, thus enabling efficient water treatment. This technology doubles the energy efficiency of the conventional technique and can reduce operating costs.

Development of an Energy Management System

We have developed a function that enables optimal energy supply by predicting power demand—based on factors such as past usage results and weather forecasts—and combining power sources like commercial power, photovoltaic power, and storage batteries. Moving forward, the plan involves practical application of the smart energy system in initiatives for building management systems, water treatment plant systems, etc.

Reducing Power Consumption and Weight of Aurora Vision

Through increased efficiency of the power and drive circuit for LED drive, optimization of drive voltage, and launch of high-efficiency LED, we have reduced power consumption per unit of area by 3%. Moreover, by reducing the number of components through efforts such as consolidating power supply, we have reduced weight per unit of area by 5%.

Aurora Vision

Initiatives for Reducing Environmental Impact

Continuous Improvement Activities

Initiatives to reduce energy consumption and CO_2 emissions such as improving facilities, testing, and distribution and enforcing waste separation continue on a daily basis at sites such as Kobe Works, Itami Works, and Nagasaki Works.

- **Equipment Improvements**
  New lines built at the Kobe Works and Itami Works employ LED lighting, higher efficiency air conditioners, and photovoltaic systems to achieve greater power savings. We are also making improvements that contribute to increasing facility efficiency, such as utilizing the exhaust from thermal-catalyst boilers as a heat source for drying ovens and generating warm water that is used to wash products.

- **Testing improvements**
  When testing large electrical equipment such as the VVVF* equipment used in rolling stock, efforts are made to utilize energy effectively, such as using power generated from electrical generators connected as artificial loads that are non-destructive, as well as using night-time power to operate drying ovens.

  * VVVF: Variable-voltage, variable frequency control for AC electric motors.

- **Distribution Improvements**
  We are promoting the reduction of CO_2 emissions by utilizing returnable packaging and making a modal shift in transportation from using trucks and planes to using railways and ships.

Overseas Production and Maintenance Sites

In response to growing railway demand overseas, in addition to our overseas sites in countries such as North America, Mexico, and Italy, we will start operations in India this fiscal year. To prepare for greater demand in Asia while considering global warming in the future, we will reinforce and expand overseas production sites and promote local production for local consumption in order to reduce CO_2 produced during transportation.

【Staff Commentary】Offering Railway Station Auxiliary Power System Utilizing Regenerative Energy

In the rail industry, the technologies which utilize the regenerative energy created by a railcar's kinetic energy for other railcars are becoming more popular. However, there are cases where this cannot be achieved effectively depending on a train's operational status. For this reason, Mitsubishi Electric developed a compact system which supplies regenerative power for use in the air conditioning, lighting, elevators, and so on of railway stations. Since delivering the first system, many railway operators have come to witness it in operation, and we have received much positive feedback. Moving forward, we will consider deploying this system overseas as a product which contributes to energy-saving in the railway field.

Takashi Katsumata
Transportation System Dept.
Transportation Transformer System
Technology Section
Kobe Works

Environment – Energy & Industrial Systems Group

Business Overview and Priority Environmental Issues

Delivering Equipment and Systems that Support Stable Electricity Supply

Mitsubishi Electric's Energy & Industrial Systems Group provides a wide range of systems and products that play a vital role in power generation, power conversion, power distribution, and power retailing. On the product side, this includes generators, switches, transformers, switchgear, and vacuum circuit breakers, while systems include plant monitoring, system stabilization, and system preservation and control. With the realization of a low-carbon society now an important theme globally, we are more committed than ever to making contributions to the energy conservation of power companies and end users alike through the development of high-efficiency equipment and by stepping up our involvement in businesses related to smart grids and smart communities.

We manufacture equipment and systems at the Energy Systems Center and Transmission & Distribution Systems Center (both are located in Hyogo Prefecture and engage in small-lot production), as well as at the Power Distribution Systems Center (Kagawa Prefecture; small-lot and mass production) and at our affiliates in Japan and overseas. Our business group focuses on reducing the environmental impact resulting from the operations of our overseas affiliates, reducing the emission of SF_6 gas—which has a high global warming potential—and strengthening the management of chemical substances under the guidance of our domestic site, which is the mother factory.

Priority Environmental Issues

- Climate change
- Depletion of mineral resources
- Proper management of chemical substances in design and manufacturing
- Preservation of biodiversity in areas where we operate

Message from Energy & Industrial Systems Group

Helping Achieve a Low-Carbon Society by Developing High-Efficiency Equipment and Stepping Up Our Involvement in Businesses Related to Smart Grids/Smart Communities

As a provider of a full range of equipment and systems, from power generation to transmission and distribution, we recognize that achieving a low-carbon society represents one of our most important missions. Based on this, the Energy & Industrial Systems Group is now focusing on two initiatives.

Yasuyuki Ito
Executive Officer
In Charge of Energy & Industrial Systems

The first is developing highly efficient equipment and promoting its greater use. Under this initiative, we are developing and commercializing high-efficiency generators, switches for controlling heat generation, transformers that reduce energy loss, and equipment that eliminates or reduces the use of SF_6 gas, which has a high global warming potential, with the ultimate goal of reducing CO_2 emissions from product usage.

The second is stepping up our involvement in businesses related to smart grids and smart communities. Utilizing technologies and know-how acquired at our in-house proving and testing facilities, we are expanding the delivery of products like smart meter systems and battery energy storage systems that contribute to realizing "highly efficient, extremely reliable low-carbon power distribution systems," "systems that optimize energy use by enabling users to visualize and control consumption," and "a robust energy infrastructure that operates seamlessly even at the time of an emergency."

We are also working on the development of power generation stabilizing equipment and systems capable of answering new demand. This includes further improving the efficiency of thermal power generation, promoting the expansion of nuclear power generation business based on the energy policies of each country, and handling the nationwide demand and supply of electricity in Japan by connecting electric power utilities companies.

On the other hand, regarding reducing the environmental impact resulting from business activities, our focus is to continuously reduce the energy used in production and testing processes and enforce the strict management of chemical substances.

Development of a High Efficiency 900MVA-class Indirectly Hydrogen-cooled Turbine Generator

Mitsubishi Electric has developed "VP-X", a series of new indirectly hydrogen-cooled generators with a capacity of up to 900 MVA and original advanced features such as high performance ground insulation, an effective cooling system, a compact size, and high efficiency. Verification tests were successfully completed on one of the world's largest 870 MVA generators*, and we have demonstrated one of the world's highest efficiencies of 99%. The series of VP-X generators was commercially launched in April 2015.

*As of December 8, 2014, based on Mitsubishi Electric survey.

High efficiency VP-X turbine generator

870MVA verified generator

Development and Dissemination of Switchgear that Reduce Environmental Impact

With the aim of reducing greenhouse gases, Mitsubishi Electric is promoting the popularization of 70kV class cubicle-type gas insulated switchgear (C-GIS) equipped with a vacuum circuit breaker that uses no SF_6 as the result of adopting dry-air insulation. We are also developing a gas-insulated circuit breaker (GCB) series that utilizes a spring structure instead of the conventional hydraulic structure to significantly reduce maintenance work and minimize energy loss. We have completed commercialization for products up to 500kV and are now working on minimizing material consumption and operating power, as well as extending the life of the equipment.

Cubicle-type gas insulated switchgear (C-GIS)

Gas circuit breaker

Transformers that Reduce Environmental Impact

We supply customers in Japan and overseas with low-heat generation, highly efficient transformers that contribute to the reduction of CO_2 emissions. These transformers reduce electricity loss that can occur between the power plant and end user during transmission and conversion. In addition, we are developing compact transformers that help reduce the amount of material used.

High-efficiency transformer

Smart Meter Systems and Battery Energy Storage Systems Essential for Realizing Smart Grids and Smart Communities

Regarding business related to smart grids and smart communities and their contribution to climate change measures, we established a proving and testing facility to gather technologies and knowhow assuming the requirements for power transmission and distribution networks in 2020. Utilizing the technologies and know-how accumulated and customers' evaluations obtained from this approach, specific business expansion activities have begun.

First, smart meter systems will be the core component for fully liberalizing retail power sales. After 2016, it will be possible to freely select where one purchases electricity, and the information as to when, where, and how much was used will be indispensable. Therefore, we are currently focused on developing a system that enables large volumes of meter data to be collected accurately at low cost, and its actual operation in several utilities.

Secondly, we are installing and testing battery energy storage systems for small-scale power systems in locations such as remote islands. These systems are the key to balancing power generation when using renewable energy, for which output fluctuates, and power generation using fossil fuels. Battery energy storage systems are also anticipated to be valid forms of solving the problem of excess renewable energy in the main power system. Mitsubishi Electric is focusing on expanding products that take full advantage of renewable energies such as wind and solar power, and is contributing to the realization of a low-carbon society and the stable operation of power systems.

Development of the Latest Monitoring Control System with Minimum Environmental Impact

This system offers extensively enhanced functionality and improved performance compared to conventional systems. It simultaneously realizes resource and space savings with volume and weight reductions of up to 30% compared to the previous model.

Additionally, power consumption has been reduced by up to 33% compared to conventional systems. The CPU card and I/O module are designed so that hardware components from the previous generation are compatible, making replacement possible as well. This minimizes resource consumption when updating equipment and contributes to reducing the environmental impact.

Instrumentation Control System

Initiatives for Reducing Environmental Impact

Staying Focused on Preventing Environmental Pollution and Reducing CO_2 during Production

The Energy & Industrial Systems Group's manufacturing bases (4 at Mitsubishi Electric, 12 affiliates in Japan, 3 overseas affiliates) manufacture equipment in small lots, including large generators and transformers. They also produce medium-sized equipment and system devices using small-lot production and manufacture components, assemble products, and perform testing for plates, machine work, and insulation materials. Each factory pays particularly close attention to prevent air, water, or soil pollution, since they handle chemical substances and insulating oil. These factories also use great amounts of energy because of their large furnaces, cleanrooms, hot-water baths, and testing facilities. As a result, each is taking steps to reduce CO_2 from production by systematically installing PV systems, electrifying steam-powered equipment, and conserving energy by reusing factory exhaust heat as well as by promoting activities that minimize the release of SF_6 gas into the atmosphere.

Raising the Effectiveness of Environmental Activities by Sharing Information between Factories

The Energy & Industrial Systems Group is working to raise the effectiveness of its environmental initiatives by having environmental managers from Mitsubishi Electric's works and affiliates become involved in various ways, such as by participating in environmental promotion conferences or conducting energy conservation inspections at affiliate companies.

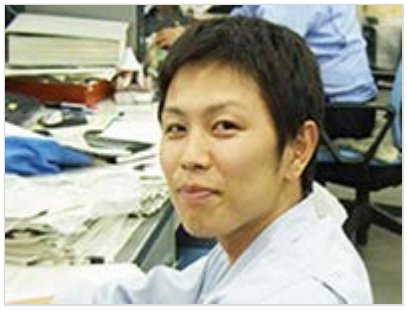
Fiscal 2015 Implementation Status

- **Environmental Promotion Conferences**
  Sessions: 5 (2 managers' meetings; 3 working-level meetings)
  Theme: Activities established for reducing CO_2 emissions during production by improving facility operations and JIT manufacturing processes
  Main results: Reduced CO_2 emissions by 1,692t-CO_2/year as a consolidated group, including all affiliate companies, implementing energy-saving measures such as improving operations in production facilities, switching to electricity for steam facilities, reducing loss of steam, and improving JIT manufacturing processes.

- **Environmental Audit**
  Audits were conducted at MELPAC Co., Ltd. (Hyogo Prefecture) and the Asahi Factory of Ryosan Industry Corporation (Aichi Prefecture).

【Staff Commentary】 Development of a Monitoring Control System that Saves Resources and Space, and Achieves Low Power Consumption

Following a 13-year span, Mitsubishi Electric has developed an eco-conscious, compact monitoring control system for thermal power stations that features improved functions and performance compared to conventional systems. It has input/output modules and other equipment that adopt a framework which can reuse some existing components when the system is renewed to the latest version. This saves resources, which is a significant feature. We intend to leverage this system's features and increase the number of deliveries.



Fumitaka Ito
Generation Control & Monitoring System Design Section
Energy Plant & Systems Department
Energy System Center

Environment – Building Systems Group

Business Overview and Priority Environmental Issues

Delivering Safe, Secure, and Convenient Products and Solutions that Enhance the Value and Functions of Entire Buildings

Mitsubishi Electric's Building Systems Group provides elevators and escalators—as well as building management systems that include access control, building management, and surveillance cameras—to public and private building owners in over 90 countries. As these are essential components of social infrastructures, it is necessary to deliver and sustain products and services that are safe, secure, and convenient. To this end, we provide full support ranging from initial sales to maintenance services and renewal, as well as new solutions that further enhance the value and functions of entire buildings. As part of this, we are aggressively expanding the sales of energy-efficient, compact, and lightweight elevators and escalators, as well as building management system products that realize attainable energy savings according to building usage conditions by monitoring and controlling the energy usage conditions of building facilities. Doing this will help to reduce CO_2 emissions throughout society and enable us to contribute to reducing environmental impact.

The Building Systems Group has manufacturing bases at Inazawa Works and in 10 countries around the world including, Thailand and China. Inazawa Works serves as the mother plant, manufacturing, processing, painting, and assembling elevator and escalator components such as traction machines, device components, and control equipment. Environmental initiatives such as reducing CO_2 from production, switching over to lead-free solder, and eliminating the use of wood in packaging materials by adopting returnable containers are being expanded from the Inazawa Works to other manufacturing companies as we promote reducing environmental impact globally.

Priority Environmental Issues

- Climate change
- Waste reduction and management
- Proper management of chemical substances in design and manufacturing

Message from Building Systems Group

Proactively Proposing Building Solutions for Energy Savings and Reducing Environmental Impact through Our Elevator, Facima, and DIGUARD Systems

The Building Systems Group is in charge of manufacturing the elevators and escalators that provide vertical transportation in buildings and building management systems. It is contributing to the realization of a society with more vitality and comfort through the ongoing delivery of safe, secure, convenient forms of transportation and living spaces around the world.

Nobuyuki Abe
Executive Officer
In Charge of Building Systems

In light of the ever–increasing demand in the elevator/escalator industry, whether it be for new facilities in emerging countries such as China and India or for renewal in developed countries, there is a need to provide safety and security, as well as energy efficiency and space and weight reductions. In response to these societal demands, the Building Systems Group makes proposals that focus on eco–conscious products, such as introducing energy–saving functions in the latest models and reducing power consumption through renewal. Additionally, we propose new building solutions based on our Facima*1 and DIGUARD*2 systems—which focus on security, crime prevention, and energy conservation—and support the introduction of attainable energy efficiency and conservation that consider user comfort and convenience.

At the same time, we are focusing on reducing environment impact from production processes. Currently, our group is a global supplier of elevators and escalators, with manufacturing companies in 10 countries worldwide. In the future, as local production for local consumption continues to progress and the production ratio of our overseas manufacturing companies increases, the mother factory, Inazawa Works, will expand its environmental initiatives to manufacturing companies in Japan and overseas. These initiatives include reducing CO_2 from production, suppressing the use of harmful metals and chemical substances, and promoting recycling. In doing this, we will work to create production activities that are more environmentally focused.

*1 Facima: Open integrated management system for building facilities.
*2 DIGUARD: Mitsubishi Electric's total security solution.

Initiatives Contributing to the Environment and Society

High-speed Elevators – NEXCUBE (for Japan) and NexWay (for overseas)

Compared to other models, high-speed elevators require a large-capacity traction machine with high power consumption. To counter this, through application of its original stator core technology, Mitsubishi Electric has successively introduced traction machines that are more energy efficient, more compact, and lighter than conventional models. For the control devices, we use full-silicon carbide (SiC) in the production of our world-leading power semiconductor modules. Compared to our previous products, power loss is reduced by approximately 65%, and volume is reduced by 40% as a result of restricting heat discharge. Additionally, owing to the incorporation of an energy-saving elevator group control system that controls the allocation of multiple elevator cars, further energy savings (up to 10%) has been realized.

Full-SiC semiconductor module and control device

AXIEZ Series – Standardized Elevators for the Japan Market

AXIEZ Series elevators greatly reduce power consumption and achieve energy savings of up to 20% compared to conventional models. They accomplish this by using a gearless traction machine equipped with a permanent magnet motor, LED ceiling lighting inside the car, reduced standby power when the elevator is not in operation, and having an optimized balance between the car and counterweight. AXIEZ Series elevators can contribute to even further reductions in power consumption through the incorporation of a converter system that stores and uses electricity generated during braking. Furthermore, we have added a large-capacity elevator to the lineup. With a capacity of 17-26 passengers, it is ideal for applications where traffic flow is high such as large office buildings, commercial facilities, and hospitals. Compared to conventional models, this model has a more compact traction machine, and elevator car, counterweight, and hoistway structural parts are all lighter.

AXIEZ

NEXIEZ Series – Standardized Elevators for International Markets

The NEXIEZ Series, a line of standardized elevators for international markets manufactured in Thailand by Mitsubishi Elevator Asia Co., Ltd., also uses a gearless traction machine equipped with a permanent magnet motor. This results in a more compact, lightweight design and a 20% reduction in power consumption compared to conventional models. NEXIEZ Series elevators can contribute to even further reductions in power consumption as they are equipped with LED interior lighting and a converter system that stores and uses electricity generated during braking. For Central and South America and India, we have introduced strategic models for each region, and are promoting local production and local procurement as we aim to disseminate our highly energy-efficient products.

NEXIEZ-LITE (elevator for India)

Facima Building Automation System

Facima is a building automation system for monitoring and controlling building facilities such as air conditioning, lighting, and access status. The system optimizes demand control by monitoring peak energy demand and stopping the operation of air-conditioning/lighting facilities as required based on a priority order set by the building manager in advance. Facima also automatically controls building facilities according to tenant business hours and holidays, which assists in achieving reductions in power consumption while considering user comfort and convenience. Additionally, Facima collects and analyzes data on the operation of building facilities, visualizes energy use conditions, and proposes energy-saving and cost-reducing options for the entire building.

Facima BA-system touch control panel

Initiatives for Reducing Environmental Impact

Rolling Out Initiatives of Mother Factory at Overseas Manufacturing Companies

The Building Systems Group manufactures elevators and escalators at manufacturing companies in 10 countries worldwide, including Japan, Thailand, and China. At the Inazawa Works, the mother factory in Japan, there is a particular aim to improve the energy efficiency of machinery used in processes that consume large amounts of power, such as the production equipment for machining and painting. In the future, as local manufacturing for local consumption increases and the production ratio of our overseas manufacturing companies grows, we will proactively introduce the following initiatives and other measures to overseas manufacturing companies with the aim of reducing environmental impact at the global level.

- **Promoting Production Equipment Energy Savings and Lower VOC Emissions**
  A wide range of processes are involved in the production of elevator and escalators. One of the processes requiring high power consumption is machining. However, by updating to the latest processing equipment and shortening the processing time, higher productivity has been achieved and power consumption suppressed.
  The use of heating energy is very high in painting processes as well, where heat is utilized both during the preparation process (parts cleaning) and drying process. With this in mind, the temperature and quality of the processing liquid were reviewed and the temperature was lowered, resulting in a reduction in power consumption. We have also installed a volatile organic compound (VOC) removal device in the painting line to reduce VOCs emitted during the drying process. Additionally, we visualize factory air usage (flow meter at factory entrance) as part of our activities to reduce power consumption from compressor usage.

- **Introducing Renewable Energies**
  Additional photovoltaic module panels were installed at the newly built Elevator QM Center and other facilities, bringing the total number installed to 1,461. Their combined output is 342.9kW and the electricity generated is used to power equipment and air-conditioning inside the factory. Additionally, for all group company buildings constructed in the future, we will promote the utilization of photovoltaic modules and eco-conscious items (specifications such as LED lighting, water-saving toilets, and recycling materials).

- **Upgrading Aging Facilities and Introducing LED Lighting**
  We have updated aging boilers, compressors, transformers, and air conditioners to more efficient equipment, and are switching to the use of LED lighting when replacing lighting equipment, thereby achieving greater energy savings.

- **Promoting Materials Recycling**
  We are collecting and sorting waste plastic for recycling purposes. To further promote this initiative, we began collecting and sorting electronic component reels, plastic bands, and plastic containers in April 2011. This has enabled us to recycle one ton of materials every month.

- **Reducing Wooden Packaging Materials and Number of Trucks**
  To comply with the increasing demand for zero emissions from construction sites in Japan, we are promoting the use of returnable containers for appearance parts (jamb, elevator car) of not only standard elevators, but also custom-order elevators. In this way, we are aiming to eliminate the use of wooden packaging materials and reduce the number of trucks used.

- **Lead-free Printed Circuit Boards**
  We are engaged in initiatives to reduce the use of lead in compliance with regulations being enacted around the world, including Europe's RoHS. Today, elevators are not subject to the RoHS directive, but as a voluntary measure, we are steadily changing from eutectic to lead-free solder in the manufacturing of printed circuit boards.

【Staff Commentary】Proposing Elevator Renewal Based on Energy-saving Concepts

In order to ensure that Mitsubishi Electric elevators have a long service life, renewal must be conducted approximately every 25 years in line with the extended life of buildings. We propose a renewal service based on energy-saving concepts aimed at enabling the continued use of as many existing components as possible. This approach reduces cost and shortens the duration of renewal work. While naturally achieving safety, security, and convenience, we are also contributing to the reduction of CO_2 emissions by cutting energy consumption as much as 60%.

Kohei Fukui
Domestic Sales Section, Sales Department
Inazawa Works

Environment – Electronic Systems Group

Business Overview and Priority Environmental Issues

Safeguarding People's Lives and Contributing to Space Research and Cutting-edge Technologies

Mitsubishi Electric's Electronic Systems Group manufactures communications, broadcast, and observation satellites, ground control systems required for satellite operations, and large telescopes such as the Subaru Telescope. In this way, we are safeguarding people's lives and contributing to space research and cutting-edge technologies. We also supply electronics equipment such as contact image sensors used in copiers and modules for millimeter-wave radar used in vehicle safety systems to communications companies and automotive manufacturers. At the Kamakura Works and Communication System Center, our main sites in Japan, activities such as reducing CO_2 from production, preserving biodiversity, local cleanup activities, and employee visits to local elementary and junior high schools for the purpose of educating children about coursework prior to entering a company and environmental issues are promoted.

Priority Environmental Issues

- Climate change
- Deforestation
- Preservation of biodiversity in areas where we operate

Message from Electronic Systems Group

Working to Solve Environmental Problems and Develop Products for Next-generation Energy Solutions

Yoshiaki Nakatani
Senior Vice President
In Charge of Electronic Systems

The products of the Electronic Systems Group play a vital role in solving humankind's shared environmental problems and in the development of next-generation energy solutions. For example, we are the primary contractor for manufacturing the "IBUKI" (GOSAT) launched in 2009 and GOSAT-2 scheduled for launch in 2017, which are designed to observe the concentration distribution of greenhouse gases and monitor the emission and absorption of these gases, thereby assisting in the prevention of global warming. Additionally, the Himawari-8 and Himawari-9 geostationary meteorological satellites launched in October 2014 and scheduled for launch in 2016, respectively, provide even greater observation capabilities for monitoring global warming and weather phenomena. We are also conducting research on space-based solar power generation; that is, generating electricity from sunlight in outer space and sending the electricity back to Earth via radio waves for a 24-hour-a-day stable supply of electricity.

Meanwhile, one of our ground-based solutions is Doppler Lidar, which can remotely measure the moving speed of dust and particulates in the atmosphere. Doppler Lidar can also monitor and forecast substances that have an environmental impact on the basis of automobile emissions or the heat-island effect. It is expected that this technology will contribute to the renewable energy domain through more efficient control of wind farms used for wind power generation and extending the service life of wind power generation equipment.

We are also working to reduce CO_2 emissions from the production of these products and enhance the efficiency of energy utilization. More specifically, most precision electronic devices are manufactured in cleanrooms and require the use of testing equipment. As such, we are introducing initiatives to improve the operation of air conditioning and testing equipment so that energy is used more efficiently.

Initiatives Contributing to the Environment and Society

Contributing to World-leading Global Environment Observation

The Japan Aerospace Exploration Agency (JAXA) selected Mitsubishi Electric as the primary contractor for GOSAT-2*1. The satellite is scheduled for launch in 2017 as the successor to the "IBUKI" (GOSAT) (launched in January 2009), which was developed as the world's first satellite dedicated to space observation of the concentration distribution of greenhouse gases.

Greenhouse gases Observing SATellite-2 (GOSAT-2)

GOSAT-2 is equipped with high-performance observation sensors that will enable more precise measurements of greenhouse gas concentration distribution. It will also estimate particulate matter (black carbon, PM2.5, etc.), a capability which assists in monitoring atmospheric pollution. This time, just as with "IBUKI", Mitsubishi Electric is in charge of the entire project, including development and production of the satellite system and observation sensors, constructing the ground-based facilities, and overseeing satellite control operations after launch.

Moreover, GOSAT-2 is expected to be a focal point in international coordination and cooperation, with several greenhouse gas observation satellites following in the footsteps of IBUKI, such as OCO-2 launched by the United States in 2014 and Europe's CarbonSat, which is scheduled for launch in the future.

*1 GOSAT-2: Greenhouse gases Observing SATellite-2

Contributing to Enhanced Monitoring Capabilities of Weather Phenomena and the Global Environment

The weather forecast is a part of our daily lives. Following Himawari-7, which continues to operate smoothly, Mitsubishi Electric developed the Himawari-8, which was launched in 2014 and began operation on July 7, 2015. There is also a plan to launch Himawari-9, which will have performance equivalent to that of Himawari-8, in 2016.

Himawari-8 and Himawari-9 meteorological satellites

Equipped with world-leading next-generation meteorological observation sensors, Himawari-8 and Himawari-9 will enable an advanced level of monitoring atmospheric phenomena (typhoons, torrential rain, etc.) and the global environment (sea ice, volcanic ash, yellow sand phenomena, etc.) thanks to enhanced resolution and more observation channels, doing so with the time required to make observations significantly reduced.

Contributing to Understanding Disaster Situations and Monitoring of Oceans and Forests

Satellite application such as observation at the time of a disaster and monitoring the conditions of forests and agriculture are expanding and becoming common around the globe. Mitsubishi Electric's Advanced Land Observing Satellite-2 "DAICHI-2" (ALOS-2) is a global observation satellite launched on May 24, 2014 with the objectives of safeguarding people's lives and solving global-scale environmental problems. As the main contractor for "DAICHI-2", the successor to "DAICHI", Mitsubishi Electric was in charge of manufacturing the satellite, the synthetic aperture radar, and ground-based control and processing systems.

Advanced Land Observing Satellite-2 "DAICHI-2" (ALOS-2)

"DAICHI-2" is expansively carrying on the "DAICHI" mission of map creation, regional observation, understanding disaster status, and resource exploration. It is useful for understanding the growth status of grains and other crops, and is supporting the smooth supply of resources and energy, as well as international initiatives to tackle global environmental problems. In addition, "DAICHI-2" can assist in monitoring the illegal logging of forests in tropical rainforest zones such as in Southeast Asia and Brazil.

Ecological Contributions through Various Uses of Highly Precise Positioning Data


First Quasi-Zenith Satellite "MICHIBIKI"

The Quasi-Zenith Satellite System, a system of positioning satellites especially for use by Japan, has an orbit with a large period of time spent near the zenith above Japan. As a result, positioning signals can be sent to spots where positioning was previously difficult, such as places blocked by buildings or mountains. As a supplement to GPS, it has enabled a dramatic improvement in positioning precision: from approximately 10m to the centimeter-level. It is expected that this highly precise positioning data will be used to develop solutions contributing to the environment in diverse fields; for example, eco-drive control and automatic driving using road elevation and positioning data in the automotive sector, more efficient railcar operation and management in the railway sector, and automatic operation of agricultural and construction machinery in the agricultural, construction, and civil engineering sectors.

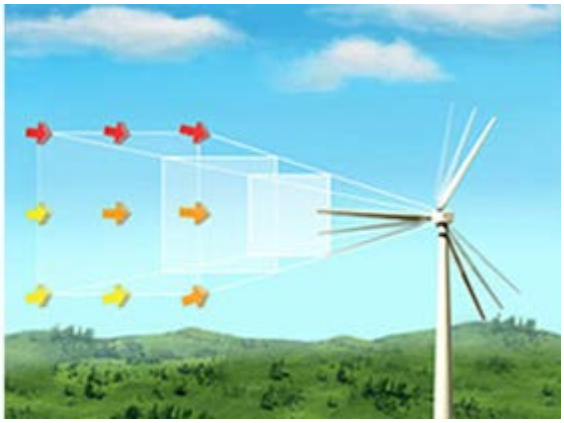
Doppler Lidar Systems for Wind Assessments at Wind Farms

The purpose of Doppler Lidar (Light Detection and Ranging) systems is to measure wind velocity and direction while detecting aerosols and their movement in the atmosphere. Doppler Lidar helps make wind assessment easier, compared with conventional anemometers, as it can provide real time wind data for wide areas utilizing beam scanning patterns.

One type of Doppler Lidar for wind farms is installed on the nacelle of the wind turbine and measures wind velocity and direction in five to nine directions. Its purpose is to measure wind velocity and direction along the line of sight at a horizontal distance of 40 to 250 meters or more*2. Measurement data is sent to the turbine in real time, enabling turbine control that optimizes power generation efficiency, protects the wind turbine, and reduces maintenance cost*3.

It's also possible to install Doppler Lidars on offshore buoys or platforms, or existing wind farms, and they can be used to monitor and extract observation data from a remote location using wireless monitoring and control functions. Eye-safe wavelength (near-infrared, invisible) Class 1M lasers are used to ensure eye safety.

*2 Observation distance varies depending on atmospheric conditions.
*3 Wind turbine power curve can be measured.


Doppler Lidar for wind farms

Initiatives for Reducing Environmental Impact

Reducing CO_2 Emissions from Cleanroom Production

Precision electronic devices are mainly manufactured, assembled, and tested in cleanrooms to maintain quality. In addition, because of the variety of test equipment used, we are striving to reduce CO_2 emissions from production by improving productivity and reducing the use of electricity. To achieve this, we adjust the air conditioning of the cleanroom based on whether or not testing equipment is being used. We also analyze the heat in computer server rooms so that hotspots can be eliminated, separate the cold- and hot-air duct work for air conditioners and servers, and optimize air conditioner control.

New Production Building at Kamakura Works – CO_2 Emissions Cut by Approx. 23%

The design building of Kamakura Works, which was completed in January 2015, has successfully cut CO_2 emissions by implementing the following measures.

- **Energy Consumption Control**
  Not only is Mitsubishi Electric controlling and monitoring when lights are turned on and off, and the adjustment of each lighting fixture through the introduction of LED lighting and a layout-free lighting control system, but it is also reducing power used for lighting with automatic ON/OFF control triggered by motion sensors (introduced for common areas and offices). We have also cut the power consumption of air-conditioning systems through the adoption of LOSSNAY ventilation units equipped with a night purge function.*1

- **Utilization of Natural Ventilation and Natural Light**
  We installed an Eco-Void, an open–ceiling space in the center of the building spanning from the first floor to the roof. On each floor, windows are positioned to face the Eco-Void, generating an updraft from natural wind pressure and the chimney effect of the space, creating natural ventilation that reduces the need for air–conditioning.

  Furthermore, we installed a light collection system as the highest point of the Eco Void. It continuously collects natural light and uses a light-tracking sensor to capture the sunlight at its highest intensity, a factor that varies throughout the seasons. Regardless of the season or time of day, natural light is collected from the first floor up, cutting down on electricity consumed for lighting.

- **Measures Related to Building Structure**
  By introducing heat insulating sandwich panels*2 and Low–E glass*3 for the exterior walls, we have alleviated the burden of heating and cooling.

*1 Night purge function: Draws low-temperature external air into the building at night and uses it to lower cooling load when starting air-conditioning equipment the following morning.
*2 Heat insulating sandwich panels: A building material made from two steel panels with heat insulating material sandwiched in-between. These panels are of a sophisticated design and lightweight, offering excellent insulation performance, strength, fire resistance, durability, and installation ease.
*3 Low–E (Low Emissivity) glass: A sheet of glass whose surface is coated with a special metallic membrane that consists of tin oxide or silver. The Low-E membrane increases the reflection rate of far-infrared rays. Multi-pane Low–E glass reduces heat transfer, achieving greater insulating performance.

【Staff Commentary】Development of Himawari-8 to Improve Meteorological Observation Accuracy

Himawari-8 was launched on October 7, 2014, and became Japan's first geostationary meteorological satellite to obtain color images in December of the same year. Color images make it easier to distinguish between clouds and yellow sand, which was difficult to do using monochrome images. Moreover, image resolution has been doubled and observation time has been reduced to one-third (one-twelfth when near Japan) compared to the previous satellite, making it possible to clearly ascertain detailed cloud movement and significantly improve observation accuracy. Final adjustments were made in preparation for full operation, which began on July 7, 2015.

Makoto Shibusawa
Civil and Commercial Space Department

Environment – Communication Systems Group

Business Overview and Priority Environmental Issues

Providing Communications Equipment and Services Contributing to the Advancement of Today's Information Society

Mitsubishi Electric's Communication Systems Group is making contributions to the advancement of today's information society through products and services supplied to communications carriers, financial services firms, retail companies, and governments, both in Japan and abroad. These products and services include communications infrastructure equipment that uses optical and wireless information communications technologies (ICTs) as well as surveillance cameras utilizing the latest in video surveillance technologies. ICTs have advanced at a rapid pace and demand has changed almost overnight. Therefore, in order to deliver satisfaction to our customers around the world, we have built an efficient yet flexible production system and cutting-edge development facilities at the Koriyama Plant in Fukushima Prefecture and the Communication Network Center in Amagasaki, Hyogo Prefecture.

Priority Environmental Issues

- Climate change
- Depletion of mineral resources

Message from Communication Systems Group

Contributing to the Development of Communications Markets and Reducing Environmental Impact through Our Value-Added Systems

Takashi Nishimura
Executive Officer
In Charge of
Communication Systems

Networks that incorporate optical and wireless ICTs are key elements of the social infrastructure that make progress in our daily lives and industry possible. Moreover, as ICT devices become more functional and are used by larger and larger numbers of people, electricity consumption will also increase rapidly. As a result, the Communication Systems Group is striving to achieve greater energy savings and reduce environmental impact with a focus on three core themes.

The first is "energy-efficient products." Here, we are working on energy-efficient designs for optical access systems used in communications infrastructure equipment and communications gateways for service providers.

The second is "achieving energy savings in services provided using our products." Here, our optical access systems are used in automated meter readers for smart grids, while our communications gateway equipment is starting to be used in HEMS/BEMS to help make it easier to monitor electricity use. We are also working to market our network equipment for M2M services and for obtaining data for demand response programs.

The third is "environmental contributions during installation work." Here, we are developing digital surveillance cameras that reduce and reuse communications cables.

We are moving forward with a reduction of CO_2 from production, and at our Koriyama Plant, which was damaged in the Great East Japan Earthquake, we rebuilt the manufacturing building as an "eco factory" and reduced CO_2 emissions from the production of our main products by 25% compared to conventional methods.

Going forward, we will further refine our optical and wireless information communication technologies and video surveillance technologies while delivering value-added systems to our customers. This will enable us to help develop communications markets around the world and mitigate environmental impact.

Initiatives Contributing to the Environment and Society

More Energy-Efficient and Compact Optical Access Systems

The GE-PON ONU customer network terminating unit for optical access systems uses a passive optical network (PON) to provide up to 64 users with a single optical fiber connection, which makes the unit more compact and energy-efficient. In addition, this unit achieves a 65% reduction in power consumption and 74% reduction in material usage compared to conventional units because of its use of low power consumption parts and reduced number of parts.

GE-PON ONU customer network terminating unit

Equipment for Demand Response* Services

We supply gateway equipment to service providers that connects various household, factory, or building networks to an energy management system using the cloud. This equipment is used to obtain power consumption data from home appliances, air conditioning units, or production lines which is then used to deliver demand response services that strike a balance between electricity supply-demand and energy management systems, such as HEMS.

* Demand response: When tight supply-demand conditions are present, the user curbs power use or shifts it to another time at the request of the supplier to maintain an appropriate supply-demand balance.

Gateway

Reducing and Reusing Communications Cables

We are working to reduce and reuse communications cables during installation work through the development of the MELOOK μ+ digital surveillance camera system, which can use existing analog surveillance camera cables for high-definition and highly functional digital surveillance without the laying of new LAN cables for digital CCTV.

Initiatives for Reducing Environmental Impact

Environmental Assessment Evaluations

We require environmental assessments for all new product development projects. These assessments are helping us to make products and packaging more compact and to reduce the amount of packaging materials we use.

Expanding Environmental Management to the Supply Chain

In addition to reducing CO_2 during production and at the product usage phase, we are streamlining product transportation and reducing CO_2 by improving loading ratio and introducing a modal shift.*

* Modal shift: Switching from using truck transportation to marine or rail transportation, which can carry large volumes of goods and is earth friendly.

Koriyama Factory – Reduced CO2 Emissions from Production by 25%

At our Koriyama Factory, which was damaged during the Great East Japan Earthquake, we rebuilt the manufacturing building as an eco-factory, reducing CO_2 emissions from the production of its main products by 25% compared to conventional methods. This was achieved by improving productivity and installing energy-saving utilities.

Koriyama Factory – Reduced Use of Organic Solvents

The Koriyama Factory engages in every step of the manufacturing process from materials processing such as plate fabrication and molding to product assembly. It has reduced the use of organic solvents by introducing a microbubble wash during the plate cleaning process and changing to powder paint solvents.

Communication Network Center – Achieved Greater Energy Efficiency through Production Line Improvements

The Communication Network Center, which designs and assembles nearly all of the products made by the Communication Systems Group, made improvements to its production line to more flexibly respond to changing demand from the marketplace, resulting in less space being used and improved productivity. As a result, the Center was able to significantly reduce the amount of electricity it uses for lighting and air conditioning equipment necessary for production. In addition, the Center is working to make the utilities used by its design and sales offices even more energy-efficient by upgrading to higher efficiency air conditioning and making operational improvements.

Affiliates – Contributing to Greater Electricity Savings and Resource Recycling

Communication Systems Group affiliates mainly sell mobile phones. These companies strive to reduce the electricity usage of lighting, air conditioning, and office automation equipment at their nationwide outlets, in addition to collecting unwanted mobile phone handsets as part of their recycling programs.

【Product Highlights】Communication Gateway Unit Achieving Visualization of Energy

Mitsubishi Electric has developed and launched a communication gateway device as an information collection module for energy management systems. The communication gateway device contributes to energy savings in various situations such as in homes, offices, and factories by controlling various devices via a network and visualizing energy consumption. In consideration of the fact that the functions of energy management systems are expanding year by year, we have developed a platform that allows the addition of controllable devices and new services, thereby providing systems with the flexibility to enable function expansion.

Environment – Living Environment & Digital Media Equipment Group

Business Overview and Priority Environmental Issues

Providing a Broad Range of Products and Services with a Focus on "Smart Quality"

Mitsubishi Electric's Living Environment & Digital Media Equipment Group manufactures air conditioners, ventilating units, water heaters, photovoltaic systems, lighting solutions, kitchen appliances, home electronics, and video imaging equipment. With five sites in Japan, affiliates in Japan, and mass-production and assembly factories located in China, Southeast Asia, Europe, and Central America, our aim is to expand products globally. We are promoting energy savings by introducing the Company's energy-efficient products and improving productivity at the abovementioned factories. At the same time, we are strengthening the management of chemical substances throughout the supply chain and working to ensure the proper management of waste, exhaust, and wastewater.

Priority Environmental Issues

- Climate change
- Depletion of mineral resources
- Proper management of chemical substances in design and manufacturing
- Air, water, and soil pollution due to operations and procurement

Message from Living Environment & Digital Media Equipment Group

Developing Eco-friendly Products and Reducing Our Own Environmental Impact

The Living Environment & Digital Media Equipment Group recognizes that contributing to reducing environmental impact by promoting the recycling and energy-efficient use of its products by customers will help to enhance the competitiveness of its business as well.

Takeshi Sugiyama
Executive Officer
In Charge of Living Environment & Digital Media Equipment

As part of this, we announced the new concept of "Smart Quality" in fiscal 2013, and we are supplying a broad range of eco-friendly products and services for the home, office, and industry. These include energy-saving products that reduce CO_2 from usage as well as photovoltaic systems that generate renewable energy and do not produce CO_2 during power generation.

We are also focusing on reducing CO_2 emissions from production and more effectively utilizing resources, which are both key themes under Mitsubishi Electric's Environmental Vision 2021. As activities to reduce CO_2 from production, the Living Environment & Digital Media Equipment Group is proactively introducing its core energy-saving products—namely, air conditioners, LED lighting fixtures, heat-pump hot-water supply systems, and photovoltaic systems—at all production sites. We are also promoting energy-saving activities by systematically updating environmental infrastructure equipment and improving productivity linked to just-in-time improvement activities. As for our efforts to more effectively utilize resources, we were among the first manufacturers in the industry to set up a recycling plant to recover and recycle used products in order to establish a sustainable recycling program.

Kirigamine Z Series Room Air Conditioner Wins ECCJ Chairman's Award Two Consecutive Years

Kirigamine Z Series air conditioners realize energy savings through features such as a compressor equipped with a high-density winding motor and Mitsubishi Electric's original Move Eye sensor. In recognition of its performance, the Kirigamine Z Series was presented the Energy Conservation Grand Prize of the ECCJ Chairman's Award two consecutive years, in 2013 and 2014.

Kirigamine Z Series

Slim ZR Series Package Air Conditioners for Retail Stores and Offices Achieve Industry’s Top Annual Performance Factor (APF)

Mitsubishi Electric's Slim ZR Series package air conditioners have achieved the industry's top APF*1 rating in all capacity ranges as the result of adopting a highly efficient heat exchanger.

*1 Annual Performance Factor: An indicator introduced in 2007 that enables the evaluation of energy efficiency approximately equal to that under actual usage conditions.

Package air conditioners for retail stores and offices

Grand Multi Series Building Air Conditioning System Achieves Industry’s Top APF

Grand Multi air conditioners are equipped with the world's first*2 flat-tube heat exchanger, optimized refrigerant distribution, and a high-efficiency compressor. As a result, they have achieved the industry's top APF.*3

*2 As of beginning sales in October 2013 (based on in-house review).
*3 As of February 2015, based on in-house review of building multi-split air conditioners.

Grand Multi

MILIE LED Lighting – Realizing Low Power Consumption and Comfort

The MILIE LED lighting brand name was coined from the words "Mitsubishi","lighting," and "ecology." It expresses our desire to make positive contributions to the Earth and society through LED lighting. The lineup has been expanded with products for a wide variety of applications. Products include high-efficiency LED base lights for offices, high-ceiling LED base lights for factories, warehouses, and gymnasiums, and high-luminosity LED downlights and spotlights for retail stores.

MILIE LED lighting

Photovoltaic Systems Maximizing Natural Energy and Offering Prolonged Use

Mitsubishi Electric produces the Multi Roof Series lineup, solar cell battery modules that promise stable, high output and maximized power generation surface area for installation through the combining of modules to suit the roof shape. The Multi Roof Series was designed giving great consideration to life-long generating capacity, which was achieved by combining power generating capacity and durability. Moreover, the series features a power conditioner that leads the industry in conversion efficiency*4 by minimizing conversion loss and sufficiently securing consumable electricity.

*4 Refers to the conversion efficiency of Japanese residential power conditioners. The rated load efficiency of the rated input voltage is as stipulated by JIS C 8961 of PV-PN44K2. As of February 2015, in accordance with in-house review.

225W Multi Roof Series PV module

Recycling System for Large-scale, High-purity Plastics Leads Recycling Technology for Home Appliances

Through the collaborative efforts of Group companies Hyper Cycle Systems Corporation and Green Cycle Systems Corporation, an original large-scale, high-purity plastic recycling system was developed. Mitsubishi Electric is reusing plastics recovered in its refrigerators, air conditioners, and other home electronics products. We also utilize a unique, highly accurate material identification technology for recycled plastics developed together with Shimadzu Corporation, as well as a recovery technology for rare earth magnets developed together with the Ministry of Economy, Trade and Industry to further improve the recycling business.

Initiatives for Reducing Environmental Impact

High-Efficiency Air Conditioners, LED Lighting, and PV Power Generation Systems Being Used at Each Manufacturing Site and Affiliate

All of our manufacturing sites and affiliates utilize the Company's core energy-saving products—namely, high-efficiency air conditioners, heat-pump hot-water supply systems, and LED lighting—and reduce CO_2 emissions from production. We have also installed photovoltaic systems that are contributing to the reduction of peak electricity demand during the summer.

Promoting Energy-saving Activities by Improving Productivity Linked to Just-in-time Activities

We are promoting energy-saving activities by introducing improvements that result in higher productivity. These include initiatives such as company-wide just-in-time improvement activities in the factory that reduce equipment operating loss, as well as making improvements to logistics and reviewing production methods.

Strengthening the Management of Chemical Substances Affecting the Environment and Human Health

In response to EU RoHS directives that specifically call for eliminating the use of six harmful substances and REACH regulations requiring that information on chemical substance content be provided, we are strengthening the management of chemical substances throughout the supply chain in product procurement, design, production, sales, and services.

【Product Highlights】Kirigamine Z Series Wins ECCJ Chairman's Award Two Consecutive Years

In general, air conditioner heating performance declines when the outdoor temperature falls, therefore causing uneven temperature in spacious areas such as living rooms. Mitsubishi Electric developed equipment driven by a high-voltage compressor and high power to realize energy savings and high heating performance even at temperatures below freezing. Additionally, we improved comfort at foot level by incorporating a sensor in the indoor unit that detects temperature in all directions and a mechanism that circulates air a maximum of 180°from the installation face. In recognition of the above performance features, the Kirigamine Z Series was presented the ECCJ Chairman's Award two consecutive years.

Environment – Factory Automation Systems Group

Business Overview and Priority Environmental Issues

Helping Customers in the Manufacturing Industry to Enhance Their Competitiveness

Mitsubishi Electric's Factory Automation Systems Group provides a wide range of products and solutions in the field of industrial mechatronics, including controllers, drive products, energy-saving support products, and equipment in the field of electric power distribution control for automotive manufacturers, equipment manufacturers, and other customers in the manufacturing industry. In recent years, there has been a growing need in the manufacturing field for total solutions that realize high-added value, such as automation utilizing IT and IoT, improving productivity, and promoting energy savings. However, there is also a growing demand for inexpensive products, especially in emerging countries—leading to the situation of market polarization. As a response to this issue, our group is proposing automation solutions that utilize robots and accelerate expansion of the sensor business, while also promoting an expanded range of inexpensive products and strengthening the global business system. Each of our production sites is a mass-production facility with automated lines powered by industrial robots. In addition to striving to enhance productivity, we are incorporating proprietary energy-saving equipment, systems, and solutions and accumulating expertise and experience through new technological developments. In Japan, design and manufacturing are carried out at Nagoya Works and Fukuyama Works. Overseas, we have sales and service sites, and in some cases production facilities, in various countries including China, Southeast Asia, India, the United States, Europe, and South America. Through productivity and product quality improvements, we are helping to add value to the businesses of our customers around the world and enhance their competitiveness. In addition, as part of strengthening the global business system, we are expanding procurement and production overseas mainly in emerging countries. We are also engaged in efforts to strengthen environmental risk management such as the management of chemical substances in activities like parts procurement, and the management of wastewater discharge / atmospheric emissions from factories.

Priority Environmental Issues

- Climate change
- Depletion of mineral resources
- Proper management of chemical substances in design and manufacturing
- Air, water, and soil pollution due to operations and procurement

Message from Factory Automation Systems Group

Delivering Devices, Equipment, and Solutions that Help Reduce Energy Usage during Production to Customers around the World

Devices and equipment used in industrial mechatronics are essential to adding value and enhancing the competitiveness of a business through quality and productivity improvements for customers in the manufacturing industry. In recent years, more and more companies want to reduce their environmental impact across the entire supply chain as well as reduce the total cost of ownership (TCO) through energy savings. As a result, demand is growing for solutions that reduce energy usage from production.

Given this, the Factory Automation Systems Group leverages its control and network technologies from factory automation equipment and measurement technologies towards its energy-saving activities in the field of power distribution. As a result, it is possible to deliver FA energy solutions that improve productivity and reduce energy costs associated with factory production equipment that utilizes large amounts of energy. We also utilize these solutions in-house as part of our efforts to reduce CO_2 emissions from production.

Kei Uruma
Executive Officer
In Charge of Factory Automation Systems

Furthermore, we are helping to prevent global warming through the launch of transformers compliant with the Japanese "Top Runner" standards (2nd version), which are highly energy efficient even when used alone, and a high-performance energy-saving motor that is also compliant with Top Runner standards (equivalent to the IE3 efficiency rating). Demand in the domestic manufacturing industry is increasing due to government policies and the weakening of the Japanese yen. In addition, the need for energy conservation is growing due to factors such as the expansion of automation in emerging countries in line with the rising cost of labor and infrastructure investments. Accordingly, the Factory Automation Systems Group is working to enhance its product development capabilities as well as establish a position as the top global provider of factory automation solutions by promoting productivity and energy-saving solutions around the world.

Initiatives Contributing to the Environment and Society

FA Energy Solution e&eco-F@ctory®

The energy solution e&eco-F@ctory® combines and provides our control and network technologies from factory automation equipment such as programmable controllers and measurement technologies from our energy-saving activities in the field of power distribution. By visualizing energy consumption per unit of production (i.e., specific energy consumption), this FA energy solution contributes to improving productivity and reducing energy costs associated with factory production equipment that consumes large amounts of energy.

MELSEC iQ-R Series
programmable controller

Energy Measurement Module, EcoMonitor Series

By installing our energy measurement modules in switchboards and distribution boards, it is possible to measure various data such as energy consumption, voltage, and current. This module not only measures and analyzes the overall consumption of factories and buildings, but also the individual consumption of departments, sections, lines, and equipment, achieving efficient energy usage by managing the basic unit.

EcoMonitor Light energy
measurement module

iQ Platform*1- C Controller , R12CCPU-V

By changing the microcomputer and computer environments used at factories to C Controllers, we have been able to reduce equipment size, eliminate the use of fans, and reduce power consumption. This model also features excellent reliability for prolonged operation, reduces factory line stoppage due to breakdowns, and requires less renewal maintenance, thereby making it energy-efficient and resource-conscious.

*1 iQ Platform: Next-generation integrated platform. The iQ name is derived from the characteristics of "integrated Q," "improved quality," "intelligent & quick" and "innovation & quest."

R12CCPU-V
C Controller

Development of Products Compliant with Top Runner Standards

We launched a transformer compliant with the second version of Top Runner standards for fiscal 2015 (ending Mar. 2015) and a high-performance, energy-saving motor compliant with Top Runner standards (equivalent to the efficiency class of IE3*2) for fiscal 2016. If all of the approximately 100 million standard motors in Japan were replaced with highly efficient IE3-compliant motors, calculations show that some 15.5 billion kWh of power usage could be reduced annually. The same holds true for other countries as well, indicating the important role that IE3-compliant industrial motors will play in improving natural environments in Japan and abroad. The motor was awarded the Japan Machinery Federation Chairman's Award at the 2014 (35th) Excellence in Energy-Conservation Equipment Awards as an induction motor applying cutting-edge, high-efficiency design technology.

SF-PR Superline Premium Series
energy- saving motor

*2 IE3: Premium efficiency class under IEC60034-30, which classifies single-speed, three-phase, cage-induction motors into energy-efficiency classes.

Laser Processing Machines Equipped with Fiber Laser Oscillator and ECO Mode

The eX-F Series fiber laser processing machine is a combination of our fiber laser oscillator with superior laser efficiency and the eX Series two-dimensional laser processing machine. It includes advanced features such as Mitsubishi Electric's original high-efficiency servomotor, servo amplifier, and invertor control cooling module. Power consumption has been reduced approximately 60%,*3 and the addition of ECO-mode gradually stops various functions when in the standby state, thereby reducing power consumption by as much as 70%.*4 Moreover, by equipping the machines with a power/gas consumption monitor, visualization of power and gas consumption has been achieved, which supports energy-saving operation.

eX-F Series fiber laser processing machine

*3 Compared to Mitsubishi Electric's ML3015eX-45CF-R CO_2 two-dimensional laser processing system
*4 Compared to when ECO-mode is not used

Development of RV-F Series Industrial Robot

To resolve issues such as the need for efficient supply of parts, shorter startup time, and the flexibility to cope with parts variations, we have developed intelligent technologies using force sensors, three-dimensional vision sensors, multifunctional hands, and more. These intelligent technologies are used in our thermal relay assembly cells. Compared to conventional cell design, the surface area is smaller, and cost and startup time are both reduced approximately 30%, realizing increased production capacity. In recognition of its abilities, the RV-F Series was awarded the 47th (Fiscal 2014) Ichimura Prize in Industry for Distinguished Achievement from the New Technology Development Foundation Japan.

RV-F Series industrial robot

Initiatives for Reducing Environmental Impact

Utilizing FA Energy Solution e&eco-F@ctory®

We reduce CO_2 emissions from production through energy cost reductions and onsite productivity improvements achieved with the FA energy solution, e&eco-F@ctory®.

Reducing CO_2 from Production – Nagoya Works and FA Equipment Production Building

In 2013, we completed construction of a main production building that utilizes the latest equipment. We are constantly pursuing cutting-edge energy-saving techniques.
(The below results are comparisons with energy-saving equipment introduced in 2008.)

- Improved heating insulation of external walls, adoption of Low-E multilayered glass (low emissivity multilayered glass with thermal barrier for high insulation)
- Introduction of Mitsubishi Electric's latest air conditioning system, the Compact Cube e Series (cuts power consumption by 1,051,200kWh per year)
- Incorporation of LED lighting system with motion sensors (cuts power consumption by 24,700kWh per year)
- Introduction of an energy management system that utilizes the FA energy solution e&eco-F@ctory to measure and control the power consumption of air conditioning, lighting, and exhaust as well as airflow

Reducing CO_2 from Production – Fukuyama Works Smart Meter Production Building

The Fukuyama Works Smart Meter Production Building is in charge of producing smart meters, which are essential to building next-generation energy networks. This facility has implemented the following measures in order to reduce CO_2 emissions from production.

- Reduced heat transfer by 84% for the rooftop and 42% for the wall through full insulation measures and adopting a window-less structure for the production area
- Achieved greater energy efficiency by preventing excessive heating and cooling onsite by centrally managing a City Multi air conditioner system with Move-Eye using the G-150AD Web-based central controller
- Raised the efficiency of air conditioner operations by using an energy-efficient, compact air-cooled heat pump chiller
- Achieved significant energy savings by installing LED lighting (650 straight tubes and 24 ceiling lights) on the building's interior and roof overhangs (reduced energy consumption by 28,400kWh/year and reduced replacement costs by 370,000 yen/year)

Promoting Activities Customized for Each Production Line

In addition to the previous measures, the Nagoya Works and Fukuyama Works are promoting activities customized for each production line to reduce the energy consumption rate from manufacturing. These production lines include those for controllers and other products assembled using mass production, and mechatronics products assembled as single units.

- **Fukuyama Works**
  Fukuyama Works has an integrated production system that spans from parts processing to sub-assembly and final assembly. Automation is advanced as exemplified by the use of 96 multi-joint robots for assembly work. The facility uses "e&eco-F@ctory®" to measure and analyze the energy consumption of each piece of equipment on the final assembly line, which has allowed it to identify waste and take appropriate measures.
- **Nagoya Works**
  The mass production line of Nagoya Works is achieving greater energy efficiency by improving its tact time through the optimization of shrinkage fitting processes (shortened heating time), including jig and tool modifications. At the same time, the small-lot production line is working to optimize operating conditions by linking production information with equipment (electrical, heat, air, and water), which includes improvements in cleanroom air conditioning for cell production (centralized fan control to air conditioning control of production lines). It is also achieving efficiency using the unique characteristics of the line.

Switching to Higher Efficiency Equipment

We are in the process of systematically replacing aging utility equipment with more efficient models.

Making Products More Compact and Light using Less Materials

We are making numerical control (NC) equipment more compact and lightweight through the use of silicon carbide (SiC) devices. This has helped us reduce materials usage by an average of 39% compared to fiscal 2001 levels. In addition, we are also taking steps to curb our use of natural resources, including reducing rare earth elements used in servo motors and copper used in motor coil wires.

Achieved Zero Emissions

We have achieved zero emissions at both Nagoya Works and Fukuyama Works.

Strengthening Chemical Substance Management and Environmental Risk Measures

In addition to expanding design and parts procurement overseas with a main focus on emerging countries, we are promoting local production for local consumption. We are also strengthening measures for chemical substance management in parts procurement and reducing environmental risk at overseas factories.

- **Chemical substance management in parts procurement**
  We obtain a written guarantee that harmful chemical substances have not been used, and conduct analyses to determine if parts contain harmful substances when necessary.
- **Environmental risk management of overseas factories**
  Based on the laws and regulations of each country/region, we regularly report on the management status of wastewater, atmospheric emissions, and harmful substances to related industrial complexes and public organizations, and manage environmental risk.

【Product Highlights】MELFA F Series for Automation of Complex Factory Work

As opposed to the conventional automation of simple tasks, Mitsubishi Electric has focused efforts on using robots to automate tasks that are difficult—considered to require human perception—such as assembly, processing, and inspection. The MELFA F Series achieves advanced tasks by increasing robot intelligence with a visual function based on two- and three-dimensional vision sensors, a tactile function achieved by combining a force sensor with our servo technology, and a coordination function for simultaneous control of multiple robots among other features.

Environment – Automotive Equipment Group

Business Overview and Priority Environmental Issues

Strengthening Our Global Development, Production, and Sales Systems

Mitsubishi Electric's Automotive Equipment Group delivers electrical components such as alternators, starters, and engine control units, as well as car navigation systems and other car multimedia devices to automotive and auto parts manufacturers in Japan and abroad. As a full support supplier, we work together with our customers to develop cutting-edge technologies and endeavor to provide a wide range of services, from production, sales, and supply to spare parts and rebuilds. Each of our production sites mass produces parts, while our three development sites (i.e., Himeji Works, Sanda Works, and Fukuyama Works) function as mother factories that manage our other 14 production sites in the Americas, Europe, and Asia.

Priority Environmental Issues

- Climate change
- Proper management of chemical substances in design and manufacturing
- Air, water, and soil pollution due to operations and procurement

Message from Automotive Equipment Group

Contributing to the Realization of a Low-carbon Society through the Development of Low Fuel Consumption Technology for Vehicles

According to the IPPC Fifth Assessment Report on climate change, global warming is progressing and the promotion of all initiatives targeting the reduction of CO_2 emissions is required. The Automotive Equipment Group is engaged in initiatives to reduce CO_2 emissions by both installing its products in vehicles to realize better fuel efficiency and reducing energy consumption in manufacturing processes.

Yutaka Ohashi
Representative Executive Officer
Senior Vice President
In Charge of Automotive Equipment

In regards to automobiles, engines are becoming increasingly efficient in order to achieve low fuel consumption. Mitsubishi Electric is helping to increase efficiency through related products such as ignition systems for the precise control of combustion in high-compression ratio engines and turbo actuators that control the boost pressure of downsized turbo engines, and the control thereof.

Motorization is another important part of lowering fuel consumption. We are developing motorized equipment that is more compact and has higher efficiency. Some examples are a compact, high-output motor for the electric power steering being applied to large vehicles, a belt-driven motor generator with an enhanced deceleration energy regenerative function and quiet idling stop restarter, and highly efficient invertors for electric vehicles (EVs) and hybrid vehicles (HEVs) that utilize next-generation, SiC low-loss power semiconductors.

As an example of energy-saving initiatives in manufacturing processes, the new production building of Sanda Works has introduced LED lighting and cutting-edge energy-saving technologies such as automatic light adjustment and the central monitoring and optimized control of air conditioning and ventilation equipment. By thoroughly enforcing energy-saving measures such as adopting photovoltaic generation in existing buildings, we have suppressed annual power consumption for Sanda Works as a whole by 9.06 million kilowatt-hours per year, despite the floor space and number of personnel increasing by approximately 50%. These achievements are being implemented at overseas manufacturing bases as part of our global energy-saving efforts.

Initiatives Contributing to the Environment and Society

Fuel Efficiency Technologies for Internal-combustion Engines

We are helping to make automobiles more fuel efficient through products that are compact, lightweight, and offer high performance and high efficiency such as alternators, starters, and electric power steering systems. Our idling stop-and-start systems, which link the engine control unit, transmission control unit, alternator, starter, and electric oil pump, ensure reduced fuel consumption for customers. In February 2015, our GXi alternator acquired Europe's ECO Innovation Technology certification.

GXi alternator

Electric-powered Products Contributing to the Dissemination of EVs/HEVs

We are optimizing Mitsubishi Electric's strengths in semiconductor device design, circuit design, and structural design for EVs and HEVs in order to provide even more electric-powered products*.

* Electric-powered products: Products that contribute to promoting the use of electricity in automobiles by having equivalent or superior functions compared to devices driven by gasoline combustion.

EMIRAI 2 xEV concept car

Car Navigation Systems Helping to Conserve Energy

To make fuel efficiency more enjoyable for customers, we are developing and supplying car navigation systems that include a function to search for the route with the best energy savings to minimize fuel consumption, and a function to evaluate the extent to which the driver is driving in an eco-friendly manner.

DIATONE SOUND.NAVI audio navigation system

Promoting Proper Management of Chemical Substances in Design and Production

The Automotive Equipment Group is actively expanding its business globally and is striving to ensure compliance with REACH regulations, the ELV directive of the EU, and other environmental laws and regulations covering its activities and products around the world. Additionally, because the chemical substances management system of the International Material Data System (IMDS) has been introduced in the automotive industry, we are ensuring compliance with environmental guideline designs that consider the recyclability of automobiles.

Initiatives for Reducing Environmental Impact

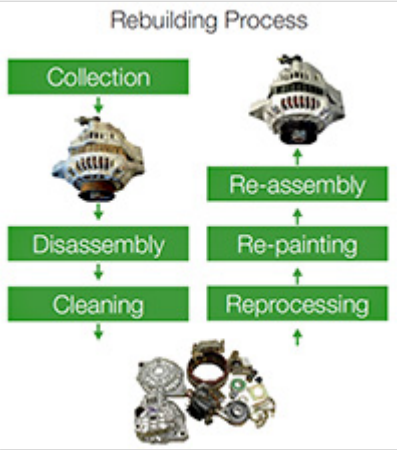
Rolling Out Measures Implemented in Japan at Our International Sites

Himeji Works, Sanda Works, and Fukuyama Works in Japan are promoting the following measures, as well as introducing them throughout the Americas, Europe, and Asia.

- Lean manufacturing to avoid the 3 "M"s: *muda, mura, muri* (meaning "waste," "variation," and "overburden" in Japanese)
- Updating to more efficient equipment
- Improving operation using just-in-time activities
- Introducing initiatives to prevent air, water, and soil pollution
- Sharing of best practices

【Product Highlights】Automotive Electrical Components Rebuilding Business for Efficient Utilization of Resources

Mitsubishi Electric is promoting the rebuilding of automotive electrical components such as alternators and starters. As opposed to the "as is" second-hand use (reuse) of components that have been removed, rebuilt products are disassembled after use and their deteriorated portions are repaired to restore original functions before being reused (recycled). This initiative is being promoted as a system that maintains quality equivalent to new components and contributes to environmental conservation.



Environment – Semiconductor & Device Group

Business Overview and Priority Environmental Issues

Delivering Key Devices to Support Our Information Society on a Global Scale

Mitsubishi Electric's Semiconductor & Device Group delivers key devices supporting a sustainable, low-carbon society. Our extensive lineup includes power devices for the high-efficiency motor control and electricity conversion of home appliances and industrial equipment, high-frequency devices used in everything from mobile phones to satellite communications, optical devices supporting high-speed optical communications, and TFT LCD modules that improve information interfaces. These products are developed and manufactured at the Power Device Works, High Frequency & Optical Device Works, the LCD Division, and their affiliates in and outside Japan. Each of these facilities is focused not only on developing low-power consumption products with minimized loss but also on implementing energy-efficient manufacturing solutions. Since semiconductor factories tend to consume large amounts of electricity to maintain a clean environment in clean rooms and to perform advanced production processes often requiring a large amount of energy, we continuously reduce energy consumption through such measures as introducing high-efficiency air conditioners. In addition, to prevent the depletion and contamination of water resources, we recycle and reuse large volumes of pure water used in production processes. We have also introduced chemical substance management systems to properly manage chemical substances in our products.

Priority Environmental Issues

- Climate change
- Depletion of mineral resources
- Proper use of water in areas where we operate
- Proper management of chemical substances in design and production

Message from Semiconductor & Device Group

Contributing to the Realization of a Low-carbon Society by Providing Energy-efficient Products

The Semiconductor & Device Group provides inverters for home appliances, electric railways, and industrial equipment, power conditioners that convert direct-current electricity from photovoltaic systems to alternating current, and power devices equipped in power conversion equipment used in various power supply devices. Our latest seventh-generation power devices reduce power loss by 80% compared to first-generation models. In addition, we are currently developing next-generation silicon carbide (SiC) power devices and incorporating them into air conditioners and rolling stock to make full use of their promising energy consumption reductions over conventional silicon. To meet requests to reduce the amount of energy consumed by IT equipment, the Semiconductor & Device Group provides high-performance, high-efficiency, and compact high-frequency & optical devices. These devices, realized by our compound semiconductor device technologies, are employed in gigabit wireless communications equipment and optical fiber communications, reducing the amount of energy consumed by IT equipment to ultralow levels.

Toru Sanada
Executive Officer
In Charge of
Semiconductor & Device

In the field of TFT LCD modules, we employ mercury-free, energy-saving white LEDs in TFT color LCD modules. Our extensive lineup of color TFT LCD modules includes various types from standard products to outdoor products featuring ultrahigh brightness. They are supplied for a broad range of applications, including POS terminals, vending machines, ticket machines, displays for banks, and in-vehicle & in-vessel displays.

In addition to focusing on the development of these low-power consumption products, the Semiconductor & Device Group continually and proactively reduces its own energy usage by such measures as employing high-efficiency air conditioners and improving wafer processing operations. Conserving energy in production is one of crucial parts of our activities because cleanrooms tend to consume a large amount of energy for dust-free and germ-free environments.

Initiatives Contributing to the Environment and Society

Low Power Consumption Power Devices

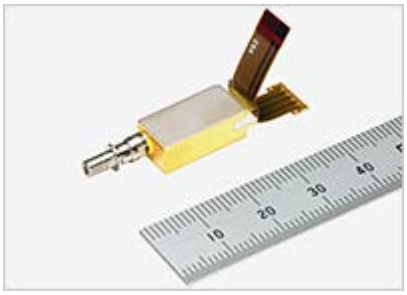
Power devices have been developed and produced using silicon semiconductors. However, they are believed to be approaching a "silicon limit," where it will be impossible to simultaneously achieve an advanced degree of both low loss and high voltage. To continue making advances despite this limit, we are developing new semiconductor devices with silicon carbide (SiC), which offers low-power consumption capabilities and can be used in a wide range of applications. For example, compared to the silicon devices used in inverters, the characteristics of SiC power devices include a power loss reduction of more than 70% during operation and higher-speed switching.

Full-SiC power module

In fiscal 2011, Mitsubishi Electric was the first in the world to equip air conditioners with SiC power modules. Since then, we have promoted their use in various products such as rolling stock and industrial equipment. In fiscal 2015, we developed a full-SiC power module compatible with power conditioners for photovoltaic generation systems in domestic households, contributing to the realization of a power conversion efficiency of 98.0%. We will continue to accelerate the development of new technologies and products to respond to market needs.

Development of Communications Module That Suppresses Increases in Optical Transmission Power Consumption

The introduction of higher-speed, higher-capacity communications networks have led to "energy efficiency in IT" becoming a global social issue. To address this issue, we are developing high-frequency devices and optical devices that reduce the power consumption of IT equipment and systems. Our new optical transmission module (transmission speed of 100Gbps) multiplexes four 25Gbps optical signals of four differing wavelengths. Our intensive efforts to improve laser diodes have realized a 50% reduction in the power consumed to cool this module, compared with conventional products.



4-wavelength integrated optical transmission module

Initiatives for Reducing Environmental Impact

Making Cleanrooms More Energy Efficient

The manufacturing of semiconductors and devices is conducted in cleanrooms under rigorous temperature, humidity, and cleanliness controls to ensure product quality and reliability. Maintaining such a high-level cleanroom environment requires air conditioners that consume as much energy as production equipment. These circumstances led to our decision to replace conventional air conditioners with high-efficiency types, and to improve the efficiency of wafer processing equipment and optimize its operations.

- **Use of High-efficiency Air Conditioners**
  Power Device Works at the Kumamoto site has changed over to higher efficiency air conditioners and is now managing all units collectively. This realizes a 16.6 million kWh (equivalent to 7,000t of CO_2) reduction in annual electricity consumption.
- **Installation of Photovoltaic Systems**
  Rooftop PV systems have been installed at Sagami Administration Center and Power Device Works at the Fukuoka site, with rated power outputs of 436kW and 300kW, respectively. These systems reduce energy usage by a total of 710,000kWh/year (equivalent to 300t of CO_2).
- **Installation of Ice-Based Thermal Storage System**
  The LCD Division uses nighttime power to create ice for its ice-based thermal storage system. Cold energy stored in the ice is then used for air conditioning. This system helps us reduce the division's electricity usage and realize a peak shift, in response to requests from Japanese government and power companies.

Combining the Best of Our Energy-saving Technologies in the Design Technology Building

The new design technology building at the Fukuoka-based Power Device Works is equipped with various environment-conscious features including improved thermal insulation that reduces the load on air conditioners, LED lighting with motion and luminance sensors, natural lighting, and natural ventilation. We have also introduced the Company's Facima system, which controls and manages energy consumption. This building has been recognized for its high environmental performance and was awarded the highest evaluation of "S Rank" under Fukuoka CASBEE*, a system that evaluates the environmental performance of buildings. Moreover, we received the 2014 Good lighting Award as recognition of our initiatives to promote energy-saving lighting, etc.

* CASBEE: Comprehensive Assessment System for Built Environment Efficiency. A standardized Japan-wide evaluation system jointly developed by industry/government/academia that ranks buildings according to their environmental performance.

Ongoing Waste Reduction Activities

Each of our manufacturing sites achieved zero waste emissions from production processes in fiscal 2006. Since then, we have been conducting waste reduction activities at our sites to promote the more efficient use of materials and turn waste into valuable materials.

Focusing on Water Recycling and Preventing Contamination from Wastewater

Semiconductor production factories use large volumes of pure water. From the viewpoint of preventing further depletion of water resources, we are making efforts to reuse pure water. As part of this, we ensure removal of organic and inorganic contaminated impurities contained in the wastewater, and have established a system to process and recycle effluent.

Thorough Management of Chemical Substances

In order to quickly and accurately respond to customer inquiries related to information on the environmental impact of our products, we have introduced a chemical substances management system.

【Product Highlights】A New Facility to Accelerate Development of Technologies/Products and CO_2 Reduction

It is necessary that we make steady progress in improving the performance of power semiconductors, which greatly contribute to reducing CO_2 emission during product usage. The Semiconductor & Device Group, which handles the production of these products, built a new design technology building in March of 2014 to integrate the separately located divisions of sales, development, and design technology all into one building. The interdivisional cooperation achieved by this integration will enable us to accelerate the development of new technologies and products, reducing CO_2 emission and other forms of environmental impact.

Environment – Information Systems & Network Service Group

Business Overview and Priority Environmental Issues

Delivering Optimal IT Services and Solutions to a Broad Range of Customers

Mitsubishi Electric's Information Systems & Network Service Group consists of the Information Systems Integration Division and three other companies: Mitsubishi Electric Information Systems Corporation, Mitsubishi Electric Information Network Corporation, and Mitsubishi Electric Business Systems Co., Ltd. We provide optimal one-stop IT services and solutions in a host of fields, from public to corporate systems. We support our customers throughout the lifecycle, from the conceptual planning of information and network systems to development, operation, and maintenance.

Priority Environmental Issues

- Climate change

Message from Information Systems & Network Service Group

Contributing to the Realization of a Low-Carbon Society through the Promotion of Various Green IT Services

Shinya Fushimi
Executive Officer
In Charge of Information Systems & Network Service

Under the creed "Diamond Solutions – Comfort, Peace of Mind, Development," the Information Systems & Network Service Group is committed to enhancing customer satisfaction and helping achieve a sustainable society through its solutions tailored to the management strategies and challenges of its customers, as well as solutions that resolve social issues.

In recent years, we have also been focusing on environmentally effective businesses with green IT, which seeks to reduce environmental impact through the use of IT. Specifically, we are aggressively expanding our products and services that reduce environmental impact, such as those that curb power consumption through server integration and consolidation, reduce the need for business travel with video conferencing, and promote paperless work environments through ledger computerization. At the same time, in addition to green IT, we are also strengthening our data center solutions based on rising demand associated with BCP*1. Our cutting-edge proprietary technologies have helped companies to reduce data center power consumption approximately 36%*2 compared to their servers built and operated in-house. Energy-efficient data centers also help companies to reduce CO_2 emissions from their business activities.

Going forward, in order to achieve smarter societies, we will leverage the many elemental technologies and strengths of the Mitsubishi Electric Group to build next-generation information systems using the latest IT solutions, such as M2M*3, Big Data, and energy management systems including HEMS*4 and FEMS*5.

*1 BCP: Business Continuity Plan.
*2 Approximately 36%: Actual value achieved during a project where the user relocated an in-house server to our data center; includes server integration.
*3 M2M (Machine-to-Machine): A computer network where connected equipment mutually exchanges information without human involvement to automatically optimize control.
*4 HEMS: Home Energy Management System.
*5 FEMS: Factory Energy Management System.

Using Data Centers to Help Customers Reduce Their Environmental Impact

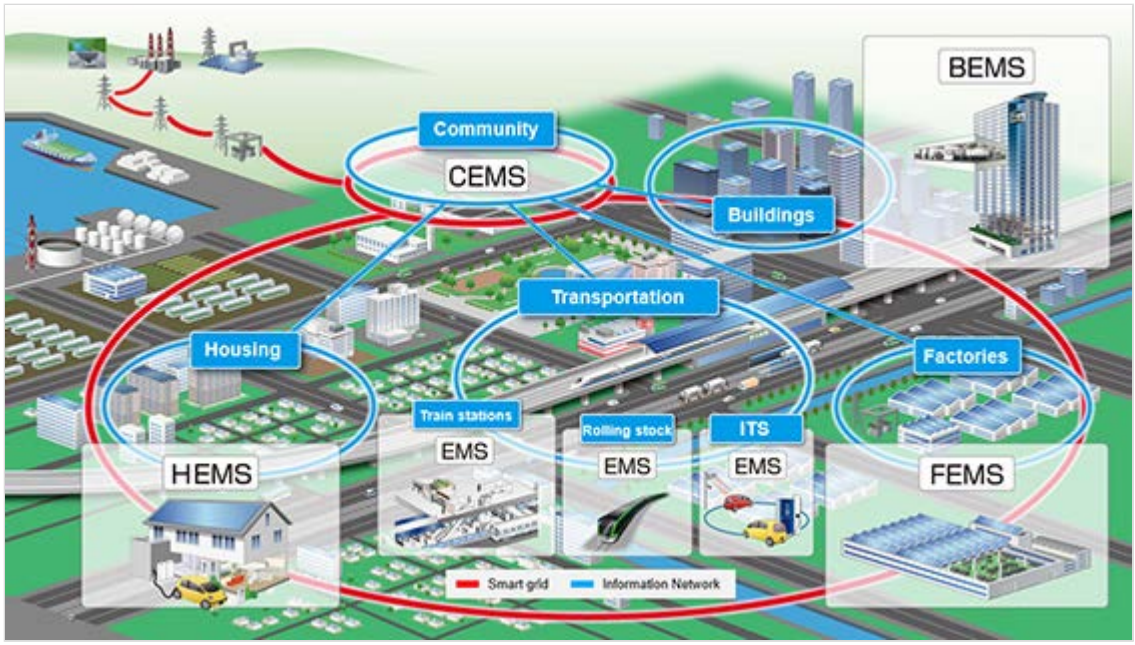
Data center

We operate data centers, which are specialized facilities containing servers and communications equipment, through which we offer housing services where customer servers are relocated to one of our data centers, and hosting services, where we lease servers at our data centers to customers. Through these services, we are able to reduce the environmental impact of our customers through IT. We are also focused on making our data centers more eco-friendly with floor designs that make it possible to place servers in denser layouts by separating the cool airflow from air conditioners from the heat emitted by servers. Our data centers are also using electricity more efficiently thanks to the use of high-efficiency water-cooled air conditioners. These innovations have helped companies to reduce their CO_2 emissions by approximately 36% compared to their servers built and operated in-house. Furthermore, we have installed photovoltaic panels in an effort to reduce power consumption with clean energy, and planted greenery atop data center roofs to prevent the heat island effect. In addition to using the information infrastructure inside our data centers, we provide an IaaS*6 platform service that makes it possible to use resources more appropriately based on data processing volumes, which achieves further cost reductions and improvements in energy savings.

*6 IaaS (Infrastructure as a Service): A service that provides information infrastructure (servers, communication equipment, communication lines, etc.) over a network.

Promoting Initiatives to Realize Smart Communities

Given the increasing seriousness of global environmental issues such as climate change, deforestation, and preservation of biodiversity, we are aiming to realize smart communities with optimally controlled energy throughout all areas, from power systems to home appliances. Based on energy management systems (xEMS) that link machines and IT and process the enormous amount of data collected from the machines, we contribute to optimized energy control in various fields such as home appliances and housing equipment, factories, and buildings.



BEMS: Building Energy Management System
CEMS: Community Energy Management System
HEMS: Home Energy Management System
FEMS: Factory Energy Management System
ITS: Intelligent Transportation System

Initiatives for Reducing Environmental Impact

Continuous Activities Aimed at Reducing Environmental Impacts

The offices and factories of our companies are working continuously to reduce their environmental impact through energy-saving initiatives, sorting and reducing waste, upgrading fleet vehicles to fuel-efficient models, and improving the energy efficiency of logistics in procurement, product shipping, and waste disposal.

Data Center Utilization

We are reducing environmental impact through the operation of energy-efficient data centers.

Promoting Computer Recycling

Following the enactment of Japan's Act on the Promotion of Effective Utilization of Resources on April 1, 2001, we established our own collection and recycling system for used business computers. We also set up a collection and recycling system for household personal computers after revisions were made to this law that took effect on October 1, 2003. Going forward, we will continue to develop recycling-friendly products as part of our commitment to increase the reuse and recycling of our products.

Promoting More Efficient Use of Energy and Resources

We are implementing a variety of initiatives to improve energy efficiency and reduce the use of resources.

- **Energy-saving Initiatives**
  We implemented the following measures in fiscal 2012, which we continue to carry out today. These measures helped us reduce fiscal 2013 energy consumption by 30% compared to fiscal 2011.
  - Relocation of servers to data centers. Stopped using server air conditioners that had been added inside offices.
  - Changed computers to new models that use less electricity.
  - Revised settings for demand controllers and curbed power usage.

- **Resource-saving Initiatives**
  Starting in fiscal 2010, we set up recycling boxes for office paper on every floor. By upholding our commitment to office paper recycling, we reduced our fiscal 2012 usage by approximately 69% compared to fiscal 2009. Furthermore, in fiscal 2013, we set up dedicated recycling boxes in order to recycle paper cups used for our tea and coffee machines.

【Product Highlights】Aiming for the Realization of Smart Communities

Thanks to continuing advancements-in IT, our way of life is becoming "smarter." For example, people can now use their smartphones to operate the air conditioning in their homes from a remote location. Moreover, we have entered an age where not only computers, but also home electrical appliances may be connected to the Internet. Power can even be produced in the home, and energy management systems (EMS)-systems for optimizing energy use-are gaining popularity. Mitsubishi Electric will help to realize smart communities that optimize energy use in apartment complexes, in office buildings, and throughout entire cities.