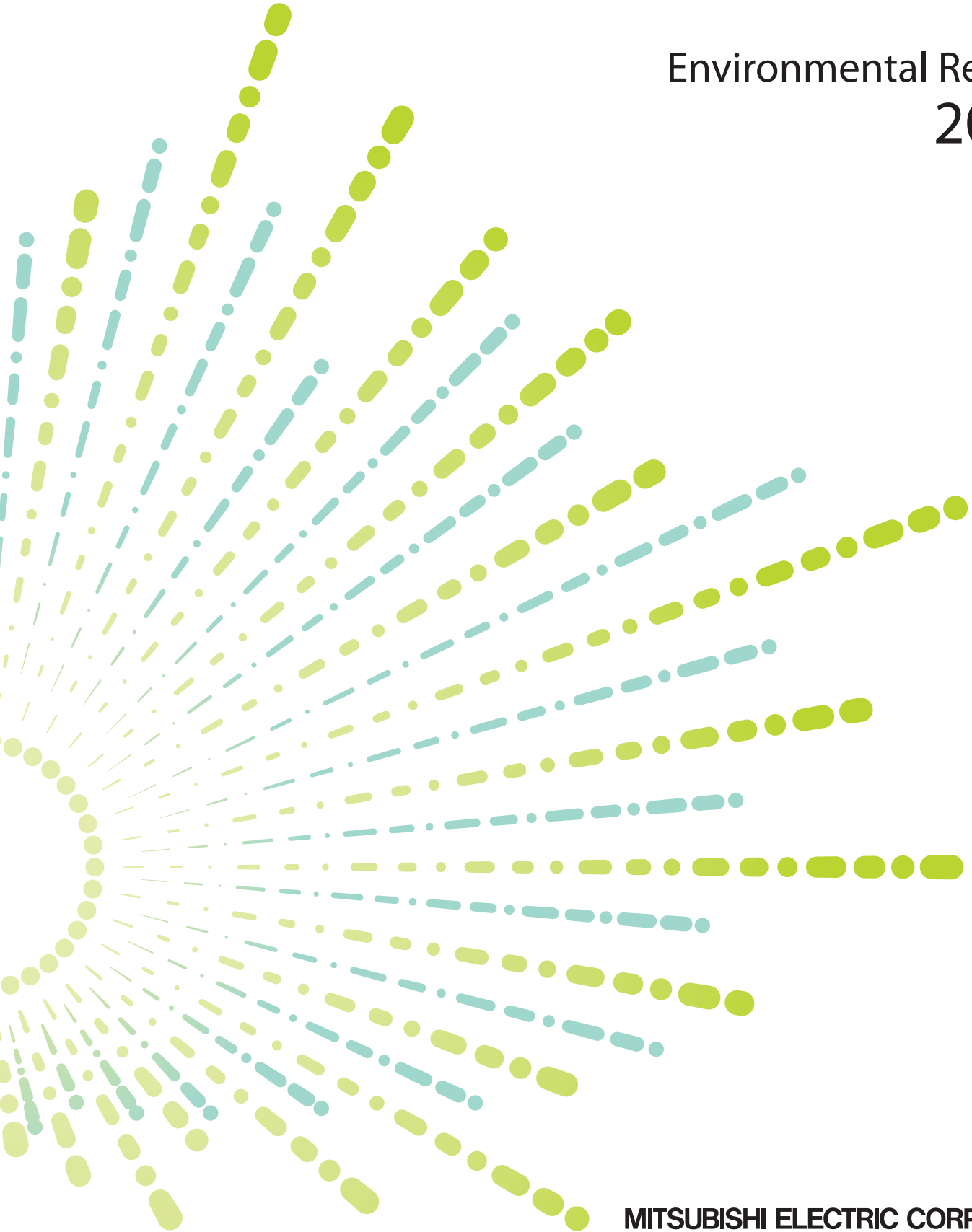


Environmental Report 2017



Contents

Environment	1
About the Report	3
From the President	4
Overview: Creating Value in the Environmental Field – Special Features of the Mitsubishi Electric Group	7
Environmental Report 2017	13
Targets and Achievements of the 8th Environmental Plan (Fiscal 2016–2018)	14
Long-term Perspective and Management Approach Towards Solutions for Environmental Issues	16
Environmental Practice Examples by the Mitsubishi Electric Group Pertaining to SDGs	26
Environmental Considerations for Value Chain Management	32
Fiscal 2017 Environmental Data	34
Period and Scope of the Report	35
Material Balance	36
Environmental Accounting	41
Environmental Performance Data	45
Awards	55
Initiatives toward Creating a Low-Carbon Society	63
Reducing Greenhouse Gases Emitted in the Value Chain	64
Reducing CO2 from Production	66
Contribution to Reducing CO2 from Product Usage	70
Reducing CO2 from Logistics	77
Initiatives toward Creating a Recycling-Based Society	80

Contents

Effective Utilization of Resources	81
Reducing Resource Inputs	83
Strengthening Collaboration for Resource Recycling Business	84
Recycling End-of-Life Products	89
Reducing the Use of Disposable Packaging Materials	92
Using Water Effectively	93
Managing Chemical Substances	97
Environmental Communication	98
The Environment and Business	104
Evaluation of the Importance of Environmental Issues	106
Public Utility Systems Group	107
Energy & Industrial Systems Group	111
Building Systems Group	117
Electronic Systems Group	121
Communication Systems Group	125
Living Environment & Digital Media Equipment Group	129
Factory Automation Systems Group	134
Automotive Equipment Group	139
Semiconductor & Device Group	142
Information Systems & Network Service Group	147
Environment Site Map	150

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

Overview

From various angles we introduce special features of the Mitsubishi Electric Group that are creating value in the environmental field, including Corporate Mission and Business Lines, Management Objectives, Environmental Vision and Key Issues, Opportunities for Growth, and Strengthening the Environmental Management Foundation.

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
- Environmental Considerations for Products
- Environmental Considerations for Procurement
- Creating a Society in Tune with Nature

Chinese language version of Group Environmental Policy:

- 三菱 机集 境方

Environmental Report 2017

- Targets and Achievements of the 8th Environmental Plan (Fiscal 2016-2018)
- Long-Term Perspective and Management Approach Towards Solutions for Environmental Issues
- Environmental Considerations for Value Chain Management
- Fiscal 2017 Environmental Data
- Initiatives toward Creating a Low-Carbon Society
- Initiatives toward Creating a Recycling-Based Society
- Managing Chemical Substances
- Environmental Communication

Chinese language version of Targets and Achievements of the 8th Environmental Plan:

- 第8次 境 划 (2015-2017年度) 目 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.

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

Environment Site Map

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

Environmental Sustainability Report

- Environmental Sustainability Report 2017
- 境行 告 2017

CSR Related Information

- About the Report
- Back Issues

Topics

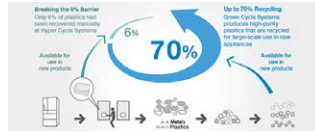
Bringing Water Back to Life through the Powers of Electricity, Bubbles, and Ozone



Here we present entirely new water recycling technology that utilizes the power of electricity to break down substances in water that were previously difficult to manage. We discuss the features of this technology and give some examples of its applications, including "microbubbles" that remove grime with the power of bubbles, and ozone generators called "ozonizers" that produce delicious, safe, clear water with the power of ozone.

- ▶ A New Dimension in Water Recycling

A Model Business for a Sustainable Future



Until now, it was considered difficult to recirculate plastics, or recycle them from home electronics appliances for reuse in new home electronics appliances, as only 6% of the material could be recycled. However, Japan's first large-scale, high-purity plastics recycling system has raised that rate to 70%, more than 10 times the previous level. We will introduce the secret behind this technology, and how it evolved.

- ▶ Plastic Recycling Comes of Age

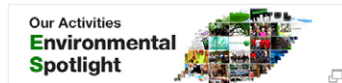
Eco Changes: An Introduction




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: 21.9MB) 

CSR – About the 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 2017 (year ending March 31, 2016). 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 discloses CSR management and information on our various activities and initiatives from the aspects of governance, the environment, and society.

Period Covered by the Report

April 1, 2016 – March 31, 2017

*Also includes some information on policies, targets, and plans for fiscal 2018 and thereafter.

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, 109 domestic affiliates, and 79 overseas affiliates (total of 189 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 section of our website.

References

- ISO26000
- Sustainability Reporting Guidelines Version4, Global Reporting Initiative
- 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

Reporting Medium

Non-financial information about the Mitsubishi Electric Group is disclosed in the CSR Report (PDF) provided in the CSR section of our website. Among this information, environmental information is introduced in detail in the Environment section of the website. The CSR Report is available in PDF format in two versions—a detailed version and digest version—via the Mitsubishi Electric Group website.

Regarding Future Projections, Plans, and Targets

This report contains not only statements of past and present facts 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. We would ask readers to keep these points in mind when reviewing this report.

Environment – From the President



The Mitsubishi Electric Group recognizes that the planet needs to be protected for future generations. Limiting our impact on the environment is thus one of our top management priorities. Our aim is to become a "global, leading green company" by solving problems through producing energy-saving products and systems and by building social infrastructure in business activities around the world, in order to contribute to creating an affluent society where both a "sustainable society" and "safe, secure, and comfortable lifestyles" are simultaneously achieved.

Pressing Forward with the "8th Environmental Plan" to Achieve "Environmental Vision 2021"

The Mitsubishi Electric Group created "Environmental Vision 2021" as a long-term vision for its environmental activities, setting 2021 as the target year for completion, coinciding with the 100th anniversary of the company's establishment. In order to achieve this vision, the ongoing 8th Environmental Plan (fiscal 2016 -2018) focuses on four areas of activities: "contributing to the realization of a low-carbon society", "contributing to the creation of a recycling-based society", "ensuring harmony with nature", and "strengthening the environmental management foundation".

Among these areas, we have placed a particular emphasis on "creating a low-carbon society", with targets set for contributing to the reduction of CO₂ emitted*1 during product usage, as well as reductions in CO₂ emissions during the production of products and systems. The Mitsubishi Electric Group has been contributing to energy savings around the world by providing a range of products that incorporate power semiconductors, which is the key to improving energy-saving performance. Additionally, we offer solutions for overall systems that deliver high energy-saving performance, such as net zero-energy buildings (ZEBs*2) and net zero-energy houses (ZEHs*3). Through these initiatives, we have been working to achieve our targets for contributing to the reduction of CO₂ during product usage. Meanwhile, in order to reduce CO₂ emissions from production, we have been moving forward with reducing CO₂ generated from energy sources, as well as reducing PFCs and other non-CO₂ greenhouse gases by taking advantage of the IoT*4 and other start-of-the-art technologies. For example, the new production building at the Nagoya Works has successfully improved productivity and energy efficiency through a unique system that combines factory automation and IT technologies. The effects have been recognized, culminating with the Nagoya Works receiving the Agency for Natural Resources and Energy Director-General's Award in Fiscal 2017 Energy Conservation Grand Prize.

Activities in other areas include enhancing our resources recycling businesses, such as the recycling of plastics from used home electrical appliances and the renewal (modernization) of elevators, which also contributes to energy savings. We are also promoting activities that contribute to living in tune with nature by conducting living creatures studies at business sites. Furthermore, we appropriately abide by and respond to environmental laws and regulations, including RoHS*5 and VOCs*6, which have become increasingly more stringent around the world. Through our efforts to reduce the environmental load at all business sites, the aim is to strengthen our environmental management foundation.

In recognition of these initiatives, in 2016, the Mitsubishi Electric Group received "A list" ratings, the top grade, from CDP—an international non-governmental organization—in three areas: climate change, water and supply chain. We will continue to press forward with our environmental efforts by executing environmental plans that will achieve Environmental Vision 2021.

Looking Forward to 2030 and 2050

In 2015, a set of 17 goals that should be achieved by 2030 were identified by the United Nations as sustainable development goals (SDGs*7), five of which pertain to the environmental activities of the Mitsubishi Electric Group, including "Climate change and mitigating its effects" and "Ensuring access to and sustainable management of water and sanitation".

In fiscal 2019, the Mitsubishi Electric Group will embark on the 9th Environmental Plan (fiscal 2019-2021),

a final 3-year plan before reaching the goals set in Environmental Vision 2021. This will include formulating medium- and long-term plans that look forward to 2030 and 2050, and will help us achieve SDGs.

We believe that these initiatives, together with the aim of becoming a "global, leading green company", will lead to achieving our planned growth targets of ¥5 trillion in consolidated sales and 8% or higher operating margins by fiscal 2021.

The Mitsubishi Electric Group is committed to improving the energy efficiency of its products and systems, and reducing the environmental load at business sites from the long-term perspective while taking the circumstances of each country into consideration. We will continue to press forward with efforts to be recognized by society as a "global, leading green company".

June 30, 2017



Masaki Sakuyama
President & CEO

- *1 Contribution to reducing CO₂ emitted: Amount of CO₂ deemed to be reduced as a result of switching from older products (those equivalent to products sold in fiscal 2001) to new, more energy-efficient products. Estimated using in-house calculation standards.
- *2 ZEB (net Zero-Energy Building): A building where the net consumption of fossil fuel energy is reduced to zero or roughly zero through energy-saving initiatives and the use of renewable energy resources.
- *3 ZEH (net Zero-Energy House): A house where the net consumption of fossil fuel energy is reduced to zero or roughly zero, through energy-saving initiatives and the use of renewable energy resources.
- *4 IoT (Internet of Things): Mechanism in which various things connected to the Internet control one another.
- *5 Restriction of Hazardous Substances: Directive adopted by the European Union to restrict the use of certain hazardous substances in electrical and electronic equipment.
- *6 Volatile Organic Compounds: Typically, toluene, xylene, and ethyl acetate.
- *7 Sustainable Development Goals to be reached by 2030, included in "Transforming Our World: the 2030 Agenda for Sustainable Development" adopted by the United Nations in the General Assembly held in September 2015.

SUSTAINABLE DEVELOPMENT GOALS
17 GOALS TO TRANSFORM OUR WORLD



SDGs Closely Related to Mitsubishi Electric Group Environmental Activities



Ensuring Access to and Sustainable Management of Water and Sanitation

Mitsubishi Electric Group's water treatment and purification technologies provide vital products and systems that help to ensure the supply of safe water.

Major businesses/initiatives: Plant systems for water supply and sewage, ozone generators



Securing Sustainable Energy and Expanding Its Use

As well as developing technologies, products and systems that contribute to saving and generating energy and creating a smart society, the Mitsubishi Electric Group is working to disseminate them around the world.

Major businesses/initiatives: Power generation, transmission, and distribution business, photovoltaic power generation



Securing a Sustainable Production and Consumption Format

Our initiatives include reducing resource inputs during manufacturing and recycling used products. We are also promoting green procurement and the reduction of final waste disposal.

Major businesses/initiatives: Reuse/recycling businesses, green procurement



Climate Change and Mitigating Its Effects

The emission of greenhouse gases, including CO₂, are assessed for the value chain as a whole in order to reduce them to targets we have set.

Major businesses/initiatives: Energy-saving products, reducing greenhouse gas emissions



Protecting and Restoring Ecosystems, and Preventing the Loss of Biodiversity

In addition to developing and providing observation satellites that report the status of oceans and woodlands, we are carrying out activities at business sites that enable us to live with the surrounding environment in harmony.

Major businesses/initiatives: Satellites, living creatures studies, "Satoyama" Woodland Preservation Project

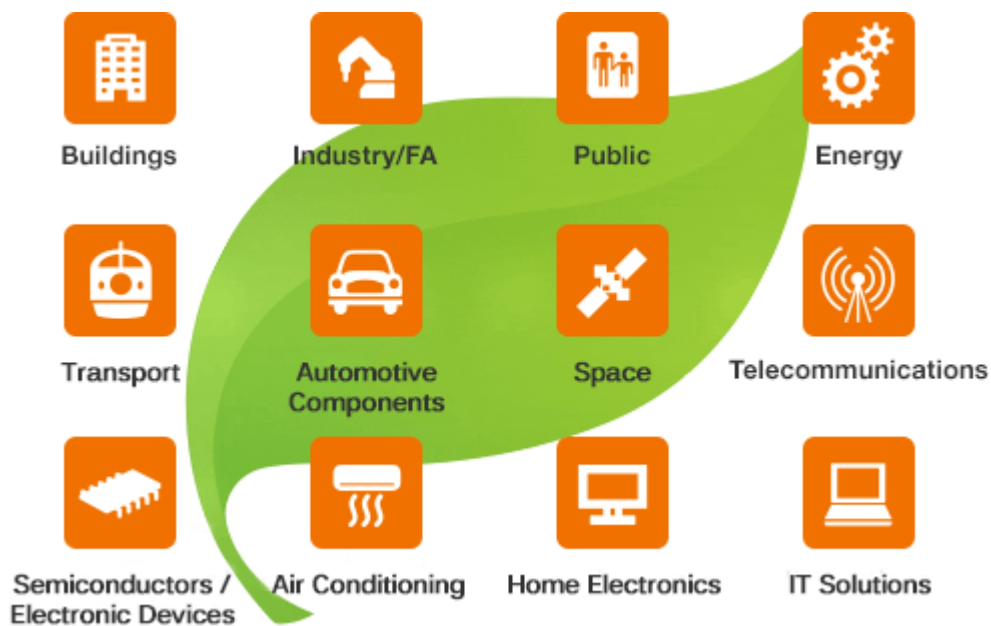
Environment – Overview: Creating Value in the Environmental Field – Special Features of the Mitsubishi Electric Group



Corporate Mission Statement and Business Lines

A Comprehensive Electrical and Electronics Manufacturer Contributing to Solutions for Environmental Issues

Our corporate mission specifies that "the Mitsubishi Electric Group will continually improve its technologies and services by applying creativity to all aspects of its business. By doing so, we enhance the quality of life in our society." Based on this mission statement, we are expanding business in a wide range of areas. Our aim is to simultaneously ensure a sustainable global environment and safe, secure, and comfortable lifestyles while meeting the individual needs of our customers.





Management Objectives

Consolidated Sales of At Least ¥5 Trillion and an Operating Margin of At Least 8%

In FY2015, the Mitsubishi Electric Group set the following growth targets as management objectives to achieve by FY2021, the year in which Mitsubishi Electric will celebrate its 100th anniversary: consolidated sales of at least ¥5 trillion, and an operating margin of at least 8%. Our aim is to improve our reputation among stakeholders and increase the value of the Mitsubishi Electric brand by enabling safe, secure, and comfortable lifestyles for our customers.

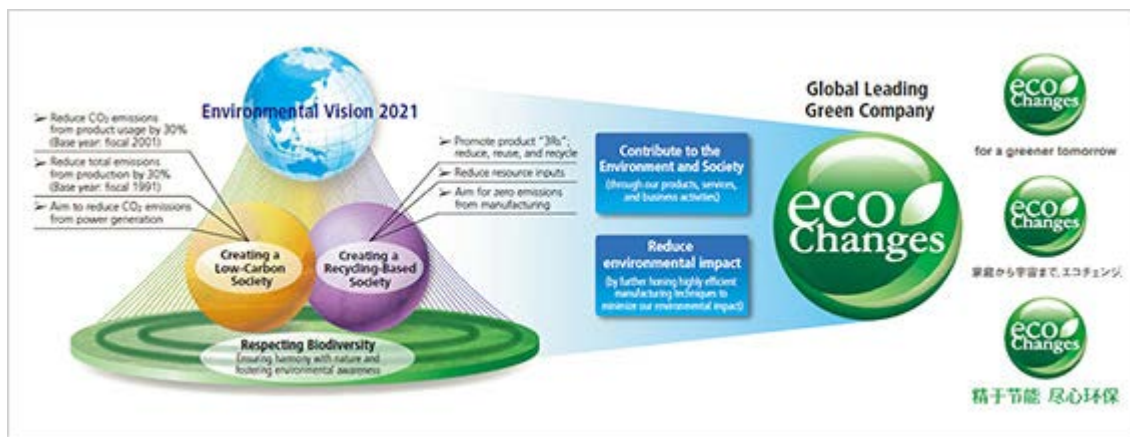




Environmental Vision and Key Issues

Helping People and the Environment through Our Technology and Actions

The three pillars of our Environmental Vision 2021 are: creating a low-carbon society, creating a recycling-based society, and respecting biodiversity. In our pursuit of this vision we are currently implementing the 8th Environmental Plan (FY2016 - 2018), which prioritizes creating a low-carbon society.

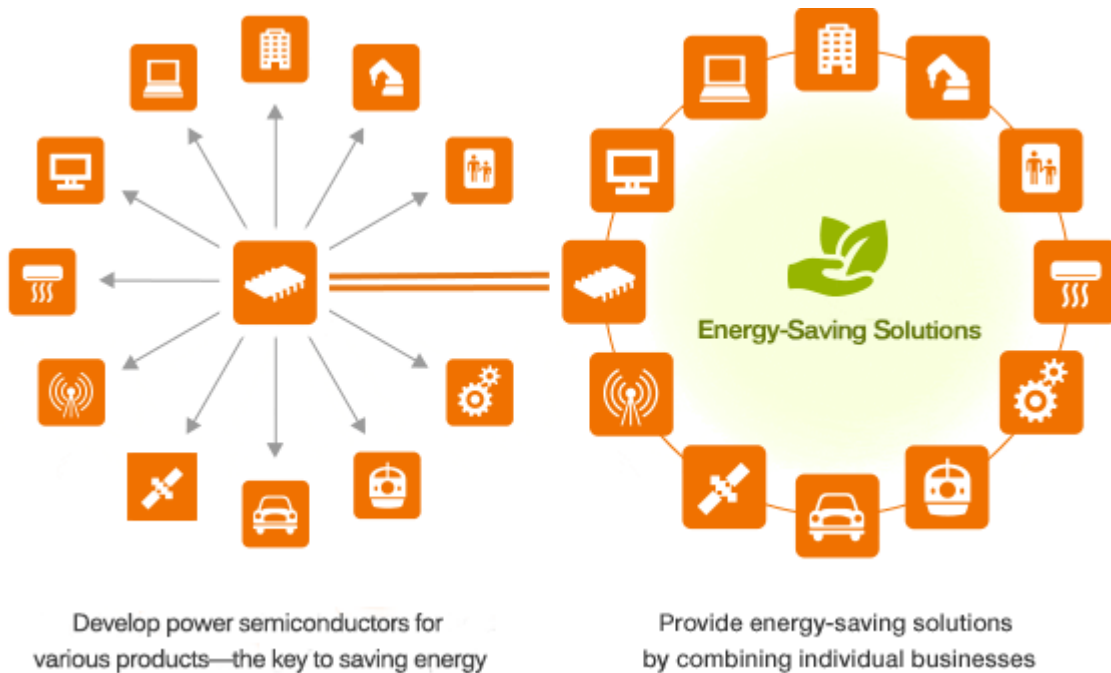




Opportunities for Growth

Reducing CO² from Product Usage

In order to create a sustainable society, work is being done around the world to reduce CO₂ emissions, a particularly important element within the issue of climate change. As we produce our own power semiconductors—the key to achieving energy savings—and utilize them in an array of businesses and products, the Mitsubishi Electric Group is at the same time providing energy-saving solutions by combining individual businesses and products. We believe that this two-pronged approach is a particular strength of our Group and will lead to opportunities for growth.

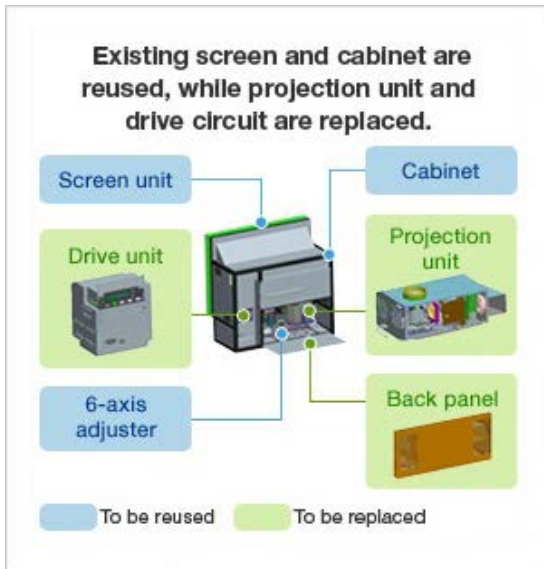


Other Opportunities for Growth

Expanding Environment-Related Business

Environmental initiatives other than CO2 emission reduction are also underway. Currently we rebuild electric automotive components, we have introduced engine replacement for display wall systems, and we have introduced the large-scale high-purity recycling of plastics, an initiative that has improved the recycling ratio of self-circulation recyclable plastics to 70%. We have also introduced other initiatives, such as launching the "Replace Series" multi-unit air conditioner system for buildings, which can be installed using a building's existing plumbing system. Our aim is to expand our environment-related business by strengthening collaboration between businesses involved in recycling resources.

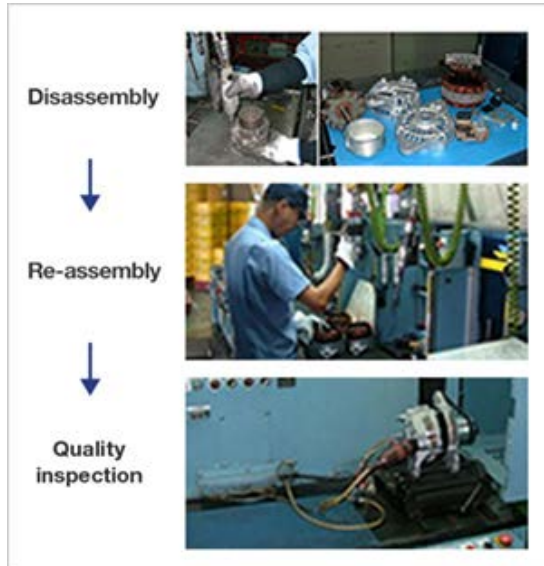
Engine Replacement for Display Wall System



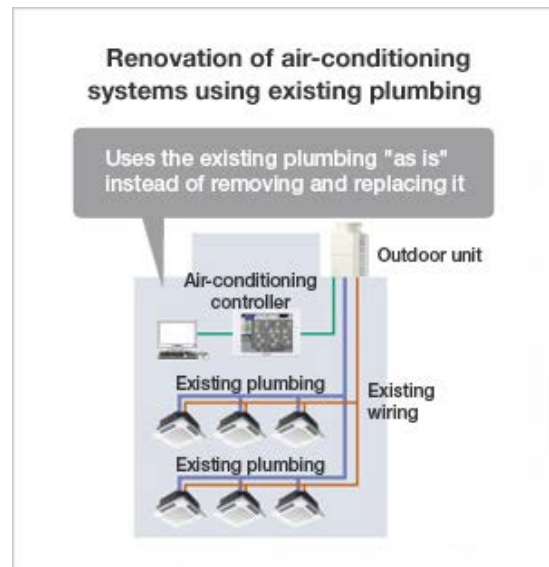
Large-Scale, High-Purity Plastics Recycling



Rebuilding Electric Automotive Components



"Replace Series" Multi-Unit Air-Conditioning System for Buildings

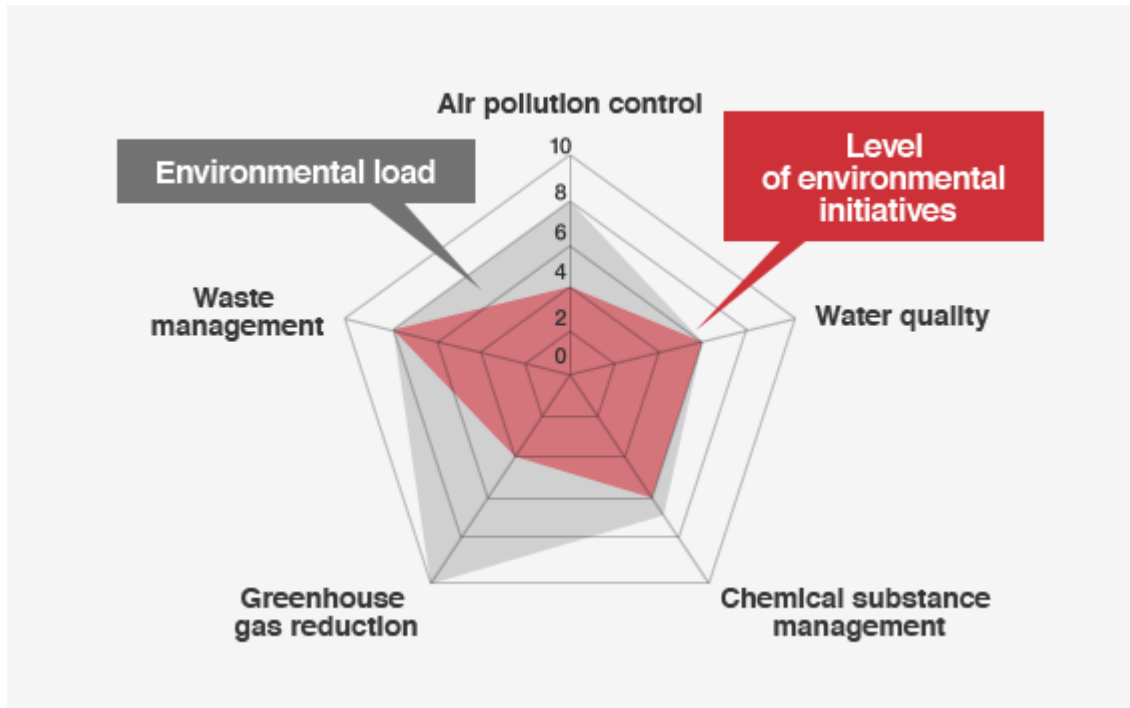




Strengthening the Foundations of Our Environmental Management

Visualizing the Level of Environmental Initiatives at Manufacturing Bases Using Uniform Standards

The Mitsubishi Electric Group visualizes its environmental impact and the level of environmental initiatives in five areas: air pollution, water pollution, chemical substances, global warming, and waste management, and evaluates them in order to ensure improvement across 91 manufacturing bases, both inside Japan and around the world.



▶ **Targets and Achievements of the 8th Environmental Plan (Fiscal 2016-2018)**

An overview and self-evaluation of progress and achievements made by the Mitsubishi Electric Group in fiscal 2017 in comparison to the targets set out in the 8th Environmental Plan.

Chinese language version of the above page:

- ▶ 第8次 境 划 (2015-2017年度) 目 与成果

▶ **Long-Term Perspective and Management Approach Towards Solutions for Environmental Issues**

Report on Mitsubishi Electric Group's long-term perspective for resolving environmental issues, 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.

▶ **Fiscal 2017 Environmental 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 告期 与范
- ▶ 物料衡算

▶ **Initiatives toward Creating a Low-Carbon Society**

- ▶ Reducing Greenhouse Gases Emitted in the Value Chain
- ▶ Reducing CO₂ from Production
- ▶ Contribution to Reducing CO₂ from Product Usage
- ▶ Reducing CO₂ from Logistics

▶ **Initiatives toward Creating a Recycling-Based Society**

- ▶ Effective Utilization of Resources
- ▶ Reducing Resource Inputs
- ▶ Strengthening Collaboration for Resource Recycling Business
- ▶ Recycling End-of-Life Products
- ▶ 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.

▶ **Environmental Communication**

A look at the various communications published in fiscal 2017, including disclosures on the results of our environmental initiatives, promotion of Eco Changes, participation in environmental exhibitions, and environment-related advertisements.

 [Verification Statement \(PDF 142KB\)](#)

* Scope of verification for green-house gas emission: Scope1, 2, 3


Environment – Targets and Achievements of the 8th Environmental Plan (Fiscal 2016–2018)


► For a General Overview of the 8th Environmental Plan in Fiscal 2017, click here.

 Very good
  Good
  Almost there
  More effort needed



Initiatives Toward Creating a Low-Carbon Society


Reducing CO ₂ from Production			
Targets of 8th Environmental Plan (Fiscal 2016–2018)	Fiscal 2017 Targets	Fiscal 2017 Results	Self-evaluation
Annual emission of greenhouse gases (CO ₂ conversion): 1.37 million tons or less	1.43 million tons	1.34 million tons	

Reducing CO ₂ Emissions from Product Usage by Improving Product Performance			
Targets of 8th Environmental Plan (Fiscal 2016–2018)	Fiscal 2017 Targets	Fiscal 2017 Results	Self-evaluation
Average reduction rate from 107 product groups: 35% (compared to Fiscal 2001)	34%	35% from 106 product groups	


Increasing Contribution to Reducing CO ₂ Emissions from Product Usage			
Targets of 8th Environmental Plan (Fiscal 2016–2018)	Fiscal 2017 Targets	Fiscal 2017 Results	Self-evaluation
Contribute to reducing emissions by 92 million tons from more than 127 product groups	75 million tons from 124 product groups	69 million tons from 119 product groups	

Initiatives Toward Creating a Recycling-Based Society

Effective Utilization of Resources			
Targets of 8th Environmental Plan (Fiscal 2016–2018)	Fiscal 2017 Targets	Fiscal 2017 Results	Self-evaluation
Mitsubishi Electric Final disposal rate: 0.1% or less	0.1%	0.002%	
Affiliates (Japan) Final disposal rate: 0.1% or less	0.1%	0.02%	
Affiliates (Overseas) Final disposal rate: 0.5% or less	0.6%	0.69%	

Reducing Resource Inputs			
Targets of 8th Environmental Plan (Fiscal 2016–2018)	Fiscal 2017 Targets	Fiscal 2017 Results	Self-evaluation
Average reduction rate from 64 product groups: 40% (compared to Fiscal 2001)	40%	38%	

Initiatives to Create a Society in Tune with Nature

Ongoing "Mitsubishi Electric Outdoor Classroom" and "Satoyama" Woodland Preservation Project			
Targets of 8th Environmental Plan (Fiscal 2016–2018)	Fiscal 2017 Targets	Fiscal 2017 Results	Self-evaluation
Total participants: 30,000 people	3,500 people	5,100 people	

Fostering Environmental Awareness through Global E-learning			
Targets of 8th Environmental Plan (Fiscal 2016–2018)	Fiscal 2017 Targets	Fiscal 2017 Results	Self-evaluation
Expand participation to 140 affiliated companies in Japan and overseas (including Mitsubishi Electric)	Implemented in 140 companies	Implemented in 144 companies	

Preserving Biodiversity at Business Sites			
Targets of 8th Environmental Plan (Fiscal 2016–2018)	Fiscal 2017 Targets	Fiscal 2017 Results	Self-evaluation
Promote protection of regional endemic species at all business sites in Japan	18 business sites (cumulative total)	17 business sites (cumulative total)	

Strengthening Our Environmental Management Foundations

Improving Environmental Initiatives				
Targets of 8th Environmental Plan (Fiscal 2016–2018)		Fiscal 2017 Targets	Fiscal 2017 Results	Self-evaluation
Mitsubishi Electric	Environmental initiatives level of completion: 100 points	Avg. of 95 points	Avg. of 97 points	
Affiliates (Japan)	Environmental initiatives level of completion: avg. of 90 points	Avg. of 85 points	Avg. of 92 points	
Affiliates (Overseas)	Environmental initiatives level of completion: avg. of 80points	Avg. of 75 points	Avg. of 91 points	

General Overview of the 8th Environmental Plan in Fiscal 2017

Due to the impact of the economic slowdown, the amount contributed to reducing CO₂ emissions through product usage failed to reach the target volume. However, the result of initiatives introduced to realize a low-carbon society—such as reducing CO₂ emissions during production and reducing CO₂ emissions during product use—were mostly good. Most of the initiatives for creating a recycling-based society and realizing a society in tune with nature are progressing as planned. However, some issues still require attention, such as improving the final disposal rate and reducing resource input volumes overseas.

Regarding the new activities to increase the level of initiatives for strengthening the foundations of our environmental management, we found that visualizing the environmental initiatives at the level of individual business sites is effective for achieving overall improvement. Based on these results, we will continue utilizing the PDCA cycle and introduce more initiatives to achieve the targets set forth in the 8th Environmental Plan.

Environment – Long-Term Perspective and Management Approach Towards Solutions for Environmental Issues

Long-Term Perspective Contributing to SDGs* Set by Paris Agreement

With the advent of climate change, resource depletion, and declining biodiversity, global environmental issues are becoming ever more urgent. It is imperative to solve these problems in order to secure sustainability. At the United Nation's Sustainable Development Summit held in September 2015, "Transforming Our World - The 2030 Agenda for Sustainable Development" was adopted by world leaders, and SDGs, which include responding to climate change, were added. At the 21st Conference of the Parties of the UNFCCC (known as COP21) held in December 2015, an international framework on climate change—the Paris Agreement—was adopted with the aim of suppressing the increase in average global temperature to below 2°C above pre-industrial levels.

The Mitsubishi Electric Group provides solutions for energy savings and water resource conservation that utilize the strengths offered by the diverse businesses and products of member companies. In addition to such efforts, we continue to try to create new technologies and ideas that resolve environment-related social issues.



* Sustainable Development Goals: There are 17 goals in three areas—economy, society and environment—to be achieved by 2030.

The following are examples of environmental practices carried out by the Mitsubishi Electric Group that correspond to five of the 17 SDGs.



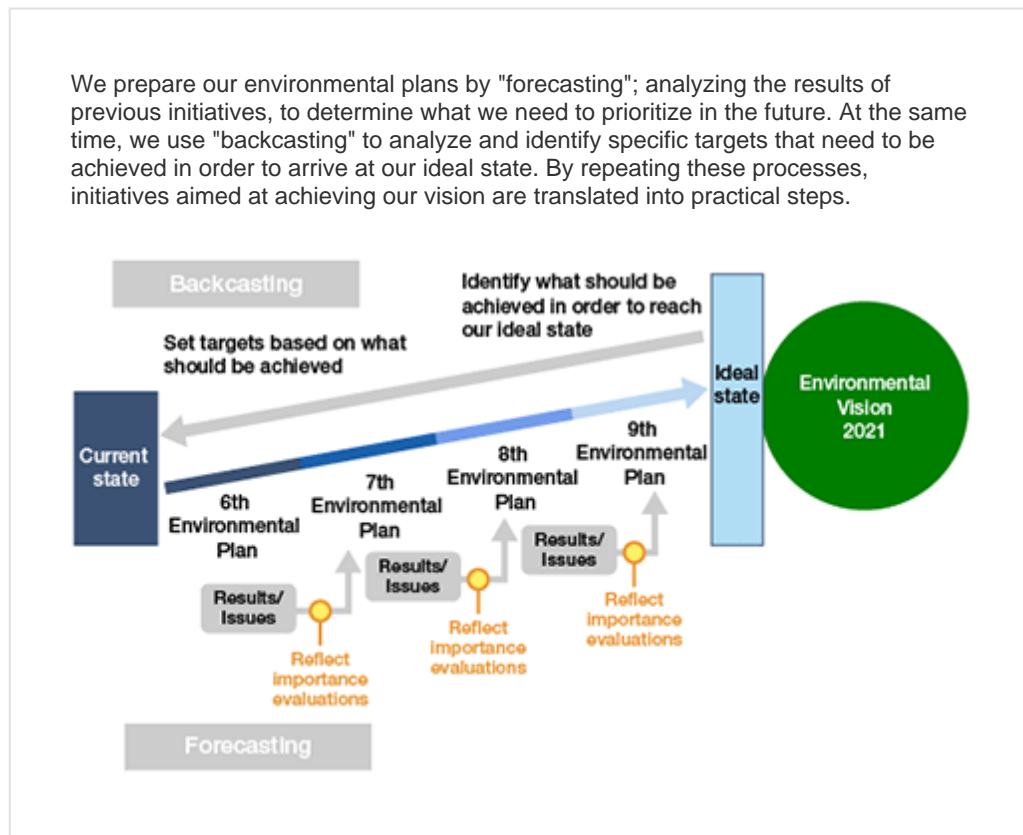
▶ Environmental Practice Examples by the Mitsubishi Electric Group Pertaining to SDGs

Mid-Term Perspective Towards Achievement of "Environmental Vision 2021"

The environmental goals to be achieved by the Mitsubishi Electric Group before the end of fiscal 2021 are defined in "Environmental Vision 2021". This policy is based on three pillars: "creating a low-carbon society", "creating a recycling-based society", and "respecting biodiversity and fostering environmental awareness". To effectively realize these goals, we prepare and actively implement an environmental plan every three years.



We prepare our environmental plans by "forecasting"; analyzing the results of previous initiatives, to determine what we need to prioritize in the future. At the same time, we use "backcasting" to analyze and identify specific targets that need to be achieved in order to arrive at our ideal state. By repeating these processes, initiatives aimed at achieving our vision are translated into practical steps.



Key Issues and Management Approach

The 8th Environmental Plan (fiscal 2016 to 2018) sets forth 11 activities in four areas: "realizing a low-carbon society", "creating a resource-recycling society", "realizing a society in tune with nature", and "strengthening our environmental management foundation". For eight of these items, numerical targets have been set from the perspectives of management and environmental impact.

Because we view initiatives aimed at realizing a low-carbon society as being among the most important tasks for the Mitsubishi Electric Group, we have set numerical targets for all of them.

The Mitsubishi Electric Group's management approach* for each environmental aspect of the Global Reporting Initiative (GRI) Guidelines Version 4 (G4) and explanations corresponding to each aspect (details page) are shown in the table below.

* "Management approach" denotes the methods applied in corporate decision-making and progress management regarding specific aspects of initiatives relating to sustainability. GRI, an NPO that aims to establish international standards for sustainability, suggested this concept in the G4 Guidelines published in 2013.

G4 Environmental Aspect and Management Approach (Open)	Indicators		Details Page
Materials	G4-EN1	Materials used by weight or volume	▶ Material Balance
	G4-EN2	Percentage of materials used that are recycled input materials	
<p>In business activities and shipments 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 the effective use of resources (maximum reuse of waste generated from production) and reducing resource inputs, as well as managing these initiatives with respective numerical targets.</p>			
Energy	G4-EN3	Energy consumption within the organization	▶ Material Balance ▶ Environmental Performance Data ▶ Reducing CO ₂ from Production ▶ Contribution to Reducing CO ₂ from Product Usage ▶ Reducing CO ₂ from Logistics
	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	
<p>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.</p> <p>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.</p> <ul style="list-style-type: none"> Through improving energy consumption efficiency and reducing consumption, we are working to reduce CO₂ emissions. The Mitsubishi Electric Group uses "CO₂ emissions per unit of sales" as an important indicator. For details, please see "Emissions". 			
Water	G4-EN8	Total water withdrawal by source	▶ Material Balance ▶ Environmental Performance Data ▶ Using Water Effectively
	G4-EN9	Water sources significantly affected by withdrawal of water	The Mitsubishi Electric Group was not able to confirm the possibility of using excessive water in each region in Japan and overseas.
	G4-EN10	Percentage and total volume of water recycled and reused	▶ Material Balance ▶ Environmental Performance Data ▶ Using Water Effectively

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	Not applicable
	G4-EN12	Description of significant impacts of activities, products, and services on biodiversity in protected areas and areas of high biodiversity value outside protected areas	The Mitsubishi Electric Group conducts no mining, cultivation or manufacturing of raw materials, and does not destroy woodlands or eco-systems. There has been not large impact due to production bases identified neither in scale nor frequency.
	G4-EN13	Habitats protected or restored	▀ Preserving Biodiversity at Business Sites
	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. In addition, at individual business sites, we are studying the biology of animals and plants on the premises, while communicating with outside experts on the basis of our findings in order to better understand the situation. These activities are incorporated into the planning of our efforts to conserve biodiversity.

Emissions	G4-EN15	Direct greenhouse gas (GHG) emissions (Scope 1)	<ul style="list-style-type: none"> ▶ Reducing Greenhouse Gases Emitted in the Value Chain ▶ Material Balance ▶ Environmental Performance Data ▶ Reducing CO₂ from Production ▶ Contribution to Reducing CO₂ from Product Usage ▶ Reducing CO₂ from Logistics ▶ Managing Chemical Substances
	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	NO _x , SO _x , and other significant air emissions	
<p>Operations of the Mitsubishi Electric Group emit four types of greenhouse gases through business activities: CO₂, sulfur hexafluoride (SF₆), perfluorocarbons (PFCs), and hydrofluorocarbons (HFCs). Reducing the emission of these gases is managed through the use of numerical targets. For CO₂ 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, "CO₂ 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 CO₂ emissions generated during production.</p> <p>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 CO₂ 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 CO₂ 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.</p> <p>Substances that cause atmospheric pollution, including nitrogen oxide (NO_x), sulfur oxide (SO_x), volatile organic compounds (VOCs), and dust/soot, are being managed on the basis of legal compliance.</p>			

Effluents and Waste	G4-EN22	Total water discharge by quality and destination	<ul style="list-style-type: none"> ▶ Material Balance ▶ Environmental Performance Data ▶ Effective Utilization of Resources
	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 2 Annex I, II, III, and VIII, 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 discharges 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	<ul style="list-style-type: none"> ▶ Contribution to Reducing CO₂ from Product Usage ▶ Reducing Resource Inputs ▶ Strengthening Collaboration for Resource Recycling Business ▶ Recycling End-of-Life Products ▶ Reducing the Use of Disposable Packaging Materials ▶ Eco Changes  ▶ Plastic Recycling Comes of Age ▶ A New Dimension in Water Recycling ▶ Tapping into Hidden Deposits of Rare Earth Elements Found in Cities
	G4-EN28	Percentage of products sold and their packaging materials that are reclaimed by category	
<p>To reduce the environmental impact of our products and services, the Mitsubishi Electric Group promotes Design for Environment activities determined from three perspectives: "reducing resource inputs", "reducing life-cycle CO₂" and "avoiding emissions of environmentally hazardous substances".</p> <p>"Reducing resource inputs" is an initiative linked to creating a recycling-based society. (See "Materials" aspect).</p> <p>"Reducing life-cycle CO₂" is an initiative linked to reducing CO₂ emissions during product use.(See "Energy" and "Emissions" aspects).</p> <p>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).</p> <p>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.</p> <p>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.</p>			
Compliance	G4-EN29	Monetary value of significant fines and total number of non-monetary sanctions for non-compliance with environmental laws and regulations	-
<p>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.</p>			

Transport	G4-EN30	Significant environmental impacts of transporting products and other goods and materials for the organization's operations, and transporting members of the workforce	<ul style="list-style-type: none"> ▶ Reducing Greenhouse Gases Emitted in the Value Chain ▶ Reducing CO₂ from Logistics ▶ Environmental Performance Data
<p>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.</p> <ul style="list-style-type: none"> ● For energy consumption and CO₂ 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	▶ Environmental Accounting
<p>Regarding total environmental protection expenditures, based on the "Environmental Accounting Guidelines 2005" produced by the Japanese Ministry of the Environment, a summary of environmental conservation costs, environmental conservation effects (environmental performance), and the economic impact accompanying environmental conservation measures (actual effects of revenue/expense cuts) are calculated and announced each year.</p>			
Supplier Environmental Assessment	G4-EN32	Percentage of new suppliers that were screened using environmental criteria	-
	G4-EN33	Significant actual and potential negative environmental impacts in the supply chain and actions taken	▶ Supply Chain Management
<p>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.</p>			
Environmental Grievance Mechanisms	G4-EN34	Number of grievances about environmental impacts filed, addressed, and resolved through formal grievance mechanisms	-
<p>Environmental grievances are processed through the Corporate Environmental Sustainability Group.</p>			

Receiving "A-List Company" Recognition, the Highest Evaluation from CDP*

In fiscal 2017, Mitsubishi Electric was named an A-List company in two programs of the CDP: "Climate Change 2016" and "Water 2016". The CDP awarded us this highest evaluation in recognition of the company's actions to reduce greenhouse gas emissions and mitigate climate change, as well as exceptional activities in terms of measures and strategies for water resources. For the CDP Supply Chain Program, we also received A-List recognition in the CDP Supplier Climate and CDP Supplier Water categories. Furthermore, for the CDP Supplier Engagement Rating, which assesses initiatives against climate change across the entire supply chain, a top "A" grade was also given. We will continue to press forward with our efforts for environmental conservation.

* CDP: An international NGO that examines, evaluates and discloses environmental initiatives of corporations and cities.



Environment – Environmental Practice Examples by the Mitsubishi Electric Group Pertaining to SDGs



Ensure Access to Water, Sanitation, and Sustainable Management

Mitsubishi Electric Group's water treatment and purification technologies provide vital technologies and systems to help ensure the supply of safe water.

Plant Systems for Water Supply and Sewage



We produce equipment for water treatment plants, including various detectors and panel meter displays, and advanced water purification facilities as a means of supporting the supply of safe water. We also provide technologies for improving, maintaining, and operating water infrastructure overseas.

Water Treatment Technologies



Mitsubishi Electric has been producing Ozonizers for nearly 50 years. These unique devices purify water using ozone instead of chlorine. They are utilized at water and sewage plants, pharmaceutical and chemical plants, and aquariums, where they contribute to the preservation of the global water environment. Our bioreactors, which efficiently filter wastewater containing organic matter, help in the purification of drinking water and treatment/reuse of sewage/wastewater. We also develop and offer other technologies that contribute to saving water resources.

Securing Sustainable Energy and Expanding Its Use

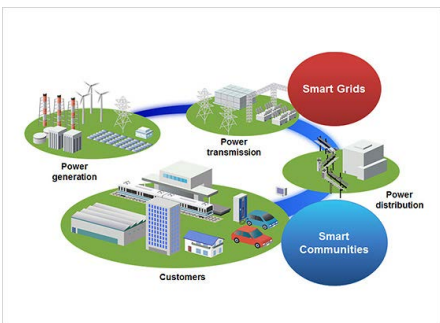
The Mitsubishi Electric Group has a wide range of technologies related to supplying and efficiently utilizing energy. Those technologies are being applied to develop advanced technologies and systems that contribute to more efficient energy generation, greater energy savings, and the realization of smart societies. We are also pursuing the most efficient use of energy by each of our products. The wide-spread application of our technologies and products enables us to contribute to the sustainable use of energy.

Power Generation, Transmission, and Distribution Business



We manufacture products related to all stages of electricity supply, from generation to delivery to the end user, including transmission, transformation, and distribution. We contribute to increasing the efficiency of the electric power infrastructure by providing highly efficient power generators and various devices and systems that help reduce the loss of power in transmission and transformation processes.

Smart Grids and Smart Communities



We are involved in initiatives to develop and commercialize smart grids and smart communities, including the construction and use of our own testing facilities. While working towards the realization of smart societies, we are collaborating with external organizations in various ways, such as the delivery of storage batteries that enable electric utilities companies to conduct testing and demonstrations on remote islands.

Photovoltaic Power Generation



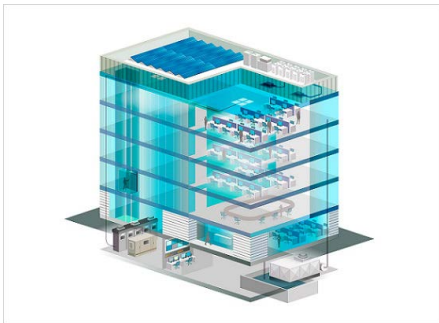
We manufacture photovoltaic power generation systems designed for high output and high efficiency, and that can be applied for various purposes—from household use to large-scale solar projects. We have also developed technologies to help improve system stability, including the isolation of faulty circuits should a problem occur.

Energy-Saving Products



The products of the Mitsubishi Electric Group require power to operate. Products that operate with higher energy efficiency contribute to reducing the emission of CO₂ during use. Accordingly, we have set targets to achieve through the development of energy-saving products.

Products Contributing to Energy Savings for Houses and Buildings

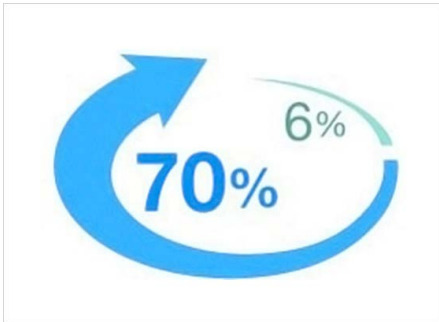


The Mitsubishi Electric Group manufactures a wide range of eco-conscious products, including lighting systems, air conditioners, escalators and elevators, and home electrical appliances. By reducing the electric power used by these products, we contribute to energy savings for entire houses and buildings. Furthermore, we offer products and systems that help to achieve efficient energy usage, such as energy management systems and multi-function controllers.

Securing a Sustainable Production and Consumption Format

In addition to reducing the volume of resources used during manufacturing processes and collecting and recycling used products, we are involved in the business of recycling plastics used in home electric appliances. Furthermore, we are attempting to minimize environmental load during production by reducing final waste disposal and promoting green procurement.

Reuse/Recycling Business



We conduct large-scale, high-purity recycling of the plastics used in home electrical appliances and collect the rare earth elements used in air conditioners. Our rebuilding business also takes faulty automotive electrical parts and reconditions them rather than replacing them.

Zero Final Waste Disposal Ratio

Primarily focusing on our production bases, we analyze and separate wastes in an attempt to transform all waste into valuable items that can be utilized, thereby minimizing the final waste disposal ratio. We have maintained a final waste disposal ratio of less than 0.1% for 12 years at Mitsubishi Electric and for 6 years at affiliate companies in Japan.

Green Procurement



We published the “Green Procurement Standards Guide,” which is based on various laws and regulations, and conduct eco-conscious materials procurement. The contents of the guide are revised as needed. In recent years, an appendix has added to explain the link between preservation of biodiversity and procurement activities.

Climate Change and Mitigating Its Effects

In order to suppress the emission of greenhouse gases—including CO₂, which is regarded to be a major cause of sudden climate change—we are contributing to the creation of a low-carbon society by reducing CO₂ generated during the Group's production activities and that produced during product use.

Energy-Saving Products



In order to reduce the CO₂ generated during product use, we continuously strive to design and develop products while keeping energy savings in mind, and focus on improving the performance of existing energy-saving products.

Reducing Greenhouse Gas Emissions

We are committed to reducing greenhouse gas emissions such as CO₂ by assessing emissions throughout the value chain as a whole and setting targets. We take every opportunity to use ingenuity in production lines, including the introduction of high-efficiency production equipment at the time of facility renewal.

Protecting and Restoring Ecosystems, and Preventing the Loss of Biodiversity

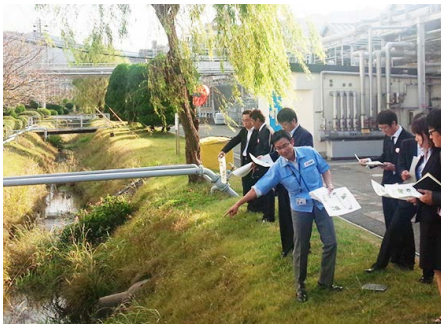
We are contributing to the protection and recovery of local ecosystems around the world by developing and providing observation satellites that report the status of oceans and woodlands. We are also proactively promoting coexistence with the surrounding environments at each business site.

Satellites



The Advanced Land Observing Satellite-2 (ALOS-2 or Daichi-2) was developed for a mission to create maps, observe lands, assess the impact of disasters, and explore resources. It is currently contributing to the collection of various data that will help to protect ecosystems by observing the degree of forest degradation in rainforest areas.

Studying Nature



As part of the activities designed for coexisting with nature in local communities, we are studying the conditions of animal and plant habitats at our business sites. The findings are used in discussions that focus on how we will approach the preservation of biodiversity in the future.

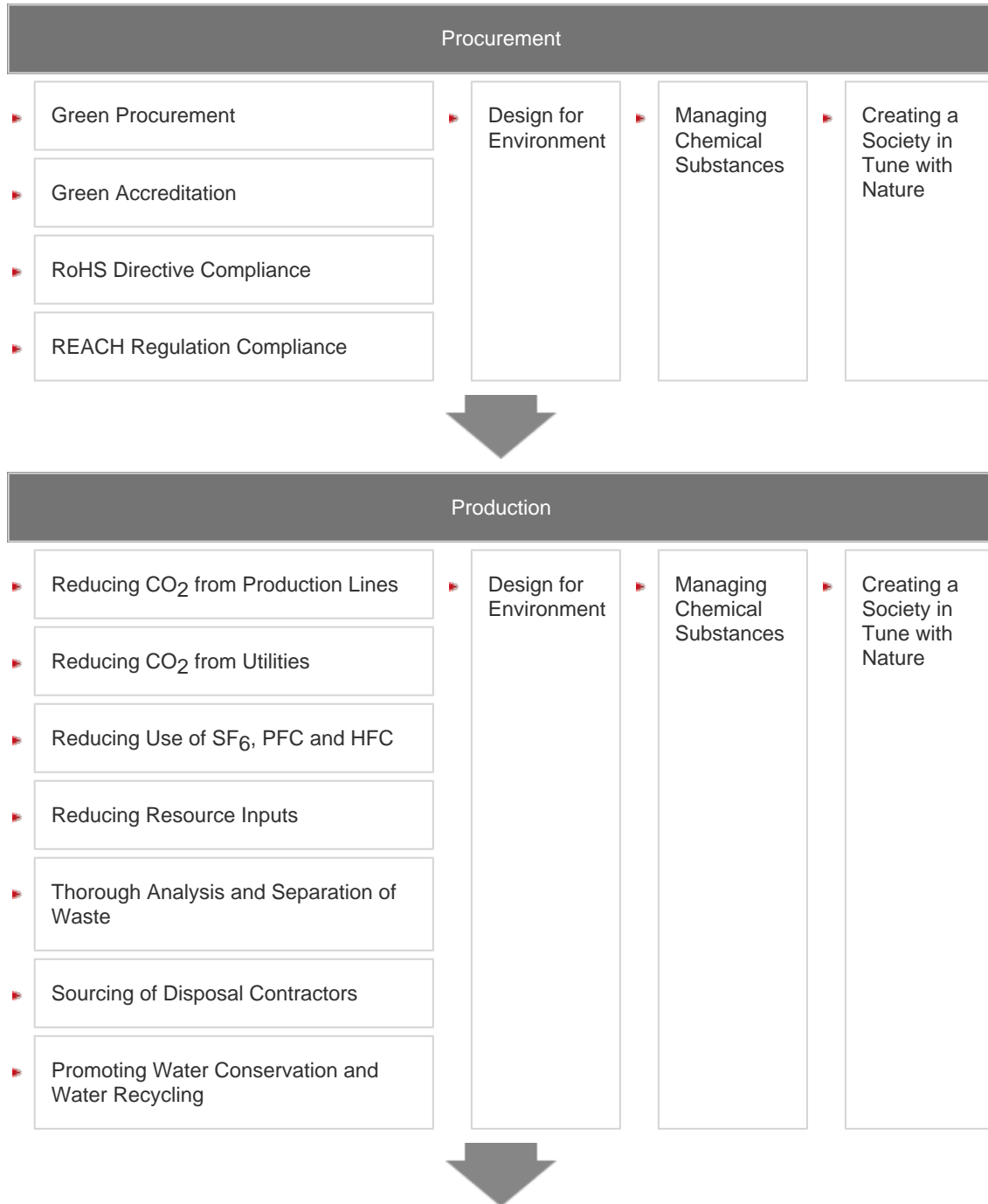
"Satoyama" Woodland Preservation Activities

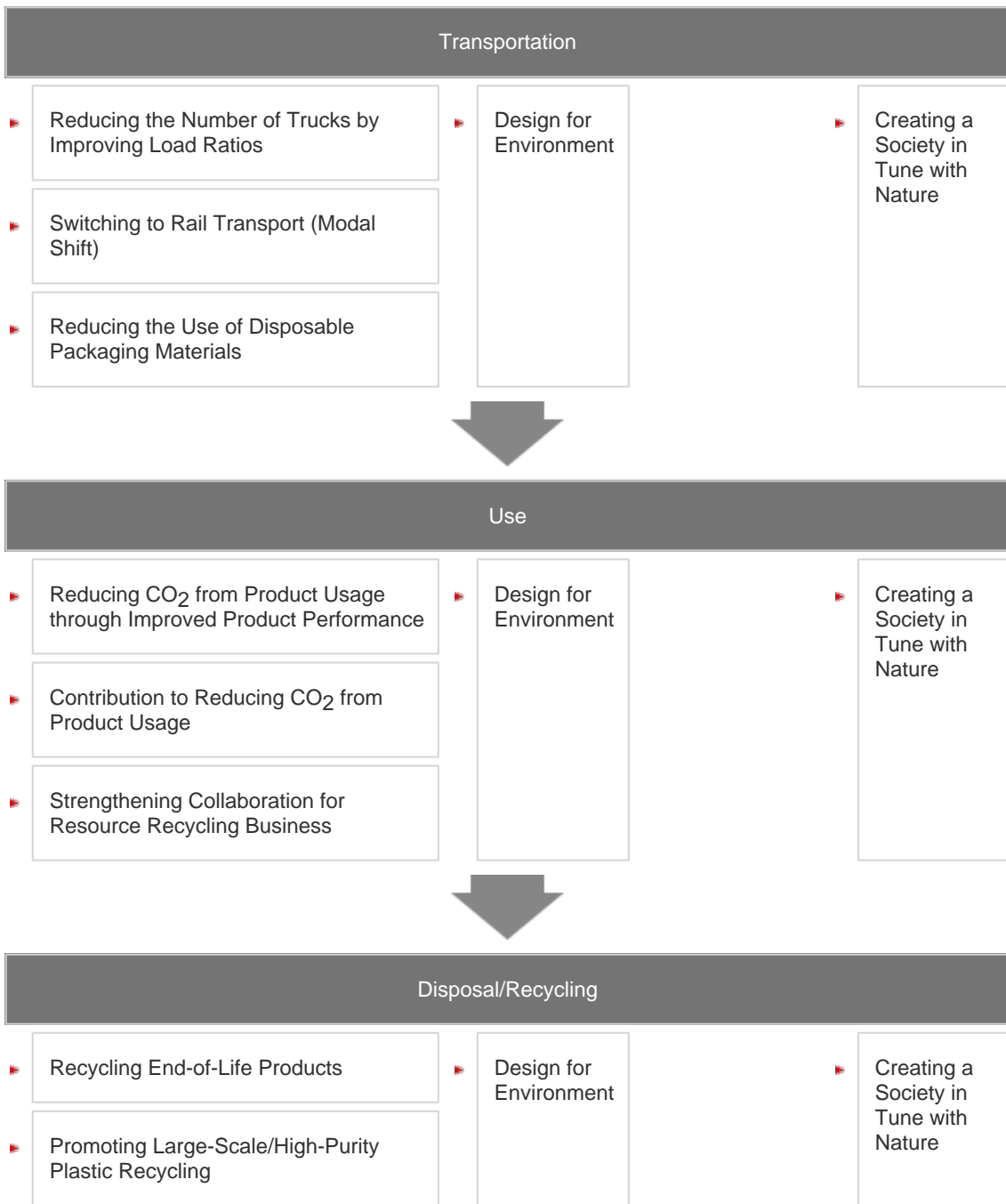


The "Satoyama" Woodland Preservation Project is a successful project that began in 2007. Its aim is to restore the surrounding natural environment near our business sites. Cooperating with communities and NPOs, we are conducting activities with the goal of improving wilderness park environments, and protecting and restoring forestlands and rivers.

Environment – Environmental Considerations for Value Chain Management

The Mitsubishi Electric Group promotes various countermeasures that are connected to the realization of a sustainable society. Examples include initiatives to reduce greenhouse gas emissions, efficiently use resources, prevent environmental pollution, and work in tune with nature in each process of the value chain, from procurement, manufacturing and transportation to use and disposal/recycling. For a more detailed report, click on the initiatives listed below.





The following page shows the material balance for the value chain.

[**Environment: Material Balance**](#)

The following page shows greenhouse gas emissions for the value chain.

[**Environment: Reducing Greenhouse Gases Emitted in the Value Chain**](#)

Environment – Fiscal 2017 Environmental Data

▶ Period and Scope of the Report

Overview of reporting period and scope.

Chinese language version of the above page:

▶ [关于 告期 与范](#)

▶ Material Balance

Report on the environmental impact resulting from our business activities, according to the "manufacture, transport, use, and recycle" product lifecycle.

Chinese language version of the above page:

▶ [物料衡算](#)

▶ Environmental Accounting

Report on fiscal 2016 totals, calculated under the Environmental Accounting Guidelines (fiscal 2006 edition).

▶ Environmental Performance Data

Performance data for various activities in fiscal 2017.

▶ Awards

List of awards received in Japan and overseas in fiscal 2017.

Environment – Period and Scope of the Report

Period Covered by the Report

April 1, 2016 – March 31, 2017

* Also includes some information on policies, targets, and plans occurring after the close of fiscal 2018.

Scope of the Report

Covers the activities of Mitsubishi Electric Corporation, 109 affiliates in Japan, and 79 overseas affiliates (total of 189 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 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, 2016 - March 31, 2017

Scope of Data Compilation: Mitsubishi Electric Corporation, 109 affiliates in Japan, and 79 overseas affiliates (total of 189 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	1,130,000 tons	290,000 tons	1,280,000 tons
Manufacturing			
Electricity	1,100 million kWh	310 million kWh	410 million kWh
Natural gas	25,370,000 m3	2,160,000 m3	11,880,000 m3
LPG	1,003 tons	2,130 tons	656 tons
Oil (crude oil equivalent)	1,856 kl	2,379 kl	595 kl
Water	7,840,000 m3	1,420,000 m3	1,710,000 m3 *2
Public water	1,280,000 m3	450,000 m3	610,000 m3
Industrial water	2,570,000 m3	85,000 m3	1,080,000 m3 *2
Groundwater	4,000,000 m3	880,000 m3	15,000 m3
Others	0.0 m3	0.0 m3	2,000 m3
Reuse of water	3,140,000 m3	940,000 m3	180,000 m3
Controlled chemical substances (amounts handled)	4,203 tons	1,401 tons	5,740 tons
Ozone depleting substances (amounts handled)	0.9 tons	0.2 tons	695 tons
Greenhouse gases (amounts handled)	2,611 tons	51 tons	4,280 tons
Volatile organic compounds (amounts handled)	1,248 tons	1,218 tons	251 tons

*1 Materials: Total value for shipping weight of products, plus amount of product packaging materials used, plus total amount of waste.

*2 Corrected after the publication of data on June 30, 2017.



OUT

Emissions (From Manufacturing)				
		Mitsubishi Electric	Affiliates (Japan)	Affiliates (Overseas)
Discharge into water	Water	6,780,000 m3	1,240,000 m3	1,220,000 m3
	Controlled chemical substances	4.0 tons	0.0 tons	9.2 tons
	BOD (biological oxygen demand)	54 tons	4.7 tons	11 tons
	COD (chemical oxygen demand)	10 tons	4.2 tons	35 tons
	Nitrogen	18 tons	14 tons	6.7 tons
	Phosphorus	2.0 tons	0.2 tons	0.1 tons
	Suspended solids	31 tons	2.5 tons	8.3 tons
	n-hexane extracts (mineral)	0.3 tons	0.2 tons	0.0 tons
	n-hexane extracts (active)	2.0 tons	0.2 tons	0.1 tons
	Total emissions of zinc	0.1 tons	0.0 tons	0.1 tons
Emissions into the atmosphere	Carbon dioxide (CO ₂)	580,000 tons-CO ₂	170,000 tons-CO ₂	320,000 tons-CO ₂
	Controlled chemical substances (excluding amounts contained in other waste)	296 tons	149 tons	287 tons
	Ozone depleting substances	0.0 ODP tons	0.0 ODP tons	0.6 ODP tons
	Greenhouse gases	61,000 tons-CO ₂	27,000 tons-CO ₂	170,000 tons-CO ₂
	Volatile organic compounds	407 tons	327 tons	24 tons
	Sulfur oxide (SOx)	0.9 tons	0.2 tons	1.0 tons
	Nitrogen oxide (NOx)	11 tons	3.4 tons	3.2 tons
	Fly ash	0.5 tons	0.1 tons	5.8 tons
Waste				
Total waste emissions		86,164 tons	63,962 tons	71,732 tons
Amount recycled		84,113 tons	54,421 tons	66,089 tons
Waste treatment subcontracted out		20,616 tons	52,297 tons	66,582 tons
Final disposal		1.5 tons	15 tons	492 tons
In-house weight reduction		734 tons	0.0 tons	110 tons
Products				
Weight of all products sold *3		990,000 tons	230,000 tons	1,070,000 tons
Weight of packaging materials		51,000 tons	5,000 tons	140,000 tons

*3 Products sold: Shipping weight of products.



IN

Sales and Logistics *4			
	Mitsubishi Electric	Affiliates (Japan)	Affiliates (Overseas)
Fuel for trucks (gasoline)	10,336 kl	2,088 kl	4.0 kl
Fuel for trucks (diesel)	26,946 kl	5,088 kl	19,890 kl
Fuel for rail (electricity)	1,463 MWh	390 MWh	0.0 MWh
Fuel for marine transport (bunker oil)	360 kl	3.0 kl	69,968 kl
Fuel for air transport (jet fuel)	617 kl	18 kl	29,371 kl

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



OUT

Emissions *5			
	Mitsubishi Electric	Affiliates (Japan)	Affiliates (Overseas)
Carbon dioxide (CO ₂)	97,000 tons-CO ₂	18,000 tons-CO ₂	330,000 tons-CO ₂

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

IN

Energy Consumption			
	Mitsubishi Electric	Affiliates (Japan)	Affiliates (Overseas)
Energy consumed during product use *6	45,700 million kWh	3,100 million kWh	22,700 million kWh

*6 Energy consumed during product use: Total energy consumed (estimated value) when using 88 finished products targeted for CO₂ 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) *7	23,050,000 tons-CO ₂	1,610,000 tons-CO ₂	10,730,000 tons-CO ₂
Amount of SF ₆ emitted during product use (corresponding value) *8	82,000 tons-CO ₂	—	—

*7 Amount of CO₂ emitted during product use (converted value): Sum of CO₂ emitted when using 88 finished products targeted for CO₂ reduction.
The amount of CO₂ emitted is equal to the energy consumed multiplied by the CO₂ emissions coefficient, for which the value shown in CO₂ Emissions from Fuel Combustion Highlights (2013 Edition) of IEA is used.

*8 Amount of SF₆ emitted during product use (corresponding value): Sum of SF₆ gas naturally leaked during the operation of products (6) that use SF₆ 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.



IN

End-of-Life Products *9	
	Mitsubishi Electric
Air conditioners	14,106 tons
Televisions	2,931 tons
Refrigerators	20,988 tons
Washing machines / Clothes dryers	6,572 tons
Personal computers	50 tons

*9 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 *10	
	Mitsubishi Electric
Metals	26,748 tons
Glass	819 tons
CFCs	286 tons
Others	11,481 tons

*10 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, 2016 - March 31, 2017
- Scope of Data Compilation: Mitsubishi Electric Corporation, 109 affiliates in Japan, and 79 overseas affiliates (total of 189 companies)

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

Basis of Calculation

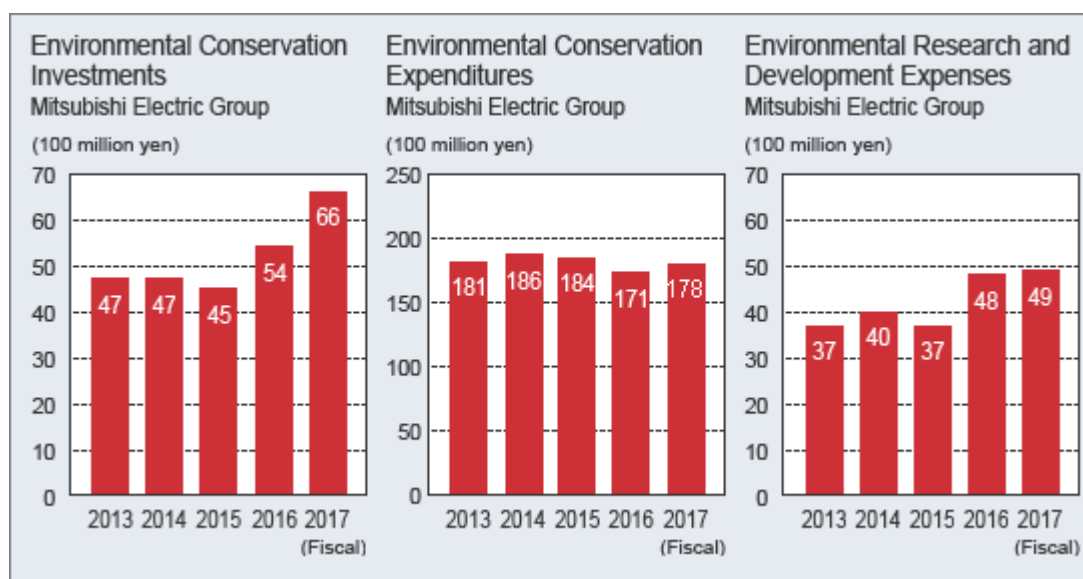
Data is calculated for environmental conservation costs, environmental conservation benefits (environmental performance), and economic benefits from environmental conservation activities (actual profit or cost-saving benefits) in accordance with the Environmental Accounting Guidelines (2005 edition) issued by the Japanese Ministry of the Environment. Economic benefits are aggregated as actual benefits, which consist of earnings and savings, estimated benefits based on Mitsubishi Electric Group accounting standards, including economic benefits to customers of using our products, such as lower electricity bills, and environmental improvements achieved outside our business sites.

* Environmental conservation costs are aggregated as straight-line depreciation for capital investments made over the past five years and are assumed to have useful lives of five years. The annual benefits of earnings and savings attributable to capital investments are also assumed to have resulted from investments over the past five years.

* In the case of comparisons to the previous year, the previous year's data have also been revised to reflect changes in the scope/range of data.

Results for Fiscal 2017

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	60	117	17	-
	43	84	14	
Pollution prevention	9.7	20	6.2	Installation and enhancement of the collection-function of greenhouse gas abatement systems, upgrading to local exhaust ventilation (LEV) systems, installation and repair of exhaust-processing and wastewater-processing systems, updating of liquid chemical tanks, water quality measurement
	5.6	20	9.4	
Global environmental conservation	47	63	5.6	Improvement of equipment efficiency (transformers, compressors, lighting, air conditioners), expansion of solar-power generation systems, introduction of power inverters
	36	44	1.5	
Resource recycling	3.0	34	5.0	Introduction of industrial effluent processing and recycling systems, adoption of returnable racks, adoption of water-regulating valves
	1.7	20	3.2	
Upstream and downstream production	0.6	3.5	1.1	Repair of systems for water purification and collection of cooling-water, adoption of reusable packing materials
	0.0	2.0	(0.2)	
Management activities	1.7	16	0.8	Visualization of power consumption, environmental education, internal auditing, in-house environmental committee activities, external ISO 14001 auditing
	1.5	11	(0.8)	
R&D activities	3.2	39	(8.9)	Raising motor efficiency, improving machining technology for compressors and heat-exchangers, developing power electronics systems, developing high-efficiency air-conditioning and cooling systems
	2.9	38	(9.3)	
Community activities	0.1	0.3	0.0	School visits "Satoyama" Woodland Preservation Project, regional clean-up activities
	0.0	0.2	0.0	
Environmental damage countermeasures	0.1	2.6	0.6	Groundwater and soil cleansing, planting of endemic tree species at company sites
	0.1	2.6	0.6	
Consolidated total	66	178	10	-
Non-consolidated total	48	138	4.5	-

* Including depreciation for capital investments made over the past five years.

Environmental Conservation Benefits (Environmental Performance)

Top figure: Mitsubishi Electric Group/Bottom figure: Mitsubishi Electric

Item	Unit	Fiscal 2017 Results	Year-on-Year Change	Year-on-Year Per Net Sales
Total energy used	10,000 GJ	1,958	47	106%
		1,164	10	105%
Water used	10,000 m ³	1,096	18	105%
		784	30	108%
Greenhouse gas emissions	10,000 tons-CO ₂	134	5.8	108%
		64	0.1	104%
CO ₂ (energy consumption)	10,000 tons-CO ₂	108	3.7	107%
		58	0.2	104%
HFC, PFC, SF ₆	10,000 tons-CO ₂	26	2.1	113%
		6.1	(0.1)	102%
Total emission and transfer of chemical substances into the atmosphere	Tons	732	(43)	98%
		296	(33)	93%
Total wastewater discharged	10,000 m ³	924	23	106%
		678	32	109%
Total emission and transfer of chemical substances into the water and soil	Tons	13	(2.4)	88%
		4.0	(1.4)	77%
Total waste discharged	Tons	221,858	9,777	108%
		86,164	1,558	106%
Final disposal	Tons	509	39	112%
		1.5	0.1	111%

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	Change	Main Costs
Earnings	37	5.2	Sale of valuable materials (metals, plastics, paper, etc.)
	19	(1.8)	
Savings	24	(5.8)	Cost reductions (electricity bills, resources used, water and sewerage, packaging materials, etc.)
	21	2.8	
Consolidated total	61	(0.6)	–
Non-consolidated total	39	1.1	–

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

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

Item	Amount	Main Costs
Consolidated total	6,541	Reduced electricity costs due to improved energy efficiency of 88 finished products targeted for reducing CO ₂ during product use*
Non-consolidated total	5,556	

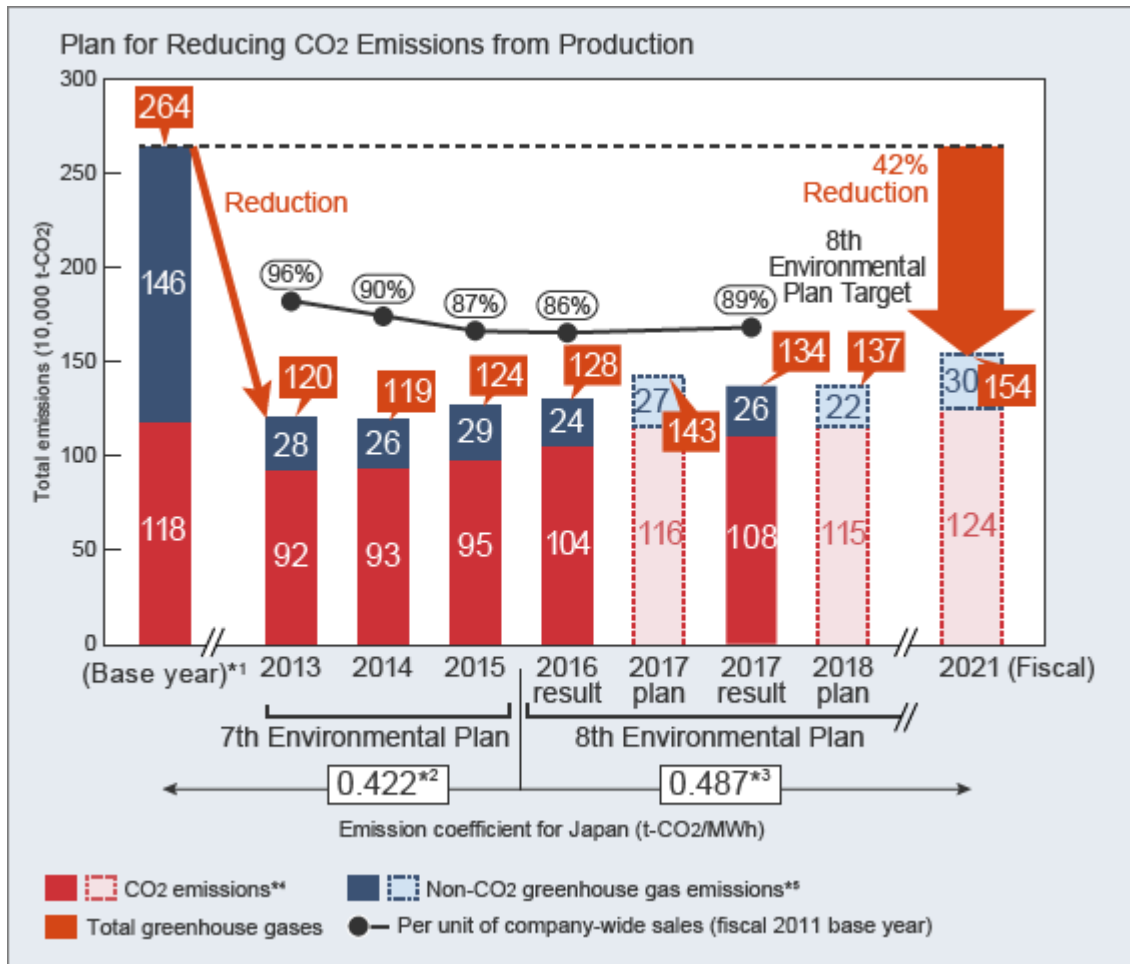
* Base products for reducing energy consumption are those sold in fiscal 2001. For electricity charges, see Japan's Energy White Paper 2016 (Agency for Natural Resources and Energy).

Environment – Environmental Performance Data

Results of Activities in Fiscal 2017

- ▶ Plan for Reducing CO₂ Emissions from Production
- ▶ Plan for Reducing CO₂ from Product Usage through Improving Energy Efficiency
- ▶ Contribution to Reducing CO₂ from Product Usage
- ▶ Total CO₂ Emissions in Distribution
- ▶ Fiscal 2017 Composition Ratio of Transport Volume by Transport Means
- ▶ Total Waste Output [Mitsubishi Electric]
- ▶ Total Waste Output [Affiliates in Japan]
- ▶ Total Waste Output [Overseas affiliates]
- ▶ Plan for Reducing Resource Inputs
- ▶ Recycling of Four Kinds of Mitsubishi Electric Home Appliances in Japan
- ▶ Packaging Materials Usage and per Net Shipping Weight
- ▶ Fiscal 2017 Trends in Water Usage and Water Recycling Volume
- ▶ Fiscal 2017 Breakdown of Water Usage
- ▶ Fiscal 2017 Water Reuse Ratio
- ▶ Fiscal 2017 Breakdown of Water Use by Overseas Region
- ▶ Material Balance of Chemical Substances Subject to Regulation
- ▶ Environmental Accounting
- ▶ Result of Fostering Leaders for Outdoor Classroom (Cumulative Total)
- ▶ Numbers of Mitsubishi Electric Outdoor Classrooms through FY2017
- ▶ Plan for Increasing Number of People Participating in Mitsubishi Electric Outdoor Classroom and "Satoyama" Woodland Preservation Project

Reducing CO2 from Production



*1 Base year for CO₂: Mitsubishi Electric parent company, fiscal 1991; affiliates in Japan, fiscal 2001; and overseas affiliates, fiscal 2006.

Non-CO₂ greenhouse gases: Mitsubishi Electric parent company and affiliates in Japan, fiscal 2001; overseas affiliates, fiscal 2006.

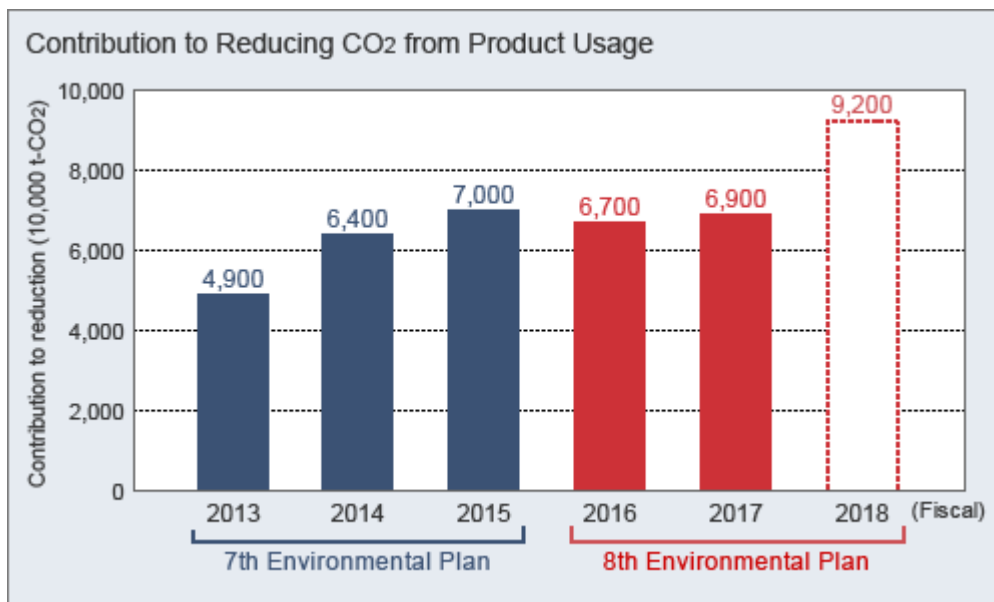
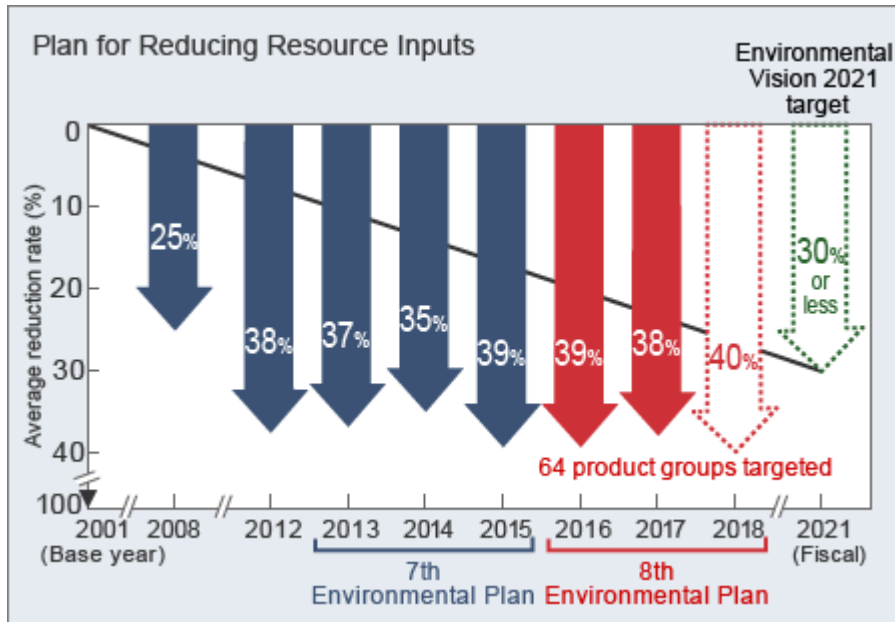
*2 Figure published by the Japan Electrical Manufacturers' Association (JEMA) in 1997

*3 Figure published by the Federation of Electric Power Companies of Japan at the time of drawing up the 8th Environmental Plan (in 2013, when two nuclear power stations were operational)

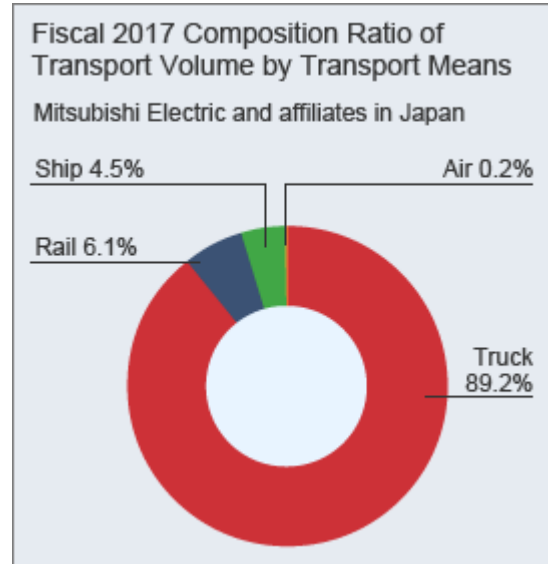
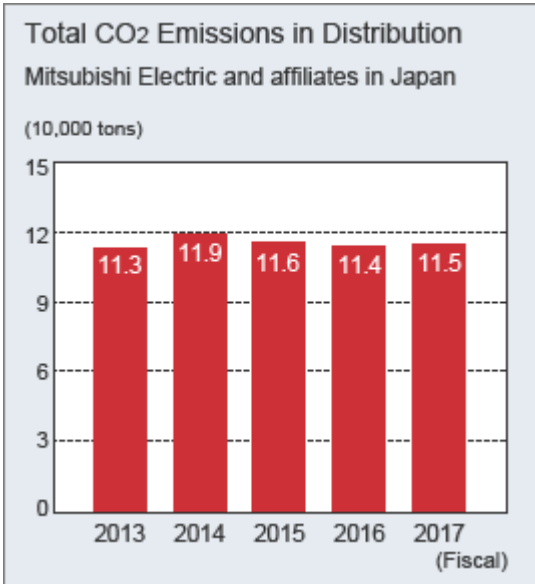
*4 Figure published by JEMA in 2006 has been referred to when calculating the overseas emission coefficient.

*5 Figure published in IPCC's Second Assessment Report (1995) was referred to when calculating the global warming coefficient of non-CO₂ greenhouse gases.

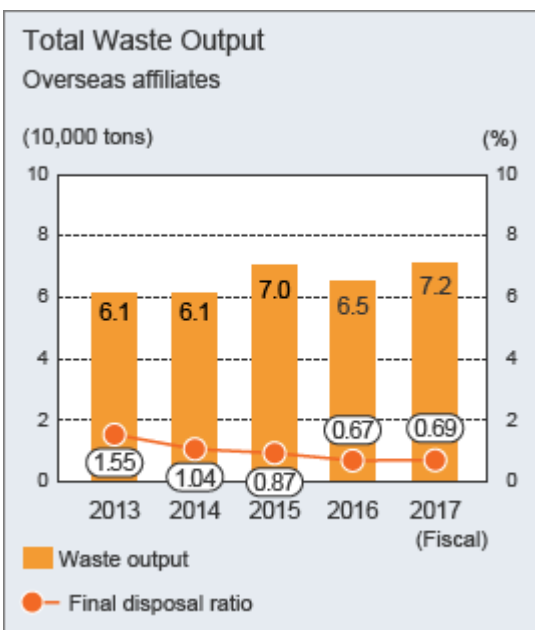
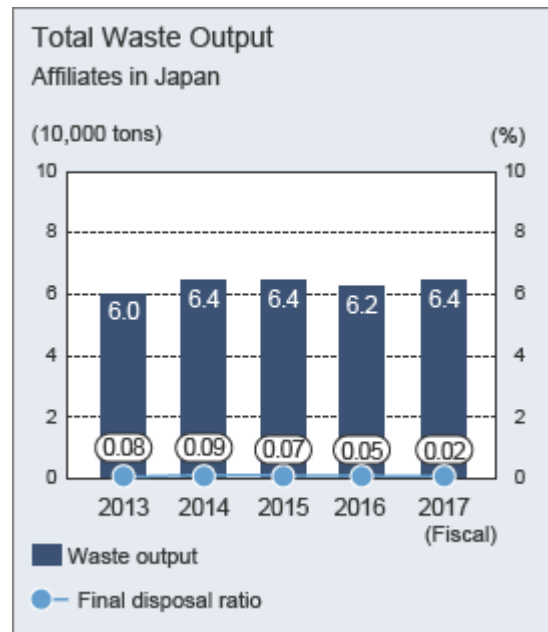
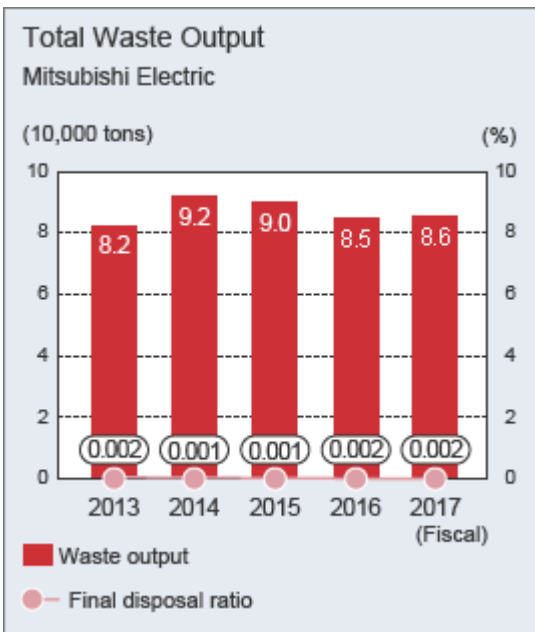
Contribution to Reducing CO2 from Product Usage



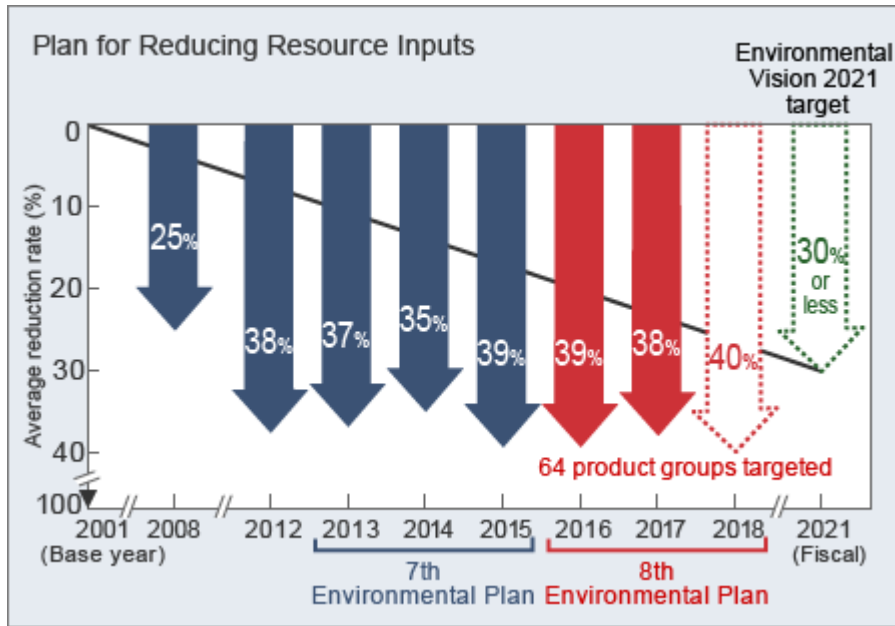
Reducing CO2 from Logistics



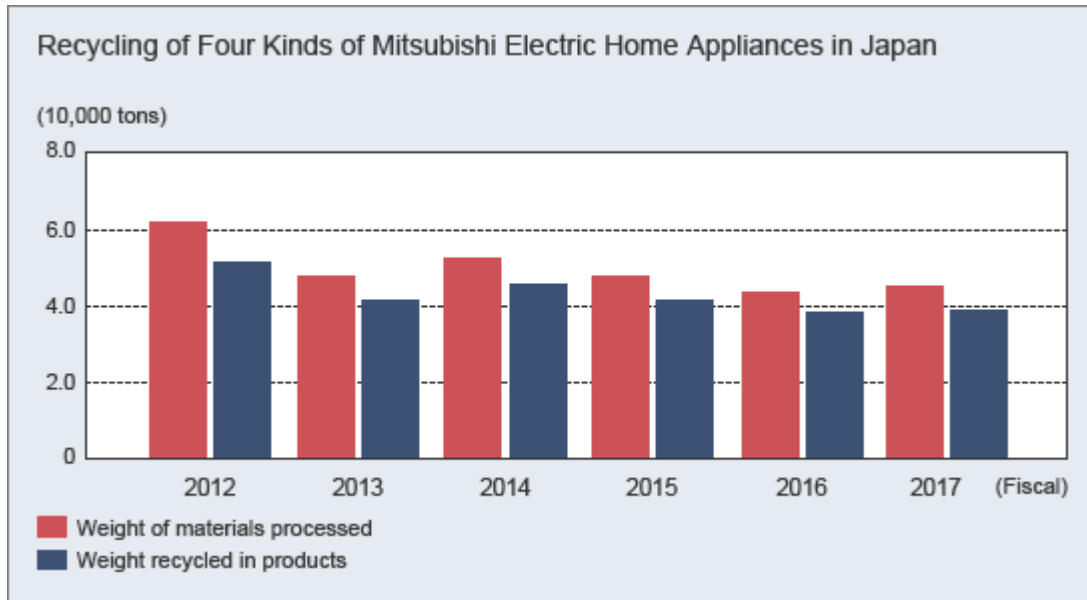
Effective Utilization of Resources



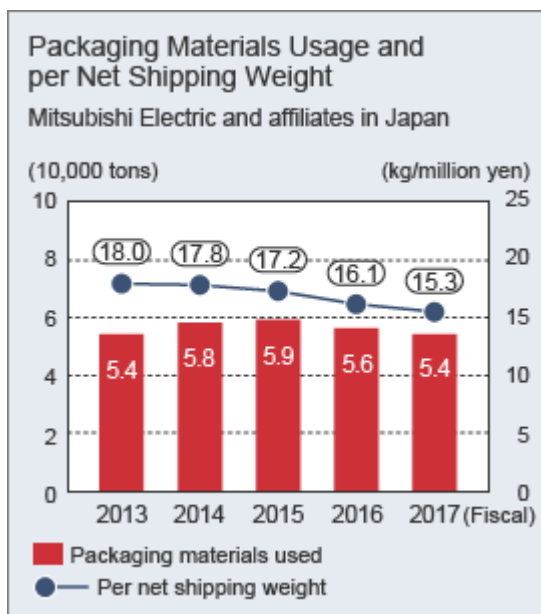
Reducing Resource Inputs



Recycling End-of-Life Products

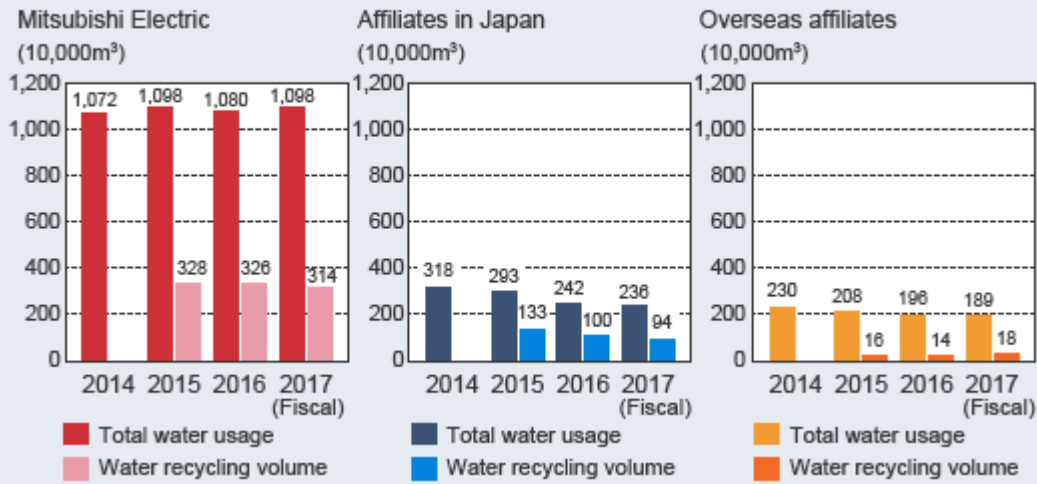


Reducing the Use of Disposable Packaging Materials

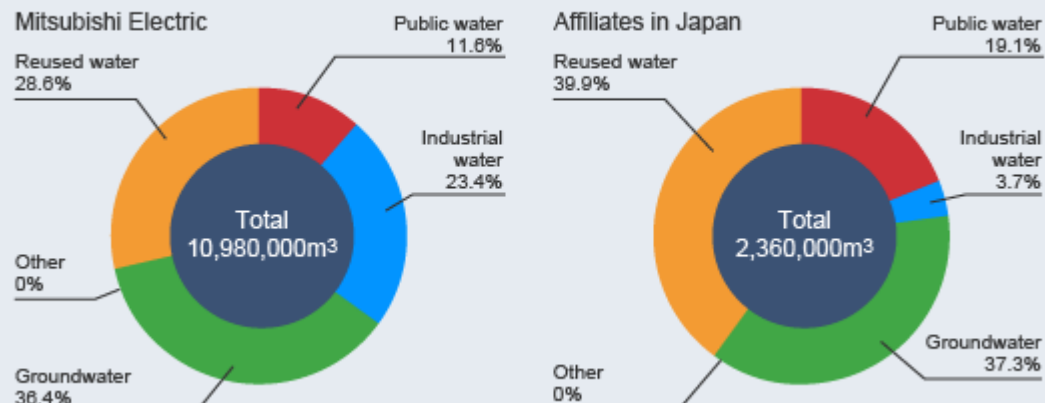


Using Water Effectively

Fiscal 2017 Trends in Water Usage and Water Recycling Volume



Fiscal 2017 Breakdown of Water Usage



Fiscal 2017 Water Reuse Ratio

(Units: %)

	2012	2013	2014	2015	2016	2017
Mitsubishi Electric	33	32	33	30	30	29
Affiliates in Japan	52	47	48	45	41	40
Overseas affiliates	7.4	6.6	5.7	7.5	7.1	9.5
Total	34	32	32	30	29	28

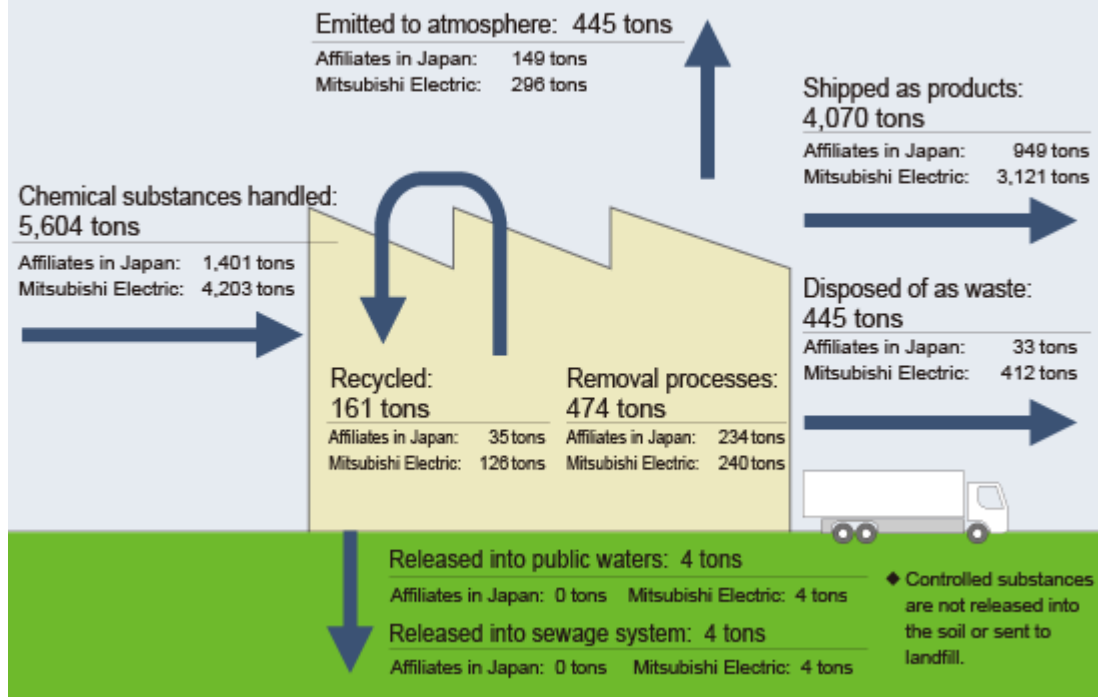
Fiscal 2017 Breakdown of Water Use by Overseas Region

(Units: m3)

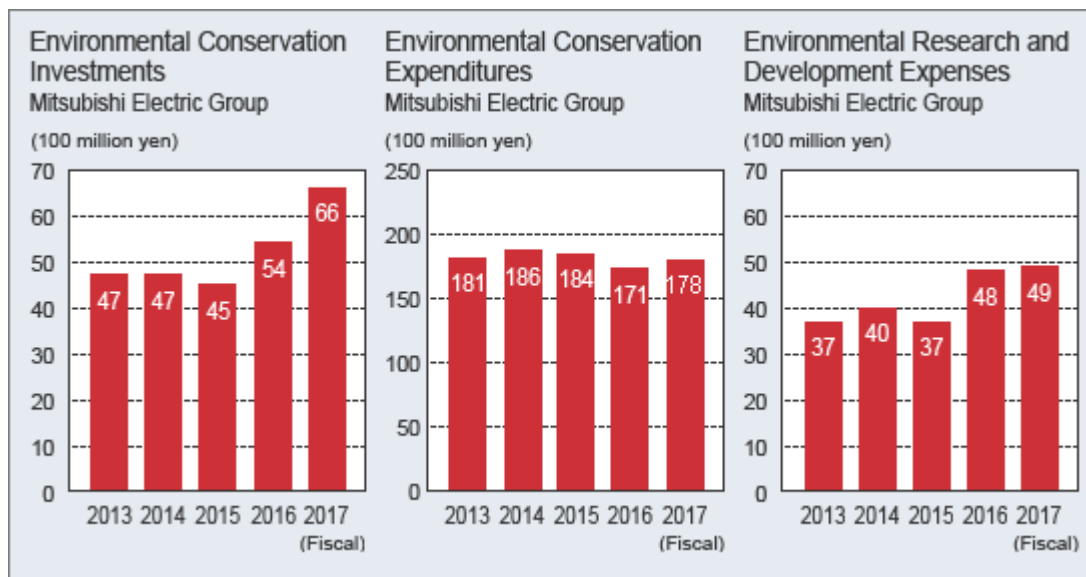
	Water Usage			Waste Water			
	Total Usage	Public Water /Industrial Water	Groundwater	River Water /Spring Water	Total Usage	Sewage	Public Water System
China	902,590	780,057	0	1,845	639,021	625,640	13,381
Southeast Asia	917,605	843,214	11,951	0	534,305	455,665	0
Europe	19,060	19,060	0	0	13,410	5,387	0
North America	26,993	26,607	0	0	22,214	22,214	0
Central and South America	24,494	21,472	2,750	0	9,262	6,512	2,750
Total	1,890,742	1,690,410	14,701	1,845	1,218,212	1,115,418	16,131

Managing Chemical Substances

Material Balance of Chemical Substances Subject to Regulation

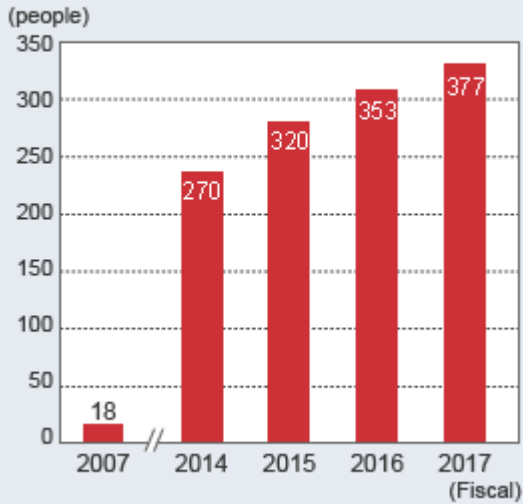


Environmental Accounting

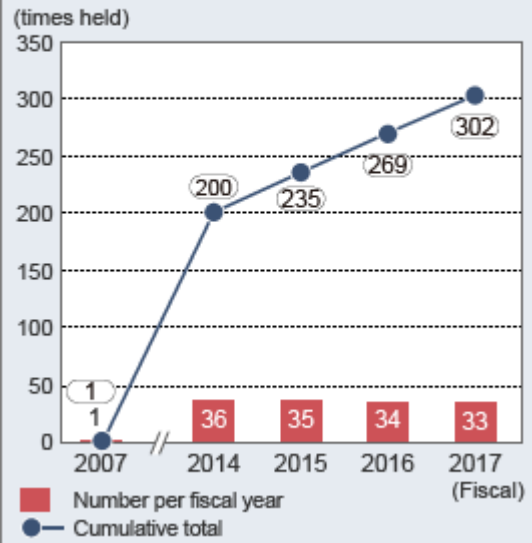


Mitsubishi Electric Outdoor Classroom

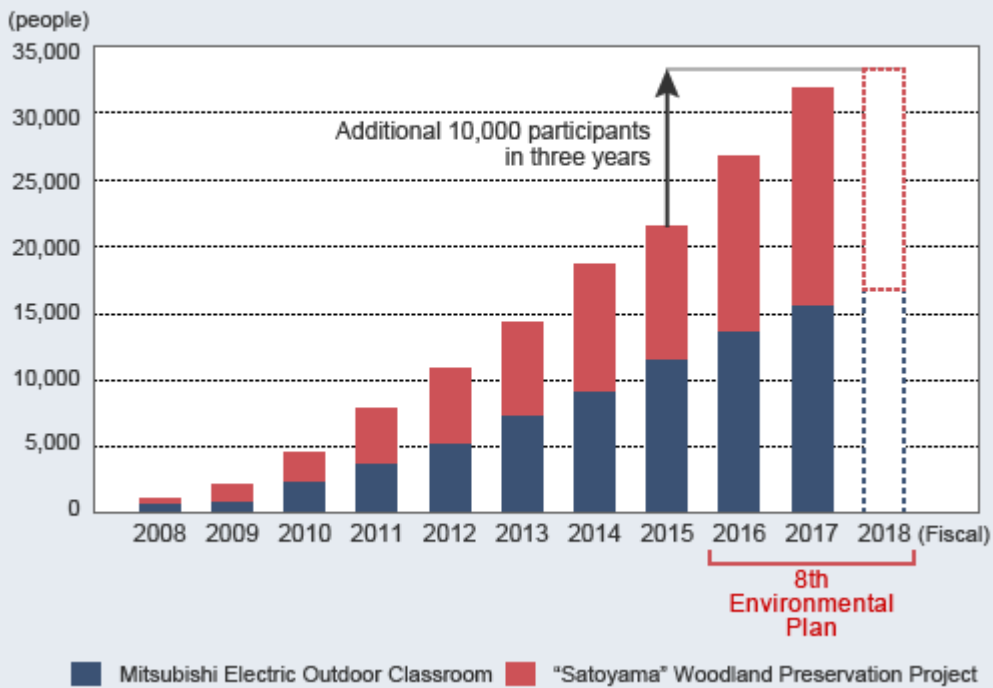
Result of Fostering Leaders for Outdoor Classroom (Cumulative Total)



Numbers of Mitsubishi Electric Outdoor Classrooms through Fiscal 2017



Plan for Increasing Number of People Participating in Mitsubishi Electric Outdoor Classroom and "Satoyama" Woodland Preservation Project



Environment – Awards

Awards

Award	Sponsor	Accomplishment /Product	Recipient Company (Site)
The Kanagawa Prefecture Association for the Safety of Hazardous Materials, President's Award (Excellent Hazardous Materials Business)	The Kanagawa Prefecture Association for the Safety of Hazardous Materials	As a business that strives for the safe control of hazardous materials at its hazardous materials facilities and sets an example for others	Ryoden Shonan Electronics Corporation
43rd Nikkei Sangyo Shinbun Advertising Award Grand Prize	Nikkei Inc.	Serial advertising in the Nikkei Sangyo Shinbun	Mitsubishi Electric Corporation
Green Curtain Contest, Group/Corporate Category Excellence Prize	Nagasaki Prefecture, Isahaya City	Green curtains made from goya (bitter melon)	Melco Advanced Device Corporation
Fiscal 2017 New Energy Grand Prize the Agency for Natural Resources and Energy Director-General's Award	New Energy Foundation	Station Energy Saving Inverter (S-EIV)	Mitsubishi Electric Corporation
Kanagawa Prefecture Environmental Conservation (Air, Water and Soil) Achievement Award	Kanagawa Prefecture	<ul style="list-style-type: none"> - Proactive environmental conservation activities such as introducing LED equipment, making regular updates to high efficiency and energy saving equipment, and using approaches to conserve energy and reduce waste - Creating a framework for environmental promotion between the Kamakura area and related local businesses, taking on a central role, and promising proactive approaches going forward 	Mitsubishi Electric Corporation Kamakura Works
Environmental Conservation Commendation/Industrial Safety Commendation, Yokosuka/Miura Regional Administration Center President's Award	Yokosuka/Miura Regional Administration Center	Contributing to reducing waste production, such as through many years of promoting the separation of industrial waste created by businesses and reinforcing waste separation among staff to greatly reduce garbage in the business place	Ryoei Technica Corporation

65th Electrical Industry Technology Achievement Awards Excellence Award	The Japan Electrical Manufacturers' Association	Commercialization of the world's highest output 900MVA indirectly hydrogen-cooled turbine generator	Mitsubishi Electric Corporation Shizuoka Works, Mitsubishi Electric Advanced Technology R&D Center
65th Electrical Industry Technology Achievement Awards Excellence Award, Home Appliance Category	The Japan Electrical Manufacturers' Association	Development of FZ Series Kirigamine air conditioners that feature unparalleled energy saving performance and revolutionary built-in flow control	Mitsubishi Electric Corporation Shizuoka Works, Thermofluid Systems Engineering Division
65th Electrical Industry Technology Achievement Awards Excellence Award	The Japan Electrical Manufacturers' Association	Development of a power conditioner for EV that is capable of coordinated operation with photovoltaic power generation systems and mains power	Mitsubishi Electric Corporation Advanced Technology R&D Center, Kyoto Works
65th Electrical Industry Technology Achievement Awards Excellence Award	The Japan Electrical Manufacturers' Association	Development of the "iNSTICK" cordless stick cleaner that offers a new "leave it in your room" cleaning style	Mitsubishi Electric Home Appliance Co., Ltd., Home Appliance Engineering Division
65th Electrical Industry Technology Achievement Awards Excellence Award	The Japan Electrical Manufacturers' Association	Development and commercialization of an ultrahigh capacity drive system for driving compressors	Toshiba Mitsubishi-Electric Industrial Systems Corporation, Motor & Drive Engineering Division
65th Electrical Industry Technology Achievement Awards Excellence Award	The Japan Electrical Manufacturers' Association	Development of flexible-shape control system for cold rolling	Toshiba Mitsubishi-Electric Industrial Systems Corporation, Process Control R&D Center, Systems Engineering First Division
65th Electrical Industry Technology Achievement Awards Excellence Award	The Japan Electrical Manufacturers' Association	Development of arc magnetically-driven circuit breaker technology for gas insulated switchgear	Mitsubishi Electric Corporation Advanced Technology R&D Center
65th Electrical Industry Technology Achievement Awards Excellence Award	The Japan Electrical Manufacturers' Association	Development of an IH jar rice cooker for perfect pot rice	Mitsubishi Electric Corporation Living Environment Systems Laboratory, Mitsubishi Electric Home Appliance Co., Ltd., Home Appliance Engineering Division
65th Electrical Industry Technology Achievement Awards Excellence Award	The Japan Electrical Manufacturers' Association	Development of the industry's only compact, lightweight and high-performance cyclone cleaner with built-in airblow functionality	Mitsubishi Electric Home Appliance Co., Ltd., Home Appliance Engineering Division

Fiscal 2017 Energy Conservation Grand Prize Products and Business Models Category Energy Conservation Center Chairman's Award	Energy Conservation Center	Package air conditioner for business premises/office use Mr. SLIM Slim ZR series type P280	Mitsubishi Electric Corporation
Fiscal 2017 Energy Conservation Grand Prize Energy Conservation Examples Category the Agency for Natural Resources and Energy Director-General's Award (Energy Conservation Field)	Energy Conservation Center	Realizing an energy conservation plant utilizing IoT technology	Mitsubishi Electric Corporation Nagoya Works
Fiscal 2017 Kanto Region Invention Awards Gunma Governor's Award	Japan Institute for Promoting Invention and Innovation	Micro-bubble pipe cleaning technology for hot water dispensing cylinders (Patent no. 5247511)	Mitsubishi Electric Corporation Nagoya Works, Shizuoka Works
Fiscal 2017 Kanto Region Invention Awards Kanagawa Governor's Award	Japan Institute for Promoting Invention and Innovation	Stick cleaner with air purifier function (Design Registration no.1516352)	Mitsubishi Electric Corporation Industrial Design Center
Fiscal 2017 Kanto Region Invention Awards Shizuoka Institute for Promoting Invention and Innovation Chairman's Prize	Japan Institute for Promoting Invention and Innovation	Rolling piston compressor (Patent no. 4659427)	Mitsubishi Electric Corporation Living Environment Systems Laboratory, Shizuoka Works Mitsubishi Electric Engineering Co., Ltd., Shizuoka Site
Fiscal 2017 Kanto Region Invention Awards Shizuoka Institute for Promoting Invention and Innovation Chairman's Prize	Japan Institute for Promoting Invention and Innovation	Air conditioner with built-in good sleep function (Patent no. 4902517)	Mitsubishi Electric Corporation Shizuoka Works
Fiscal 2017 Kanto Region Invention Awards Encouragement Award	Japan Institute for Promoting Invention and Innovation	Enhanced safety when dispensing hot water from hot water dispensing cylinders (Patent no. 5549645)	Mitsubishi Electric Corporation Gunma Works
Fiscal 2017 Kanto Region Invention Awards Encouragement Award	Japan Institute for Promoting Invention and Innovation	Air purifier that enables rapid deodorization (Patent no. 5772950)	Mitsubishi Electric Home Appliance Co., Ltd., Home Appliance Engineering Division
Fiscal 2017 Kanto Region Invention Awards Encouragement Award	Japan Institute for Promoting Invention and Innovation	Rice cooker that enables the lid to be opened and closed safely (Patent no. 5542929)	Mitsubishi Electric Home Appliance Co., Ltd., Home Appliance Engineering Division, Home & Facility Equipment Engineering Division
Fiscal 2017 Kanto Region Invention Awards Encouragement Award	Japan Institute for Promoting Invention and Innovation	Drawer-type electronic refrigerator for use in hospital rooms (Patent no. 5460817)	Mitsubishi Electric Engineering, Shizuoka Site

Fiscal 2017 Kanto Region Invention Awards Encouragement Award	Japan Institute for Promoting Invention and Innovation	Range grill capable of minimizing uneven heating (Patent no. 5674914)	Mitsubishi Electric Corporation Living Environment Systems Laboratory Mitsubishi Electric Home Appliance Co., Ltd., Home Appliance Engineering Division, Quality Assurance Division, Manufacturing Control Division
Fiscal 2017 Kanto Region Invention Awards Encouragement Award	Japan Institute for Promoting Invention and Innovation	Fin shape for the external heat exchanger in air conditioners (Patent no. 5084304)	Mitsubishi Electric Corporation Living Environment Systems Laboratory
Fiscal 2017 Kanto Region Invention Awards Encouragement Award	Japan Institute for Promoting Invention and Innovation	Vacuum cleaner suction tool (Patent no. 5083359)	Mitsubishi Electric Corporation Living Environment Systems Laboratory, Corporate Marketing Group
Fiscal 2017 Kanto Region Invention Awards Encouragement Award	Japan Institute for Promoting Invention and Innovation	Stator for electric motor, electric motor and air conditioner (Patent no. 4607911)	Mitsubishi Electric Corporation Living Environment Systems Laboratory, Shizuoka Works
Fiscal 2017 Kanto Region Invention Awards Encouragement Award	Japan Institute for Promoting Invention and Innovation	LED guide light device (Patent no. 5627306)	Mitsubishi Electric Lighting Corporation, Device Engineering Division
Fiscal 2017 Kanto Region Invention Awards Encouragement Award	Japan Institute for Promoting Invention and Innovation	Inventory warning system and inventory warning program (Patent no. 5587381)	Mitsubishi Electric Information Systems Corporation IT Product Sales Division
Fiscal 2017 Kanto Region Invention Awards Encouragement Award	Japan Institute for Promoting Invention and Innovation	Multilayer insulation sheets for meteorological satellites (Patent no. 4070068)	Mitsubishi Electric Corporation Kamakura Works
Fiscal 2017 Kanto Region Invention Awards Encouragement Award	Japan Institute for Promoting Invention and Innovation	Highly thermostable multilayer insulator used in meteorological satellites (Patent no. 5501135)	Mitsubishi Electric Corporation Kamakura Works
Fiscal 2017 Kanto Region Invention Awards Encouragement Award	Japan Institute for Promoting Invention and Innovation	A low-cost cryptographic device with improved real-time performance (Patent no. 4906800)	Mitsubishi Electric Corporation Information Technology R&D Center, Kamakura Works
Fiscal 2017 Kanto Region Invention Awards Encouragement Award	Japan Institute for Promoting Invention and Innovation	Digital broadcasting equipment that reduces image degradation (Patent no. 4749768)	Mitsubishi Electric Corporation Information Technology R&D Center, Himeji Works, Automotive Electronics Development Center, Sanda Works, Mitsubishi Electric Engineering Co., Ltd., Executive Office

Fiscal 2017 Kanto Region Invention Awards Encouragement Award	Japan Institute for Promoting Invention and Innovation	Sound reproduction device that improves the bass of compact speakers (Patent no. 4986893)	Mitsubishi Electric Corporation Information Technology R&D Center
Fiscal 2017 Kanto Region Invention Awards Encouragement Award	Japan Institute for Promoting Invention and Innovation	Low phase noise design technology for voltage-controlled oscillators (Patent no. 5451987)	Mitsubishi Electric Corporation Information Technology Center, Communication Systems Center, Corporate Research & Development Group, Kamakura Works
Fiscal 2017 Kanto Region Invention Awards Encouragement Award	Japan Institute for Promoting Invention and Innovation	Easy-to-understand elevator display device (Design Registration no. 1414238)	Mitsubishi Electric Corporation Industrial Design Center
Fiscal 2017 Kanto Region Invention Awards Encouragement Award	Japan Institute for Promoting Invention and Innovation	Sheet metal laser processing machine with improved workability (Design Registration no. 1416722)	Mitsubishi Electric Corporation Nagoya Works
Fiscal 2017 Kanto Region Invention Awards Encouragement Award	Japan Institute for Promoting Invention and Innovation	Air conditioner designed for harmony & ambiance (Design Registration no. 1485782)	Mitsubishi Electric Corporation Industrial Design Center
Fiscal 2017 Kanto Region Invention Awards Encouragement Award	Japan Institute for Promoting Invention and Innovation	4K TV design dedicated to visuals and audio (Design Registration no. 1513571)	Mitsubishi Electric Corporation Industrial Design Center
Fiscal 2017 Kanto Region Invention Awards Encouragement Award	Japan Institute for Promoting Invention and Innovation	Method of controlling indoor industrial air conditioners (Patent no. 5847034)	Mitsubishi Electric Corporation Shizuoka Works
Fiscal 2017 Kanto Region Invention Awards Encouragement Award	Japan Institute for Promoting Invention and Innovation	Electric motor stators, electric motors, and equipment (Patent no. 5745477)	Mitsubishi Electric Corporation Shizuoka Works Ryoden Asahi Technica Co., Ltd., Engineering Technology Department
43rd Japan Society of Refrigerating and Air Conditioning Engineers Award Technology Award	Japan Society of Refrigerating and Air Conditioning Engineers	Multi-air conditioner outdoor device for buildings with built-in flat tube heat exchanger	Mitsubishi Electric Corporation
Fiscal 2016 The Energy-Efficient Machinery Award Japan Machinery Federation Chairman's Award	Japan Machinery Federation	Conditioning unit that utilizes R410A refrigerant (Wide Replace Series)	Mitsubishi Electric Corporation
Fiscal 2016 The Energy-Efficient Machinery Award METI Minister's Prize	Japan Machinery Federation	Regenerative electric power and harmonic loss reduction system that utilizes full-SiC for railroad vehicles	Mitsubishi Electric Corporation
The 48th Ichimura Prize in Industry Excellent Achievement	The New Technology Development Foundation	Railroad vehicle propulsion systems that utilize 3.3 kV full-SiC	Mitsubishi Electric Corporation

Fiscal 2017 Hyogo Prefecture Invention Awards Hyogo Invention Award	Hyogo Prefecture	A selection method and selection device for plastics	Mitsubishi Electric Corporation Advanced Technology R&D Center
The Japan Society of Energy and Resources 5th Society Award	The Japan Society of Energy and Resources	"Poki-poki motor" motor manufacturing technology suitable for energy saving and resource conservation	Mitsubishi Electric Corporation Advanced Technology R&D Center, Inazawa Works, Nagoya Works, Himeji Works
Fiscal 2017 Kinki Region Invention Awards Kinki Bureau of Economy, Trade and Industry Award	Japan Institute for Promoting Invention and Innovation	Universal inverter capable of starting unknown motors (Patent no. 5611466)	Mitsubishi Electric Corporation Advanced Technology R&D Center, Nagoya Works
Fiscal 2017 Kinki Region Invention Awards Japan Patent Attorneys Association Chairman's Prize	Japan Institute for Promoting Invention and Innovation	Machine tool trajectory error compensation control technology (Patent no. 5340486)	Mitsubishi Electric Corporation Nagoya Works
Fiscal 2017 Kinki Region Invention Awards Wakayama Institute for Promoting Invention and Innovation Chairman's Prize	Japan Institute for Promoting Invention and Innovation	Method of integrating split iron cores and stators (Patent no. 5361339)	Mitsubishi Electric Corporation Fukuyama Works, Air-Conditioning & Refrigeration Systems Works, Manufacturing Engineering Center, Mitsubishi Electric Engineering Co., Ltd., Design Engineering Division
Fiscal 2017 Kinki Region Invention Awards Encouragement Award	Japan Institute for Promoting Invention and Innovation	Thermal controller for thermal printers (Patent no. 5043341)	Mitsubishi Electric Corporation Living Environment & Digital Media Equipment Group
Fiscal 2017 Kinki Region Invention Awards Encouragement Award	Japan Institute for Promoting Invention and Innovation	Image outline unsteadiness reduction processing device for on-board cameras (Patent no. 5295431)	Mitsubishi Electric Corporation Advanced Technology R&D Center
Fiscal 2017 Kinki Region Invention Awards Encouragement Award	Japan Institute for Promoting Invention and Innovation	On-board display system (Patent no. 5079095)	Mitsubishi Electric Corporation Sanda Works, Design Systems Engineering Center
Fiscal 2017 Kinki Region Invention Awards Encouragement Award	Japan Institute for Promoting Invention and Innovation	Motor controller unit for EPS (Patent no. 5603045)	Mitsubishi Electric Corporation Himeji Works
Fiscal 2017 Kinki Region Invention Awards Encouragement Award	Japan Institute for Promoting Invention and Innovation	Power conversion device (Patent no. 5538658)	Mitsubishi Electric Corporation Automotive Electronics Development Center

Fiscal 2017 Kinki Region Invention Awards Encouragement Award	Japan Institute for Promoting Invention and Innovation	Wafer structure for InP and GaAs optical semiconductors (Patent no. 4862965)	Mitsubishi Electric Corporation High Frequency & Optical Device Works
Fiscal 2017 Kinki Region Invention Awards Encouragement Award	Japan Institute for Promoting Invention and Innovation	Low-torque pulsation servo motor (Patent no. 4415634)	Mitsubishi Electric Corporation Advanced Technology R&D Center, Nagoya Works Meiryo Technica Corporation
Fiscal 2017 Kinki Region Invention Awards Encouragement Award	Japan Institute for Promoting Invention and Innovation	Air conditioning device that uses active filtration (Patent no. 5438037)	Mitsubishi Electric Corporation Advanced Technology R&D Center, Shizuoka Works, Air-Conditioning & Refrigeration Systems Works
Fiscal 2017 Kinki Region Invention Awards Encouragement Award	Japan Institute for Promoting Invention and Innovation	Device that detects people and objects such as windows from images (Patent no. 5241687)	Mitsubishi Electric Corporation Advanced Technology R&D Center, Information Technology R&D Center, M-Tec Co., Ltd., Central Business Division
Fiscal 2017 Kinki Region Invention Awards Encouragement Award	Japan Institute for Promoting Invention and Innovation	Semiconductor module for power generation that utilizes SiC (Patent no. 5147996)	Mitsubishi Electric Corporation Advanced Technology R&D Center, Power Device Works, Itami Works
Fiscal 2017 Kinki Region Invention Awards Encouragement Award	Japan Institute for Promoting Invention and Innovation	Hot water dispenser that utilizes welded joint innovation for high strength and high corrosion-resistance (Patent no. 5417349)	Mitsubishi Electric Corporation Manufacturing Engineering Center, International Division, Gunma Works
Fiscal 2017 Kinki Region Invention Awards Encouragement Award	Japan Institute for Promoting Invention and Innovation	Semiconductor device that combines thinness and a long lifetime (Patent no. 4499577)	Mitsubishi Electric Corporation Manufacturing Engineering Center Melco Power Device Corporation, Quality Control Department
Fiscal 2017 Kinki Region Invention Awards Encouragement Award	Japan Institute for Promoting Invention and Innovation	Industrial linear motor with compact mounts (Patent no. 5424821)	Mitsubishi Electric Corporation Manufacturing Engineering Center, Shinshiro Plant, Nagoya Works
Fiscal 2017 Kinki Region Invention Awards Encouragement Award	Japan Institute for Promoting Invention and Innovation	Support frame for solar cells with lightweight components (Patent no. 5312387)	Mitsubishi Electric Corporation Manufacturing Engineering Center, Plant Construction Management Department, Power Plant Engineering & Construction Center

Fiscal 2017 Kinki Region Invention Awards Encouragement Award	Japan Institute for Promoting Invention and Innovation	Arrangement conversion of information sequences within wireless communication devices (Patent no. 4772170)	Mitsubishi Electric Corporation Communication Networks Center, Information Technology R&D Center
Fiscal 2017 Kinki Region Invention Awards Encouragement Award	Japan Institute for Promoting Invention and Innovation	Frame volume control technology for layer 2 switches (Patent no. 5748678)	Mitsubishi Electric Corporation Communication Networks Center, Communication Systems Engineering Center, Mitsubishi Electric Information Systems Corporation
Fiscal 2017 Kinki Region Invention Awards Encouragement Award	Japan Institute for Promoting Invention and Innovation	Turning control technology for surveillance cameras (Patent no. 4932501)	Mitsubishi Electric Corporation Communication Networks Center, Mitsubishi Electric Engineering Co., Ltd., Media Site
Fiscal 2017 Kinki Region Invention Awards Encouragement Award	Japan Institute for Promoting Invention and Innovation	Railroad vehicle drive system that utilizes SiC (Patent no. 5031128)	Mitsubishi Electric Corporation Itami Works
Fiscal 2017 Kinki Region Invention Awards Encouragement Award	Japan Institute for Promoting Invention and Innovation	Visual information transmission and display system (Patent no. 4827992)	Mitsubishi Electric Corporation Itami Works, Industrial Design Center
Invention Award in the Occupational Field Hyogo Governor's Award	Hyogo Industrial Association	Improvement of the first pass yield using special materials for optical reflection	Mitsubishi Electric Corporation Manufacturing Engineering Center

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 2017.

▶ Reducing CO₂ from Production

A report on our targets to reduce CO₂ from energy sources and greenhouse gases excluding CO₂ (SF₆, HFC and PFC), and information regarding fiscal 2017 initiatives and achievements.

▶ Contribution to Reducing CO₂ from Product Usage

A report on objectives for promoting energy savings in our products and results of initiatives taken in fiscal 2017, and the reduction in CO₂ achieved by replacing old products with new highly energy-efficient products.

▶ Reducing CO₂ from Logistics

Overview of the Mitsubishi Electric Group's fiscal 2017 achievements in reducing CO₂ emissions through just-in-time improvement activities 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 regulations such as the Greenhouse Gas (GHG) Protocol – an international standard for the calculation of 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, to determine how to assess and calculate emissions from business activities (Scope 1 and 2) and indirect emissions from outside the range of its business activities (Scope 3).

Owing to the fact that around 80% of emissions in the value chain are greenhouse gas emissions associated with the use of sold products (Scope 3, Category 11), the Mitsubishi Electric Group focuses on developing highly energy-efficient products that are linked to reducing greenhouse gas emissions during product usage. At the same time, we strive to continuously reduce CO₂ emissions during production, as well as emissions of other greenhouse gases with greater global warming potential than CO₂.

Fiscal 2017 Greenhouse Gas Emissions

The "★" symbol denotes Mitsubishi Electric Group greenhouse gas emissions for which third-party verification has been carried out by SGS Japan Inc.

 [Verification Statement \(PDF 142KB\)](#)

Scope	Accounting (10,000 tons-CO ₂) (Below: Total emission ratio)	Accounting Summary*1
Category		
Scope 1 Direct emissions associated with fuel use at our company	38★ (0.9%)	Direct emissions from fuel use and industrial processes at our company*2
Scope 2 Indirect emissions associated with use of externally-purchased electricity and heating	96★ (2.2%)	Indirect emissions associated with use of electricity and heat purchased by our company*3
Scope 3 Indirect emissions outside the scope of our company's operational activities		
Category 1 Purchased goods and services	526 (12%)	Emissions associated with activities up to the manufacturing of materials, etc. relating to raw materials, parts, purchased products, and sales*4
Category 2 Capital goods	63 (1.5%)	Emissions generated by the construction and manufacturing of the company's own capital goods
Category 3 Fuel- and energy-related activities not included in Scope 1 or Scope 2	8.5 (0.2%)	Emissions associated with procurement of fuel from other parties, and procurement of fuel necessary for power generation for electricity, light and so on
Category 4 Upstream transportation and distribution	44 (1.0%)	Emissions associated with logistic processes up to the delivery to our company of materials, etc. relating to raw materials, parts, purchased products, and sales*5

Category 5 Waste generated in operations	0.1 (0.0%)	Emissions associated with transporting and processing waste produced by our company*6
Category 6 Business travel	4.0★ (0.1%)	Emissions associated with employee business travel*7
Category 7 Employee commuting	2.9★ (0.1%)	Emissions associated with employees commuting to and from their respective workplaces*8
Category 8 Upstream leased assets	-	Emissions associated with operation of leased assets hired by our company (Calculated by Mitsubishi Electric under Scope 1 and Scope 2)
Category 9 Downstream transportation and distribution	1.0 (0.0%)	Emissions associated with the transportation, storage, cargo handling and retailing of products
Category 10 Processing of sold products	0.1 (0.0%)	Emissions associated with the processing of interim products by business operators
Category 11 Use of sold products	3,546★ (82%)	Emissions associated with the use of products by users (consumers/business operators)
Category 12 End-of-life treatment of sold products	3.0 (0.1%)	Emissions associated with the transportation and processing of products for disposal by users (consumers/business operators)*4
Category 13 Downstream leased assets	0.01 (0.0%)	Emissions associated with operation of leased assets
Category 14 Franchises	-	Emissions at companies operating as franchises (Not applicable to Mitsubishi Electric)
Category 15 Investments	8.0 (0.2%)	Emissions associated with operation of investments
Total	4,341 (100%)	

*1 Excerpt from Basic Guidelines published by the Japanese Ministry of the Environment and Ministry of Economy, Trade and Industry

*2 CO₂, SF₆, PFC, and HFC emissions associated with the use of gas, heavy oil, etc., and with product manufacturing

*3 CO₂ emissions associated with the use of electricity, etc.

*4 Excludes some regions

*5 CO₂ emissions associated with product distribution/circulation (sales distribution)
Subject to accounting: 55 companies (production sites)

*6 CO₂ emissions associated with transportation of waste (waste distribution)
Subject to accounting: Mitsubishi Electric

*7 Results for Japan. Excludes CO₂ emissions associated with actual use of taxis and accommodation

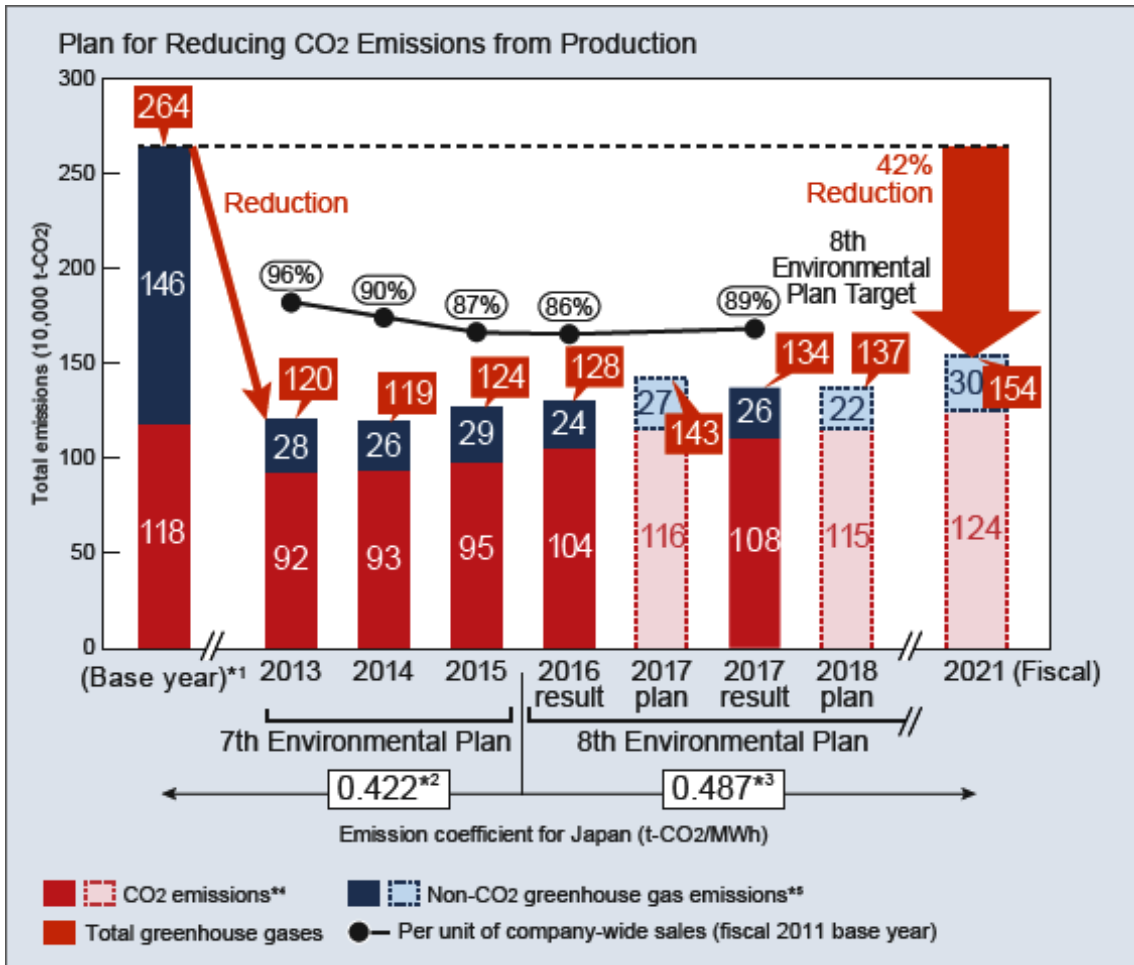
*8 Assuming that all employees use passenger rail services

Environment – Reducing CO2 from Production

Targets of the 8th Environmental Plan (Fiscal 2016 to 2018) and Achievements of Fiscal 2017

With the 8th Environmental Plan (fiscal 2016 to 2018), we will move forward with activities to reduce the emissions of "CO₂ originating from energy" and "non-CO₂ greenhouse gases (SF₆, HFCs, and PFCs)". Our goal is to lower annual emissions of all types of greenhouse gases to the CO₂ equivalent of 1.54 million tons or less by fiscal 2021.

In fiscal 2017, greenhouse gas emissions amounted to 1.34 million tons equivalent of CO₂, and we surpassed our goal of 1.43 million tons or less. The major factors behind this achievement were the shift to pump-inverters and the updating of air conditioners and lighting in Japan, and progress with facility renewal and operating improvements to production facilities overseas. The eradication and recovery of non-CO₂ greenhouse gases is proceeding, and the plan has made smooth progress.



*1 Base year for CO₂: Mitsubishi Electric parent company, fiscal 1991; affiliates in Japan, fiscal 2001; and overseas affiliates, fiscal 2006.

Non-CO₂ greenhouse gases: Mitsubishi Electric parent company and affiliates in Japan, fiscal 2001; overseas affiliates, fiscal 2006.

*2 Figure published by the Japan Electrical Manufacturers' Association (JEMA) in 1997

*3 Figure published by the Federation of Electric Power Companies of Japan at the time of drawing up the 8th Environmental Plan (in 2013, when two nuclear power stations were operational)

*4 Figure published by JEMA in 2006 has been referred to when calculating the overseas emission coefficient.

*5 Figure published in IPCC's Second Assessment Report (1995) was referred to when calculating the global warming coefficient of non-CO₂ greenhouse gases.

Initiatives to Reduce CO2 Originating from Energy and the Results

For reducing CO₂ originating from energy, our activities focused on pushing forward with energy savings in utilities and production facilities. As a result, we reduced emissions by 25,000 tons in fiscal 2017.

The following initiatives to push forward with energy savings in utilities resulted in a 19,000-ton reduction: a shift to pump-inverters, the updating of air-conditioners and lighting, and operational improvements such as adjusting the set temperatures of air conditioners.

The following initiatives to push forward with energy savings in production facilities aimed to reduce the overall consumption of electrical energy through updating production facilities and improving production efficiency, and resulted in a 4,000-ton reduction.

Going forward, while CO₂ emissions are expected to increase accompanying an enlargement of the production scale at overseas works, we aim to continue to reduce emissions through utility updates and improving the operation of air-compressors.

Example: Mitsubishi Electric Consumer Products (Thailand) Co., Ltd.

At Mitsubishi Electric Consumer Products (Thailand) Co., Ltd., which manufactures air conditioners in Thailand, we have tackled energy saving activities with the policies of 1) an all-personnel approach, 2) the proactive support of management personnel, and 3) ongoing planning and implementation. We ensure that our staff are familiar with these policies, and work as a whole company to practice energy saving during production. Having continued highly sustainable energy saving activities for over six years, we have reduced the CO₂ emissions by 10,000t-CO₂ in total from fiscal 2012 by means of initiatives ranging from the development and manufacture of products that contribute to energy saving to improvements at the administrative level.

Through these approaches, we have created an environmental management model that will also improve corporate sustainability in the pursuit of environmental concerns. Improving our brand strength has increased our turnover by 78% compared with fiscal 2012, which has also led to a 190 million yen reduction in energy costs during production.

The company won the Thailand Energy Award run by the Ministry of Energy of the Kingdom of Thailand 6 times between fiscal 2012 and fiscal 2017. We were invited to a government panel meeting as an excellent energy conservation company.



Mitsubishi Electric Consumer Products (Thailand) Co., Ltd.

Example: Nagoya Works

The flagship products of Mitsubishi Electric's Nagoya Works are factory automation (FA) products that increase productivity at the site of manufacture. We also use these products in our plants, and we aim to introduce new models as appropriate to improve productivity.

In fiscal 2015, we started operations at a new production building for FA equipment. At this plant, we are improving productivity and achieving optimal facility management by adopting highly efficient equipment such as air conditioners, heat sources, outside conditioners, and lighting, and by constructing a system based on our company's "e-F@ctory" that coordinates IoT technology, FA technology and IT technology. By visualizing not only energy usage but all information on the facility and environment, and by coordinating control of the building's facilities and production facilities, we have enabled advanced energy monitoring and control. Through these approaches, we have achieved a 30% reduction (120 kWh/m²/year) in the power use basic unit, and control of the annual volume of power consumption has reached 13% (9,273,000 kWh/year) for the site overall.

The approaches related to the new building were evaluated, and the Nagoya Works received the Director-General of the Agency for Natural Resources and Energy Award (energy conservation field) in the fiscal 2017 Energy Conservation Grand Prize/Energy Conservation Example category.



Nagoya Works

Initiatives to Reduce SF₆, HFC, and PFC and the Results

Three types of non-CO₂ greenhouse gases are emitted by the Mitsubishi Electric Group in its business activities: SF₆ (sulfur hexafluoride), HFCs (hydrofluorocarbons), and PFCs (Perfluorocarbons). SF₆ is used inside gas-insulated switchgear for electrical insulation, as well as in the etching process during semiconductor and liquid-crystal display production.

HFCs are used as refrigerants in air conditioners and refrigerators, while PFCs are used during the etching process in production of semiconductors and liquid-crystal displays.

In fiscal 2017, emissions were further reduced owing to expansion of the introduction of abatement systems at factories in Japan and improved collection capabilities at overseas plants. In total, emissions were reduced by the CO₂ equivalent of 21,000 tons.

Going forward, in Japan, we will continue to improve our capacity for SF₆ collection, as well as introduce more SF₆ and PFC abatement systems to the semiconductor etching process. Overseas, we will test regenerators in order to increase the number of times that HFC refrigerants can be regenerated, while continuing to run our refrigerant recovery scheme.

Greenhouse Gases	Past Measures	2013	2014	2015	2016	2017	2018	2021	
SF6 (Sulfur hexafluoride)	Vacuum pump abatement system Early gas-leakage detection								
HFCs (Hydrofluoro-carbons)	Recovery								
PFCs (Perfluoro-carbons)	Abatement system								

Receiving "A-List Company" Recognition, the Highest Evaluation from CDP*

In fiscal 2017, Mitsubishi Electric was named an A-List company in the CDP's "Climate Change 2016" program. The CDP awarded us this highest evaluation in recognition of the company's actions to reduce greenhouse gas emissions and mitigate climate change. For the CDP Supply Chain Program, we also received A-List recognition in the CDP Supplier Climate category. Furthermore, for the CDP Supplier Engagement Rating, which assesses initiatives against climate change across the entire supply chain, a top "A" grade was also given. We will continue to press forward with our efforts.



* CDP: An international NGO that examines, evaluates and discloses environmental initiatives of corporations and cities.

Environment – Contribution to Reducing CO₂ from Product Usage

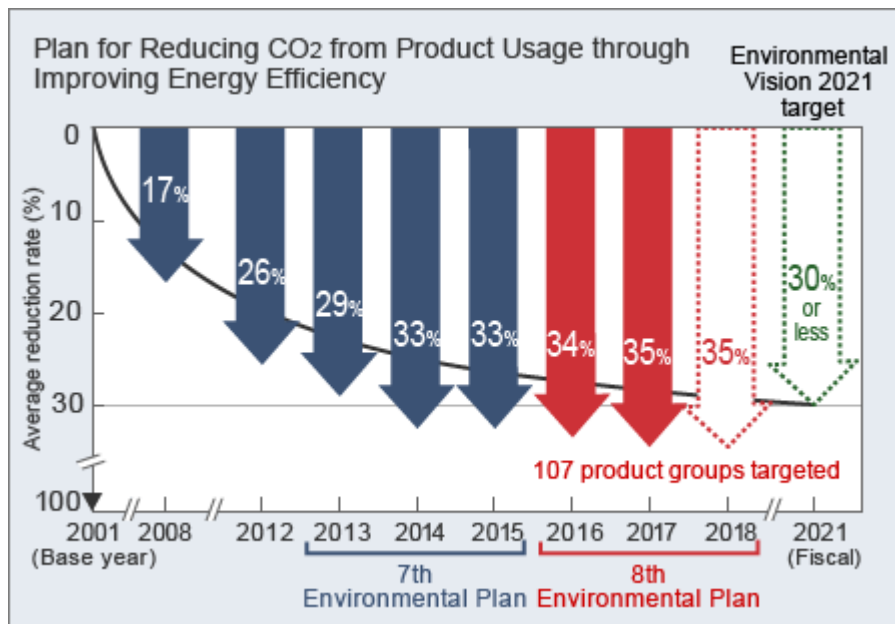
As dozens of times more CO₂ is emitted during product usage than during production, the Mitsubishi Electric Group has designated Reducing CO₂ from Product Usage and Expansion of Contribution to Reducing CO₂ from Product Usage as important tasks.

The Mitsubishi Electric Group has approximately 260 products. We pursue technological innovation and improved energy efficiency for products designed and developed in house that we have determined through product environmental analysis to have a major environmental impact due to CO₂ generation during use.

Targets of the 8th Environmental Plan (Fiscal 2016 to 2018) for Reducing CO₂ from Product Usage and Achievements in Fiscal 2017

Power consumed by the customer during product use is viewed in terms of CO₂ emissions from production of the power used. Increasing product energy efficiency can reduce CO₂ from product use. Under its 8th Environmental Plan (fiscal 2016 to 2018), the Mitsubishi Electric Group aims to achieve an average reduction rate of 35% compared to fiscal 2001, over 107 product groups.

Fiscal 2017 saw further reductions achieved mainly in the industrial mechatronics area, leading to an average reduction rate of 35%, which brings us a step closer to our goal.



Example

Package Air Conditioner Mr. SLIM: Slim ZR Series Type P280



Equipped with the industry's first full SiC DIIPM* for year-round improved energy consumption efficiency, this totally energy-efficient product reduces electricity consumption.

Low-loss circuits and high-efficiency converters also reduce peak power, delivering peak energy efficiency that decreases contract demand.

* SiC: Silicon carbide, DIIPM: Dual Inline Package Intelligent Power Module

Winner of the Energy Conservation Grand Prize Fiscal 2017
Energy Conservation Center Chairman's Award

Station Energy Saving Inverter (S-EIV)



Supplies surplus power left over from regenerated electric power produced if rolling stock brakes where power cannot be completely consumed by other rolling stock running nearby, powering station lighting, air conditioning, escalators and more, and contributing to overall conservation of energy in the rail system.

Winner of the New Energy Grand Prize Fiscal 2017
Agency for Natural Resources and Energy Director-General's Award

🟢 The Environment and Business

Example of Efforts toward Expansion of Contribution to CO₂ Reduction

Heating, Cooling, and Air Conditioning

We maximize the potential of high-efficiency devices such as inverter compressors and power semiconductors, offering heating, cooling and air conditioning with industry-leading energy saving functionality.

Our global development efforts focus on exploiting high-level energy-saving technology in air conditioners, but as we expand geographically we have started to encounter differences such as climate and customer requirements, as well as in the range of environmental regulations. We are globalizing our development and production systems in order to adapt to local requirements in a speedy and timely manner. For example, outside Japan we acquired an Italian air conditioning company (MEHITS, previously DeLclima) in 2015, and set up a new company in Turkey in 2016 for the development and production of room air conditioners. In Japan, we completed work on a heating and cooling air conditioner demonstration facility in our Air-Conditioning & Refrigeration Systems Works in Wakayama Prefecture in 2016. An air conditioning design/development and evaluation building is under construction at our Shizuoka Works, and is scheduled to be operational in 2019. These initiatives contribute to a reduction in CO₂ emissions.

Global Development Systems to Offer Products for Local Markets

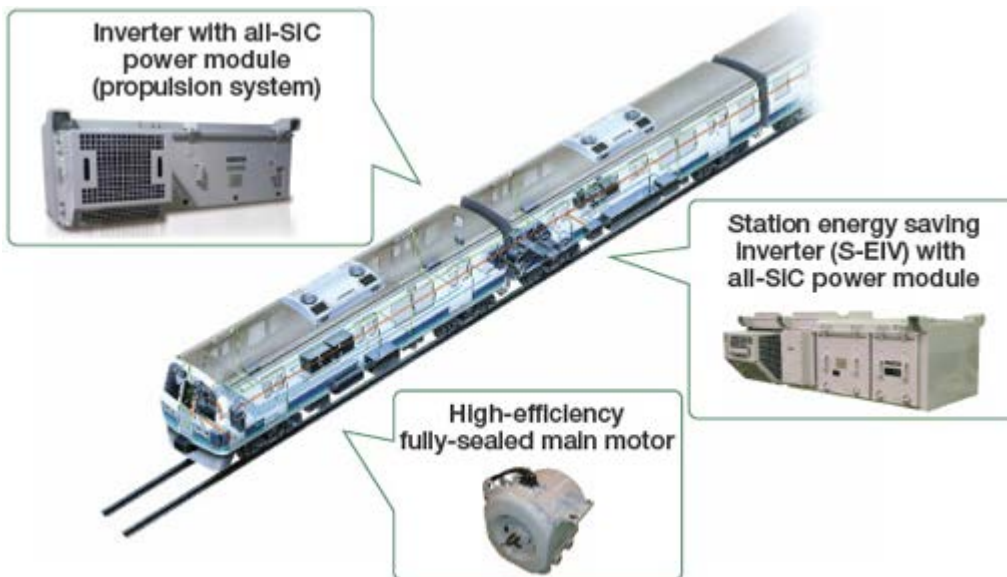


Transportation Systems

We are the only manufacturer that offers a one-stop service to rail transport systems for running, stopping, and management, offering a range of electrical equipment such as propulsion systems, main motors, and Station Energy Saving Inverter (S-EIV). Our ability to manufacture railcar air-conditioner units also contributes to energy savings throughout the rail system.

Railways have increased in importance globally in recent years in line with the move toward mass transit systems with lower environmental impact, and we are building up business structures for rolling stock electrical equipment in all territories to respond to that demand. For example, we acquired the Italian rolling stock air conditioner manufacturer KLIMAT-FER in 2013. We also started collaboration with the Polish rolling stock air conditioner manufacturer MEDCOM in 2016 in the European market. We strengthened our ability to respond to local manufacturing requirements in the USA in 2014. In Asia and specifically in India, which is forging ahead with plans to introduce rail transport in many cities, we have a rolling stock electrical equipment plant which became operational in 2015 and have now established a manufacturing, sales, and maintenance capability.

Providing Electrical Equipment for Regions with Growing Attention in Rail Transportation



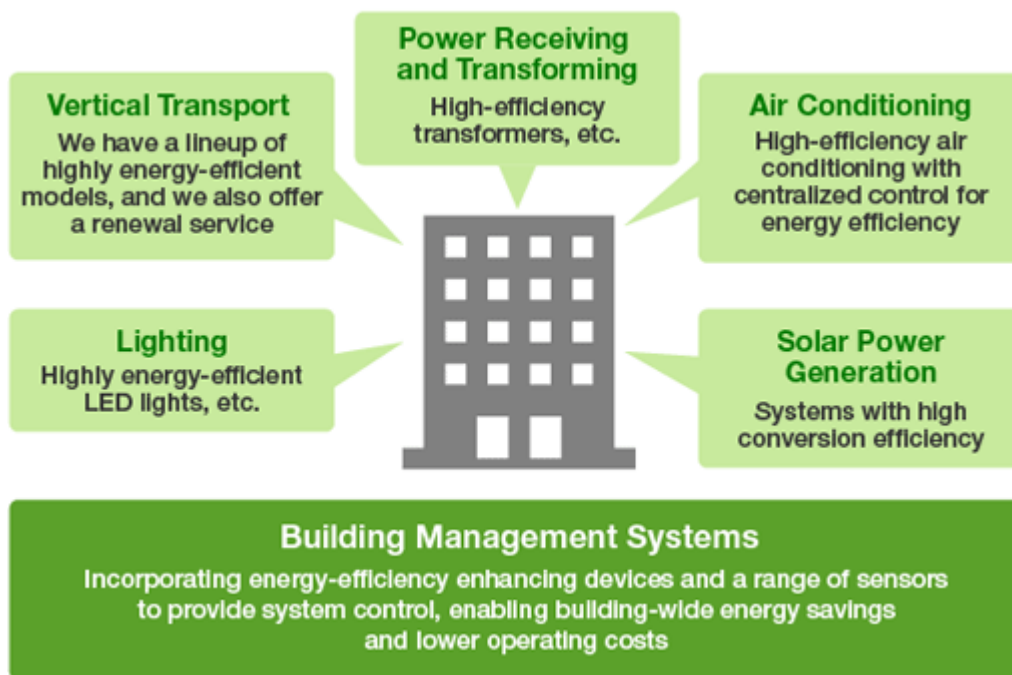
Building Systems

From vertical transport devices such as elevators and escalators through to lighting and air conditioning, we offer a wide range of products for use inside buildings. Improving the energy efficiency of these products allows energy to be saved throughout the building. We also offer building management systems that incorporate energy-efficiency enhancing devices and a range of sensors to provide system control, enabling building-wide energy savings and lower operating costs.

There has been rapid adoption of vertical transport devices in the cities of emerging nations, with a corresponding increase in demand. We are also seeing an increasing need in mature markets for replacement of existing vertical transport systems that have been in use for many years. We are therefore building up our development capability and improving production capacity in all regions to respond to these demands. New plants became operational in 2016 in India and Thailand, and a new test facility will become operational in Thailand in 2017.

A new research center opened at our original plant in Inazawa (Aichi Prefecture) in 2016. With a view to the greater global development of building systems, we are building up our capacity to train and develop people for sales, manufacturing, construction, and maintenance of vertical transport devices and building management systems.

Wide Range of Products for inside Buildings



Targets of the 8th Environmental Plan (Fiscal 2016 to 2018) for Expansion of Contribution to Reducing CO₂ and Achievements in Fiscal 2017

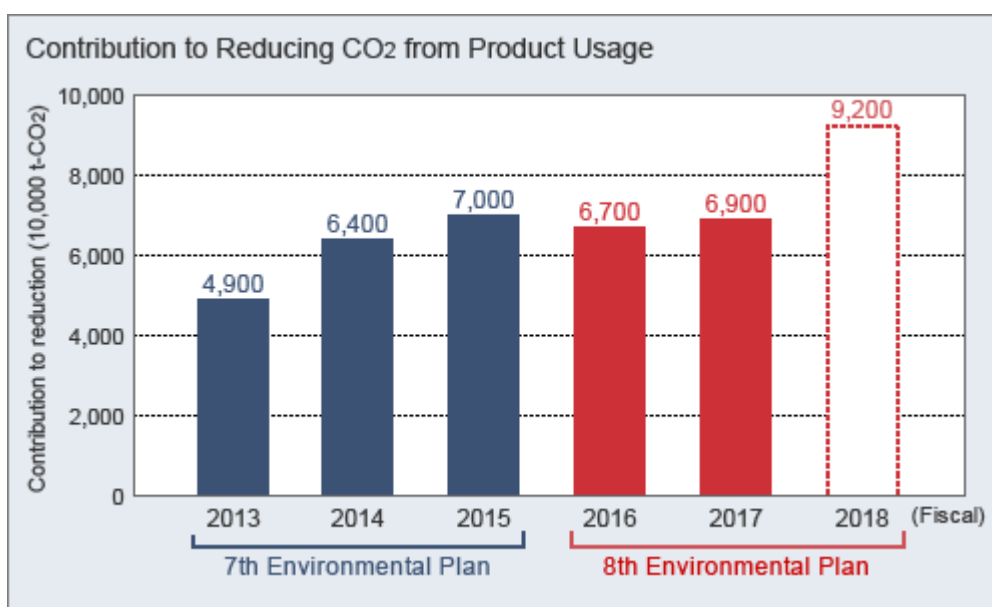
The Mitsubishi Electric Group is working to visualize and expand our Contribution to Reducing CO₂ from Product Usage. Contribution to reducing CO₂ is represented by the amount of generated CO₂ deemed saved by switching from older products to new, energy-efficient ones. The calculation is based on the following formula, which multiplies the effect of reducing CO₂ over the life of the product by the number of units sold.

$$\text{Contribution to reducing CO}_2 = \text{Effect of reducing CO}_2 \text{ from product usage per unit} \times \text{Number of units sold during the fiscal year}$$

We use official standards and industry-mandated calculation methods when computing our contribution to reducing CO₂. Where no calculation method is specified, we make calculations based on our own product scenarios. Calculations for interim products are based on GHG Protocol Scope 3 Guidance, with proportional division by product weight and percentage of sales.

The target of the 8th Environmental Plan (fiscal 2016 to 2018) is to contribute to a reduction of 92 million tons across 127 or more product groups, and the contribution for fiscal 2017 was a reduction of 69 million tons across 119 product groups.*

* This is more than the CO₂ emitted by fuel consumption in the Tokyo Metropolitan region, which is 60.6 million tons (Bureau of the Environment, Tokyo Metropolitan Government, July 2016).



Breakdown of Products with Assessed Contribution to Reducing CO₂ from Product Usage

Products (Number)	Examples of Products	Standard/Benchmark Used for Calculation
End Products (88)	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 from reducing power consumed by the product
	Energy-saving support equipment, elevator modernization, Lossnay heat exchange amount	Reduced power utilization through introduction of energy efficiency enhancing devices, contribution from upgrading to highly efficient components during refurbishment, previously wasted energy used by heat exchange
	Circuit breakers, switchgears	Reduction in leaked SF ₆ gas (CO ₂ equivalent)
	Photovoltaic power generators, turbine generators	Power produced by the generator minus energy used to generate the power, increase in power generated by improving generation efficiency
Interim Products (31)	Compressors purchased separately from air conditioners	Contribution from incorporation of products with lower power consumption
	Inverters, motors	Contribution from incorporation of products with lower power loss
	Devices	
	Electric power steering, alternators, starters	Contribution from incorporation of products with greater fuel efficiency, proportionally divided by weight
	Combined-cycle thermal power generator	Reduction of fossil fuel use by replacement of old thermal power generators. Contribution calculated as reduction in CO ₂ emissions proportionally divided by sales

* Calculations for products using electricity are based on the national or regional CO₂ emission factors given in CO₂ Emissions From Fuel Combustion Highlights (2013 Edition).

* Calculations for thermal power generation use thermal power generation factors from the calculation methods in the Initiative for Creating a Low-Carbon Society, issued by four electrical and electronics industry associations.

* Calculations for other forms of energy use and greenhouse gases use factors from the Greenhouse Gas (GHG) Emissions Accounting and Reporting Manual issued by the Japanese Department of the Environment and Ministry of Economy, Trade and Industry.

Environment – Reducing CO2 from Logistics

Basic Policies on Logistics (Distribution)

The Mitsubishi Electric Group carries out just-in-time improvement activities to improve logistics. These activities aim to visualize logistics work by quantification, and to eliminate irrational, irregular, and wasted efforts to improve transport efficiency and economy, and to reduce environmental impact through "Eco-Logistics" (Economy & Ecology Logistics).

Fiscal 2017 Achievements of the Mitsubishi Electric Group

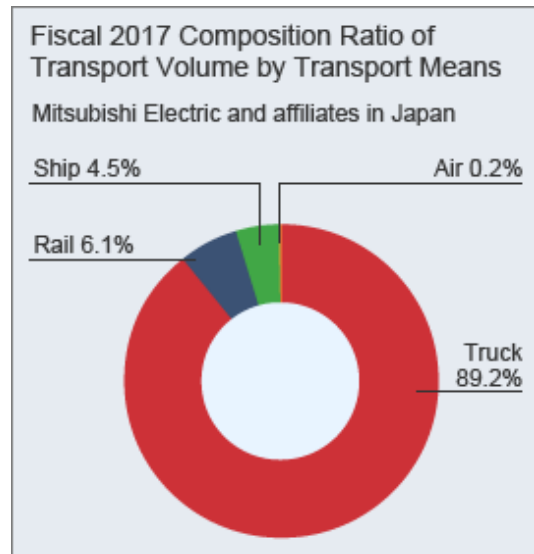
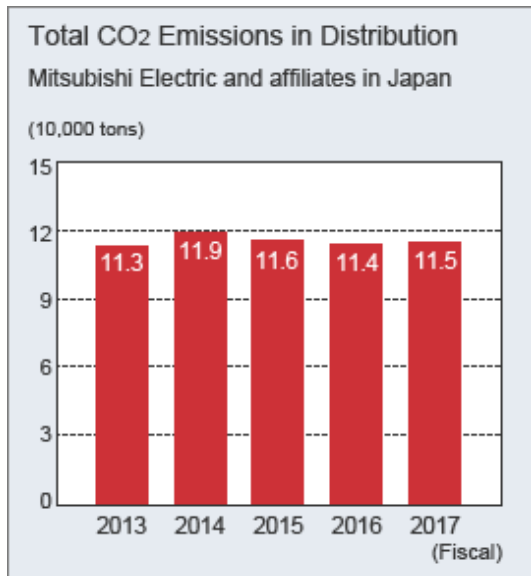
Shipping volume unit: 0.0301 tons-CO₂/million yen (a 3.5% reduction on the previous fiscal year)
CO₂ emitted: 115,000 tons (a 1,000-ton reduction on the previous fiscal year)

The Mitsubishi Electric Group and its affiliates in Japan continued to implement the following measures in fiscal 2017.

- Reviewing transportation routes
- Switching from truck transportation to rail transportation (modal shift)
- Reducing the number of trucks by improving load ratios (including Container Round Use)

Thanks to these measures during fiscal 2017, the amount of CO₂ emitted by the Mitsubishi Electric Group fell to 97,000 tons (a decrease of 1,000 tons on the previous fiscal year). The amount emitted by affiliates in Japan totaled 18,000 tons (up 2,000 tons, an increase of 0.3% on the previous fiscal year).

Regarding overseas affiliates, as a result of the focus changes, the amount of CO₂ emitted by a total of 21 companies was 329,000 tons (down 11,000 tons on the previous fiscal year), while shipping volume per unit was 0.336 tons-CO₂/million yen (up 3% on the previous fiscal year).



Example

At each of the Mitsubishi Electric Group's works, with the cooperation of other companies, we are introducing Container Round Use for the import and export of products and materials.

Usually, when freight is imported in containers, it is transported by sea from an overseas hub via a port, and is then transported over land to an import warehouse. After delivery at the warehouse, the empty containers are returned to the container-yard of the port and harbor department.

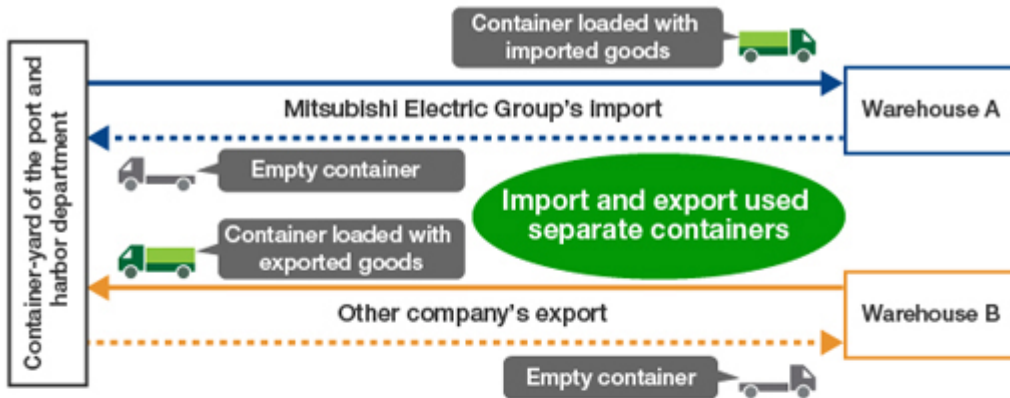
Then, with the cooperation of a company using the same warehouse or a nearby warehouse, once the importing company has unloaded the freight from the container, the exporter loads freight into the same container, achieving Container Round Use. This reduces the transportation of empty containers between the container-yard and the warehouse, and reduces CO₂ emissions. The same approach is also used with exports.

Going forward, we plan to continue and expand these activities.

Image of Container Transport (with the Mitsubishi Electric Group Importing, and a Cooperating Company Exporting)

Before Improvement

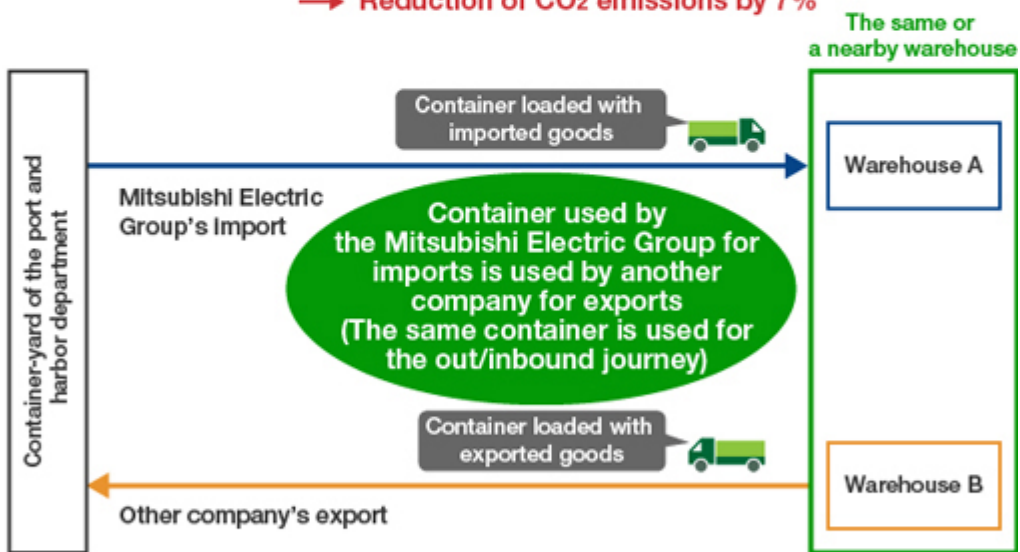
Waste from transporting an empty container



After Improvement

Reduction of the distance that empty containers are transported

→ Reduction of CO2 emissions by 7%



< Addition: Conditions of Container Round Use >

- The same warehouse or neighboring warehouses should be used
- The container size should be the same as that of the shipping company
- The timing of the imports and exports should align (the import and export should fall within the same day and timeframe)
- The carrier for overland transportation between the warehouse and container-yard should be the same for the outbound and return journey

Environment – Initiatives toward Creating a Recycling-Based Society

▶ Effective Utilization of Resources

A report on priority measures introduced to utilize limited resources more efficiently, our target for reducing the final waste disposal ratio, and information regarding fiscal 2017 initiatives and achievements.

▶ Reducing Resource Inputs

Introducing objectives and results of fiscal 2017 initiatives to reduce the size and weight of products while promoting product recycling in an effort to realize a recycling-based society.

▶ Strengthening Collaboration for Resource Recycling Business

A report on the expansion of environment-related businesses, and strengthening collaboration in the recycle-and-reuse business and aftersales maintenance business to increase resource efficiency.

▶ Recycling End-of-Life Products

Objectives and progress of initiatives to collect and recycle four kinds of home appliances and personal computers, and fiscal 2017 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 2017 initiatives and achievements.

▶ Using Water Effectively

Keeping track of water risk, initiatives for effective use of water, and results of activities undertaken in fiscal 2017.

Environment – Effective Utilization of Resources

Targets of the 8th Environmental Plan (Fiscal 2016 to 2018) and Achievements in Fiscal 2017

The Mitsubishi Electric Group focuses on the following three measures to reduce final disposal ratios: thorough analysis and separation of waste for conversion to valuable resources; higher levels of conversion to valuable resources through development of disposal contractors and sharing information about waste disposal contractors; and increased efficiency in waste (recycling) logistics.

The target final disposal ratio under the 8th Environmental Plan (fiscal 2016 to 2018) is less than 0.1% for Mitsubishi Electric and Japanese affiliate companies. In fiscal 2017, both parties achieved this target, with Mitsubishi Electric achieving a rate of 0.002% and Japanese affiliates bringing their ratio down to 0.04%. Overseas affiliates had a final disposal ratio of 0.69%, narrowly failing to reach the fiscal 2017 target of 0.6% or less.

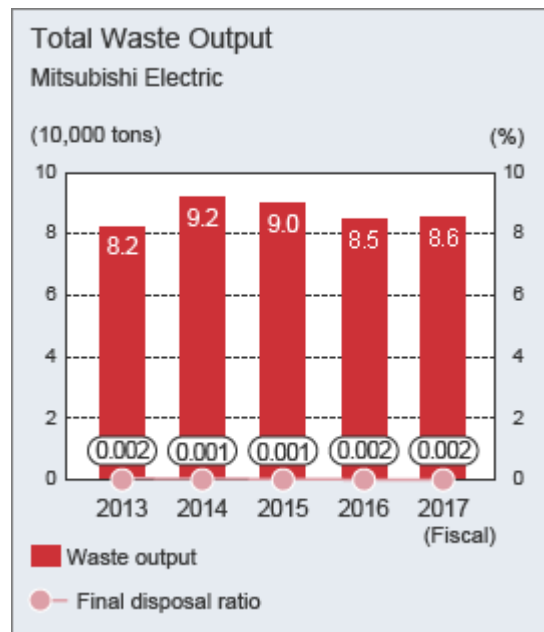
Results of Activities at Mitsubishi Electric

Each Mitsubishi Electric production base manufactures different products and so generates different kinds of waste. Our general rule is therefore to create and implement a different plan for each base. However, we also endeavor to share management expertise and information on contractors, and cooperate with neighboring bases.

Increased production in fiscal 2017 led to total final disposal rising to 86,000 tons, a slight increase over the previous fiscal year, but at 0.002%, the final disposal ratio was in line with that of the previous fiscal year.

The scope of our waste management system has been expanded from our own 26 production bases to cover our branch companies in order to enhance our legal compliance.

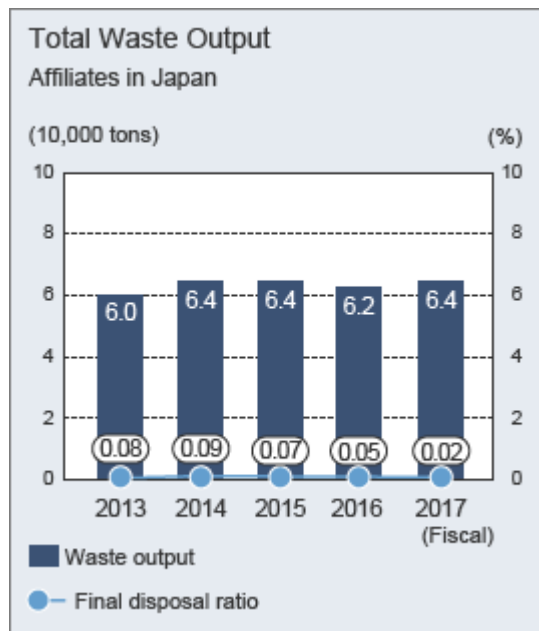
We will continue to develop strategies for improvement, such as reducing the amount of waste sent for subcontracted disposal.



Results of Activities at Affiliates in Japan

Expanded scale of business operations and other factors meant that the total final disposal figure of 64,000 tons in fiscal 2017 was slightly higher than the previous year. Final disposal ratio was improved to 0.02%.

Our own waste management systems were introduced at our affiliates in Japan to enhance legal compliance, and are in use at approximately 140 companies. Their use will be extended later to offices and other locations. We also plan to continue to digitize manifests.



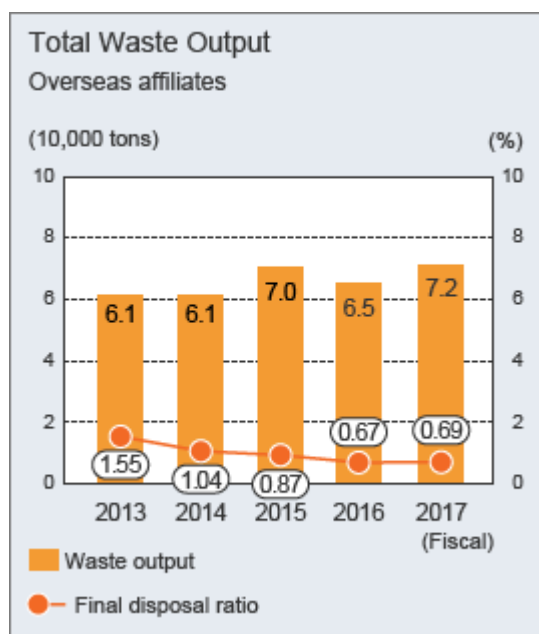
Results of Activities at Overseas Affiliates

It is difficult to set the same target levels as Japan for overseas affiliates, as regulations and waste treatment practices vary by country and region. Nonetheless, we aim to lower the final disposal ratio from 0.87% in fiscal 2015 to less than 0.5% over the three years covered by the 8th Environmental Plan.

To achieve this, we will focus our efforts on selected specific sites that require special prioritization and improvement, and improve their results through thorough separation and increased use of recycling in order to increase overall performance among our overseas affiliates.

Increased overseas production in fiscal 2017 and other factors increased final disposal to 72,000 tons and the final disposal ratio to 0.69%, both figures higher than the previous fiscal year.

In future, in addition to cooperation between neighboring bases with the aim of meeting our targets in line with local regulations, we will formulate more detailed plans and follow overseas activities more closely in an attempt to reduce the amount of waste output and the final disposal ratio.



Environment – Reducing Resource Inputs

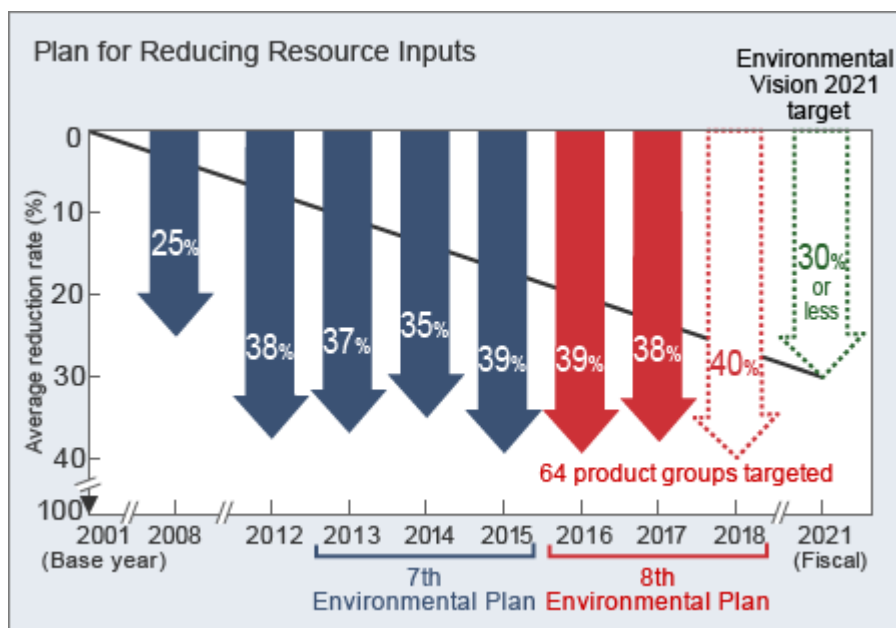
Targets of the 8th Environmental Plan (Fiscal 2016 to 2018) and Achievements in Fiscal 2017

The Mitsubishi Electric Group is reducing resource inputs by targeting specific products for miniaturization and weight reduction. The Mitsubishi Electric Group has approximately 260 products. Our aim under the 8th Environmental Plan (fiscal 2016 to 2018) is to reduce resource inputs for 64 product groups by an average of 40% compared to fiscal 2001, and this reduction target is built into our product development plans. Individual products that are not continuously manufactured and products built to customer specifications are outside the scope of resource input reduction.

The average reduction rate for resource inputs in fiscal 2017 was 38%. This is due to reduced sales volumes for products that made notable progress in resource reduction in the heavy electric machinery systems, electronic devices, and industrial mechatronics segments. The average reduction rate is influenced by business conditions, but we will proceed with steady reductions in resource inputs for all products across all segments.

Products Making Notable Progress in Resource Reduction in Fiscal 2017 (Compared to Fiscal 2016)

- Laser processing machines: 16% reduction
- Automotive fuel pumps: 14% reduction
- Escalators: 6% reduction
- Hot water supply system equipment: 4% reduction
- Gas-insulated switchgear: 4% reduction



Environment – Strengthening Collaboration for Resource Recycling Business

Sharing Case Studies and Technical Data to Strengthen Partnerships and Expand Our Resource Recycling Business

As the world's population increases and living standards in emerging nations improve, it is imperative to use resources more efficiently in order to achieve sustainable growth. This issue requires a global response, as indicated by its inclusion as a flagship initiative of EU 2020, the long term strategy announced by the European Commission in June 2010, and its mention in the Leaders' Declaration adopted at the G7 Summit in Elmau in June 2015.

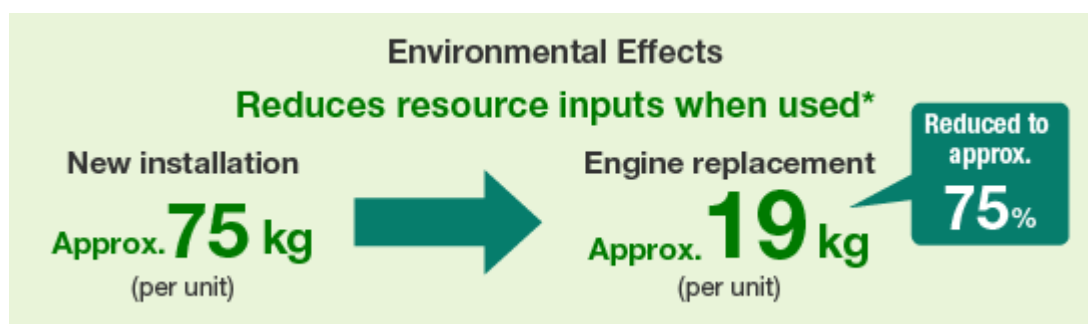
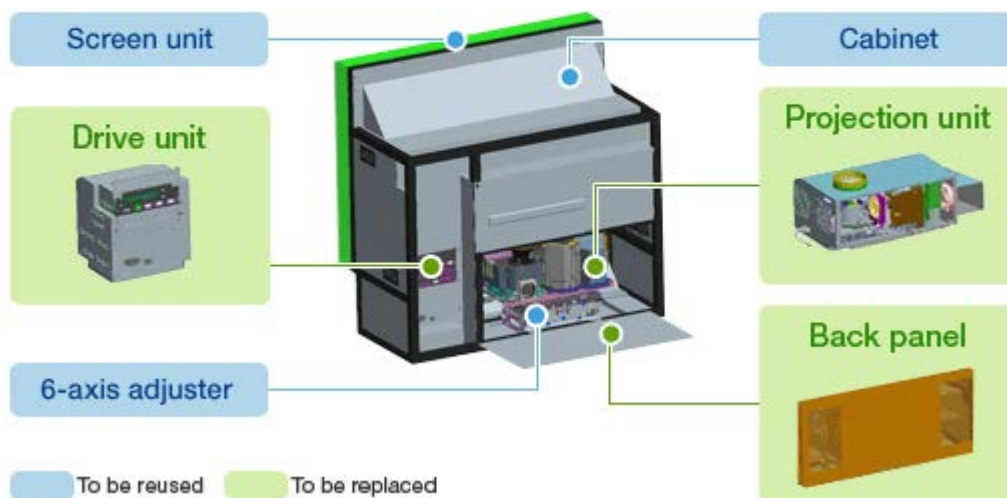
To reduce input of new resources, the Mitsubishi Electric Group operates a commercial resource recycling business that recovers and reuses resources from our own end-of-life products and refurbishes usable equipment. Under the 8th Environmental Plan (fiscal 2016 to 2018), we share technical data and case studies on a number of businesses internally, and have also started publicizing them externally with the aim of strengthening partnerships in the resource recycling business.

Mitsubishi Electric Group Resource Recycling Business

Engine Replacement for Display Wall System

In 2013, the Mitsubishi Electric Group started operating a service for reusing existing screens and cabinets when replacing projection and drive units. This service not only conserves resources by making use of existing housings, but also improves brightness, extends product life, and contributes to energy savings by upgrading the optical engine.

**Existing screen and cabinet are reused,
while projection unit and drive circuit are replaced.**

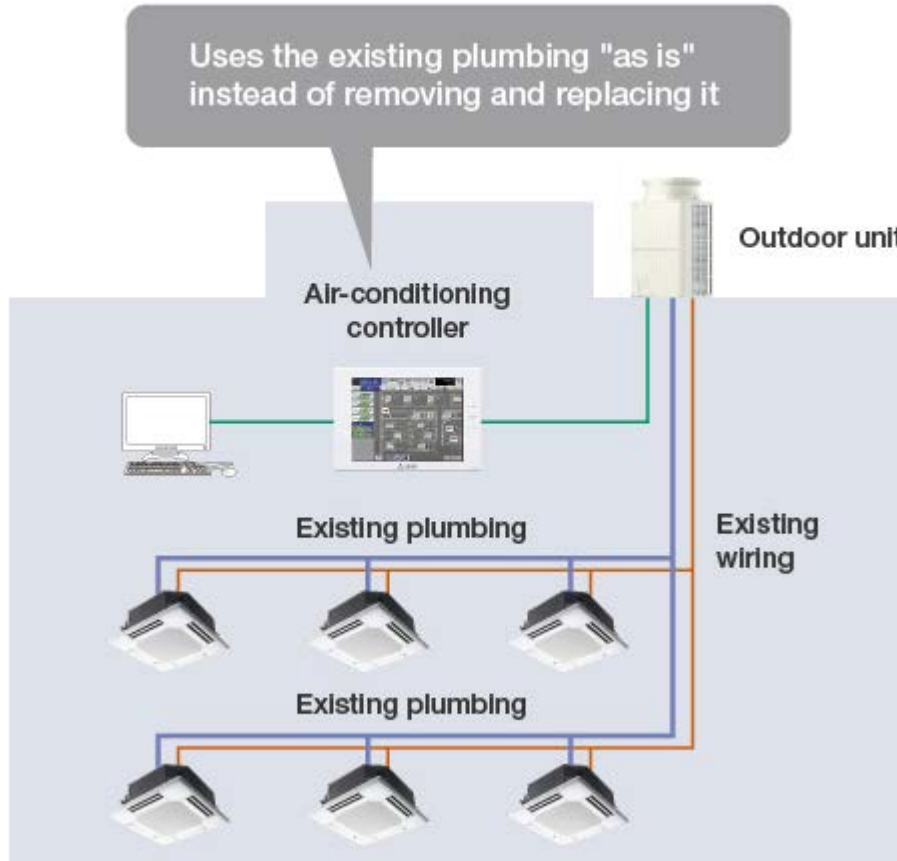


* For a Mitsubishi Electric display wall with a 50 inch screen

"Replace Series" Multi-Unit Air-Conditioning System for Buildings

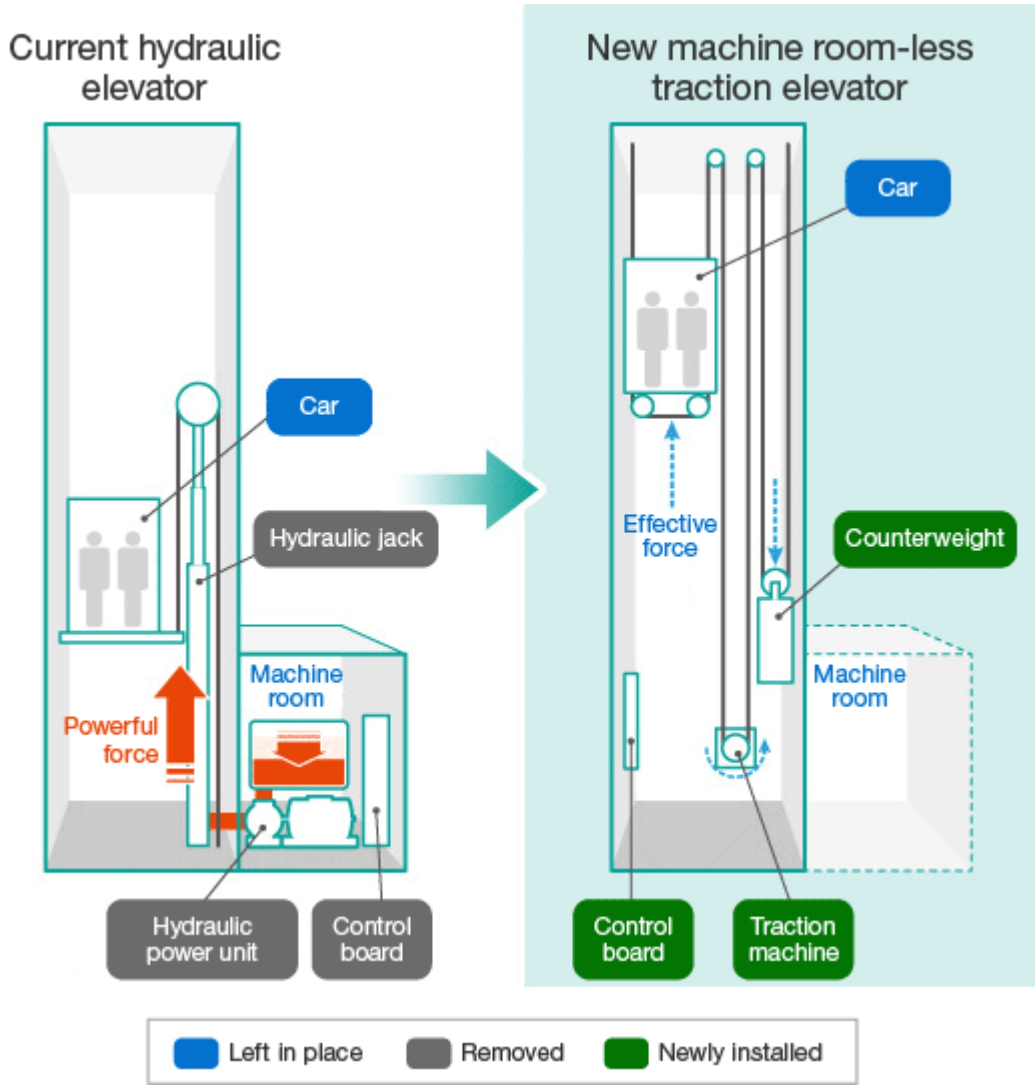
The Mitsubishi Electric Group introduced the Replace Series multi-unit building air conditioning system in 2005. This system allows existing building air conditioning system pipes to be used as-is. Reusing some pipes without replacement reduces resource inputs, and also delivers energy savings and suitable air conditioning in a shorter installation time.

Renovation of air-conditioning systems using existing plumbing

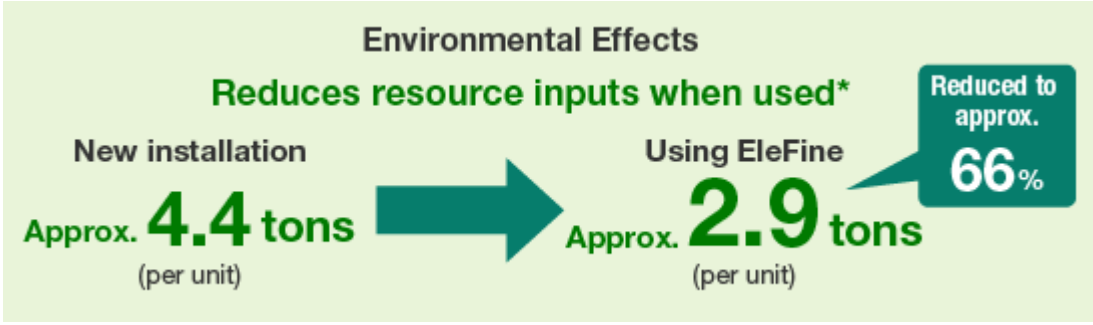


EleFine Elevator Refurbishment Service

In 2011, the Mitsubishi Electric Group started offering an elevator refurbishment service, replacing the controllers and drive units of existing hydraulic elevators to convert them to traction elevators. This service reduces resource input significantly compared to installing new traction elevators, and also shortens installation time and reduces costs.



Refurbished and converted to traction system by replacement of necessary parts and mechanisms in the controller and drive. Machine room no longer needed.

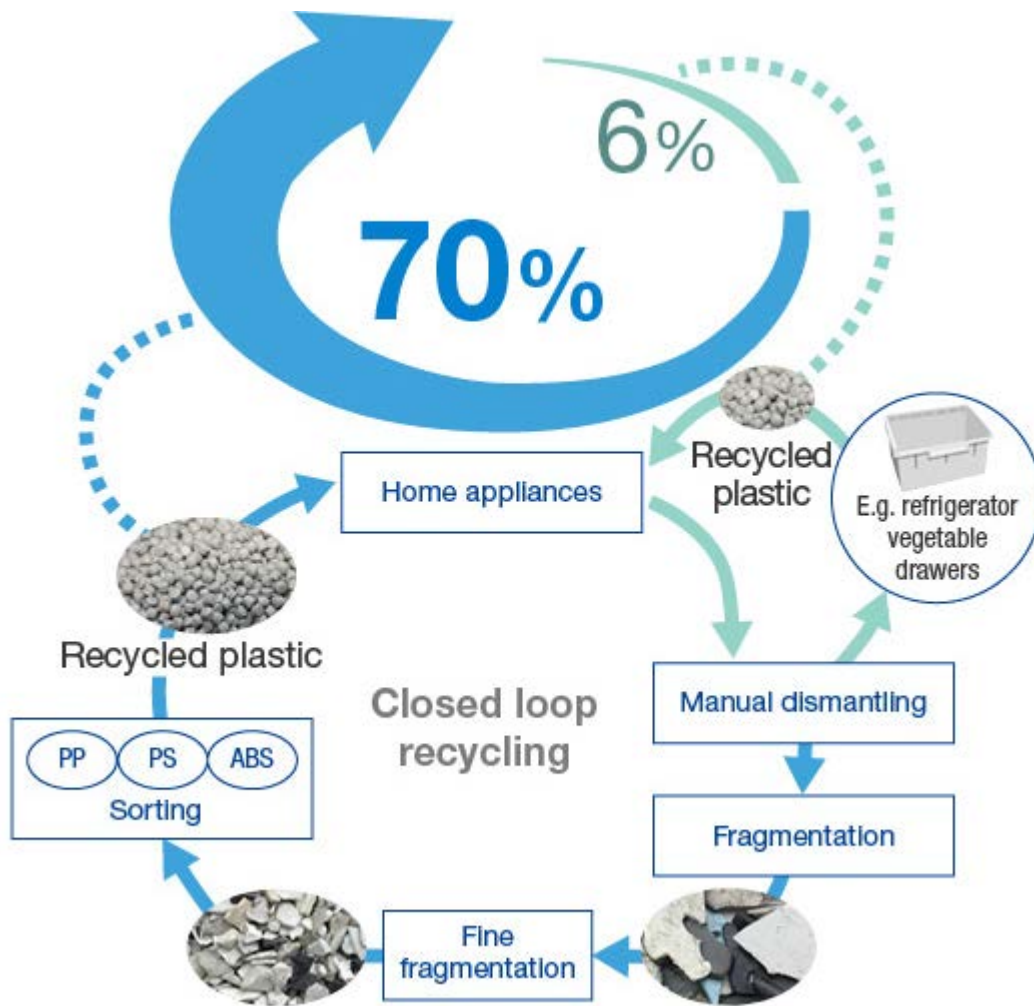


* Compared to Mitsubishi Electric machine room-less elevator (AXIEZ) with the following specifications: passenger capacity 9 people, 2-panel center-opening doors, 6-floor operation

Home Appliance Recycling Business (Closed-Loop Plastics Recycling)

The Mitsubishi Electric Group operates closed-loop recycling where we recover plastics from end-of-life home appliances and reuse them in new ones. We have developed technology to sort different types of plastic from a mixture with high accuracy, achieving a massive increase in the rate of recycling from just 6% to 70%.

(Click [here](#) for details.)



Rebuild Operations (Reusing Alternators and Starters)

The Mitsubishi Electric Group has been developing their Rebuild Operations since 1979, recovering end-of-life electrical components from automobile manufacturers and making them as good as new. The operations focus on two electrical components: the alternator that supplies power to the vehicle; and the starter that starts the engine. These parts are recovered and disassembled and have only their broken parts replaced, readying them for reuse and contributing to the conservation of resources.

Operations have been conducted mainly in the United States since their inception have in recent years been extended to Japan.
(Click [here](#) for details.)



Other

As well as the examples listed above, we also provide services such as refurbishing electrical discharge machines, which are often brought in second-hand, and rewinding generator coils to ensure continued efficiency. Extending product life reduces resource inputs and also satisfies requirements for short delivery times and reduced costs, advantages that will help our resource recycling business to grow.

Refurbishment of electric discharge machines



Before



After

Rewinding generator coils



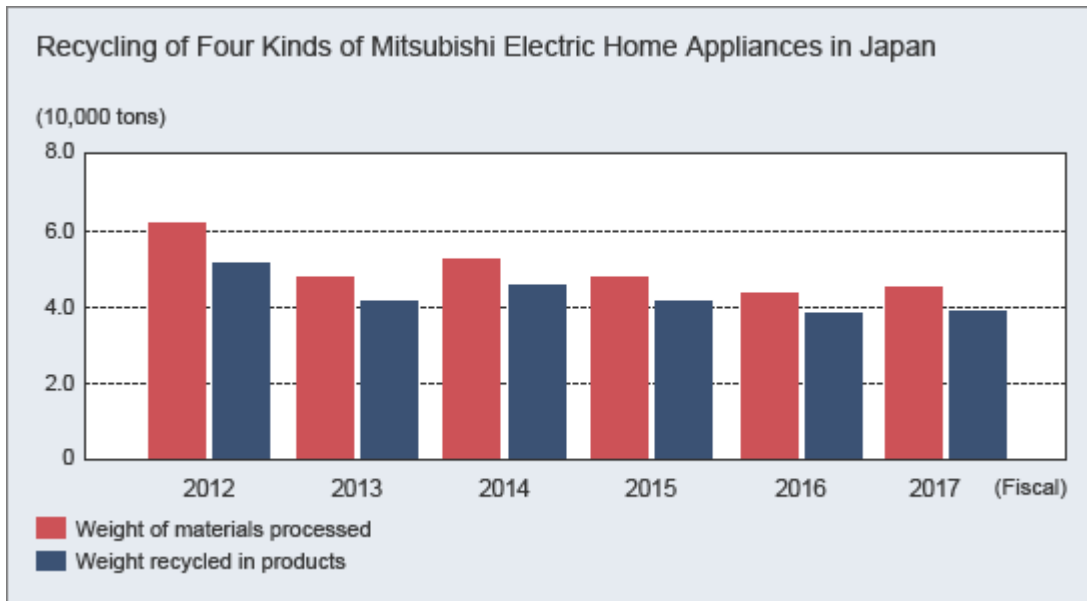
Environment – Recycling End-of-Life Products

Recycling Four Kinds of Home Appliances

The recovery and recycling of four kinds of home appliance are mandatory under Japan's Home Appliance Recycling Law*: air conditioners, televisions (CRT, LCD and plasma), refrigerators/freezers, and washing machines/tumble dryers.

In 1999, Mitsubishi Electric started operating the industry's first home appliance recycling plant, Hyper Cycle Systems Corporation (HCS). Between then and fiscal 2017, we recycled 740,000 tons of appliances. Recovery and recycling data for Mitsubishi Electric appliances of the four designated types in Japan in fiscal 2017 are shown below.

* Home Appliance Recycling Law (April 2001): This law obliges retailers and manufacturers to recover and recycle home appliances such as air conditioners, televisions, refrigerators, and washing machines. Manufacturers and importers must recycle steel, copper, aluminum, glass, plastic, and other materials, and are also responsible for setting up systems to recycle their own products. The law was amended in December 2008 to add tumble driers and LCD and plasma televisions.



Mitsubishi Electric holds Environmental Design Technology Seminars to showcase technologies developed at its recycling centers and see how they can be applied to everyday product design. Developing technologies for sorting materials recovered from end-of-life home appliances and techniques applicable to recycled materials also increases the amount of recycled material that can be used in our products.



Results of Recovery and Recycling of Four Kinds of Home Appliances (Fiscal 2017)

	Units	Air Conditioners	Televisions		Refrigerators /Freezers	Washing Machines /Tumble Dryers	Total
			CRT	LCD/Plasma			
From collection points	1,000 units	348	89	37	342	176	994
Units processed	1,000 units	344	90	36	343	175	990
Weight of materials processed	Tons	14,106	2,214	716	20,988	6,572	44,598
Weight recycled in products	Tons	13,381	1,685	651	17,076	6,175	38,970
Recycling ratio	%	94%	76%	90%	81%	93%	-

Recycling Personal Computers

Mitsubishi Electric promotes recycling of end-of-life personal computers and monitors. In fiscal 2017, we recovered a total of 5,296 office and home computers, with recycling ratios above statutory targets.*1

We started using the PC Recycle Mark*2 verification logo to show that end-of-life home computers can be disposed of without charge. Customers must request the mark after purchase for some products, but the procedure is very simple and involves nothing more than sending a postcard or applying via our site.*3 For products sold after October 2003 where the customer asks us for disposal, we check if the product is eligible for the PC Recycle Mark to make sure the customer does not pay the recycling fee twice.

Although preventing data leaks from hard drives during disposal of personal computers is essentially the user's responsibility, our subcontracted recycling agents do all they can to prevent data leaks, for example punching holes in hard drives and exposing them to strong magnetic fields to ensure physical and magnetic destruction. For office computers, we offer a paid service where customers can ask for all data to be erased by specialized software before recovery.

*1 Desktop computers: 50% or more
 Notebook computers: 20% or more
 CRT displays: 55% or more
 LCD displays: 55% or more

*2 PC Recycle Mark: The recycling mark stipulated by industry group PC3R Promotion Association, established to promote the 3Rs (reduce, reuse, recycle) among manufacturers, distributors, and importers of computers and monitors. The scheme applies to home computers and monitors sold after October 2003. Some products have the mark displayed at the time of purchase, or it may be available after purchase via registration.

*3 Mitsubishi Electric stopped selling home computers in fiscal 1999, so only our PC displays are eligible for Recycle Mark applications.

**Results of Recovery and Recycling of End-of-Life Business and Home Computers
(Fiscal 2017)**

	Units	Desktops		Notebooks		CRT Displays*		LCD Displays		Total	
Weight recovered	Tons	1.0		0.1		25.0		23.4		49.5	
		Office	Home	Office	Home	Office	Home	Office	Home	Office	Home
		0.7	0.3	0.1	0.1	1.7	23.4	2.9	20.5	5.3	44.2
Units recovered	Units	99		41		1,194		3,962		5,296	
		Office	Home	Office	Home	Office	Home	Office	Home	Office	Home
		75	24	25	16	79	1,115	491	3,471	670	4,626
Weight processed	Tons	1.0		0.1		25.0		23.4		49.5	
Weight recycled	Tons	0.8		0.1		19.7		19.9		40.4	
Recycling ratio	%	80.2%		66.4%		78.6%		85.2%		-	

* Including all-in-one computers.

Environment – Reducing the Use of Disposable Packaging Materials

Mitsubishi Electric Group Achievements in Fiscal 2017

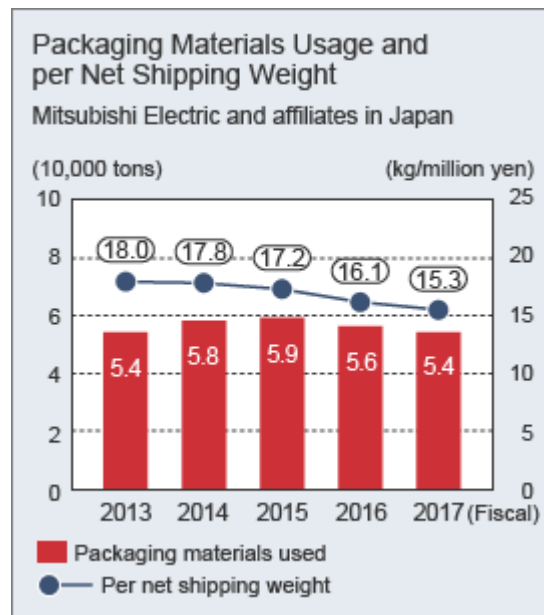
Improvements in logistics are part of Mitsubishi Electric Group's Just-In-Time improvement activities. Our fundamental principle in this area is to reduce the weight of transport packaging while ensuring that products are delivered safely to customers. Based on this line of thinking, we practice the 3Rs in packaging: reduce (simplify packaging), reuse (more returnable containers and packaging), and recycle (recycling of used packaging material).

(Mitsubishi Electric and affiliate companies in Japan)

- **Packaging by value shipped: 15.3 kg/million yen (reduced by 5% compared to previous year)**
- **Packaging material used: 54,000 tons (reduced by 2,000 tons compared to previous year)**

Mitsubishi Electric and affiliate companies in Japan reduced packaging per unit shipped through continued simplification of packaging and increased use of returnable containers.

Increased shipping volumes for some of our overseas affiliates saw 129,000 tons of packaging used by 20 companies (increased by 2,000 tons compared to the previous year), and packaging per value shipped was 133 kg/million yen (increased by 8.5% compared to the previous year).



Environment – Using Water Effectively

Understanding Water Risk In Japan and Overseas, Promoting Effective Use of Water

Water risk is increasing worldwide with ever more serious water shortages and pollution, as well as abnormal weather caused by climate change. This affects production of raw materials and manufacture of products, leading to a corresponding interest in corporate water risk management. The Mitsubishi Electric Group uses WRI Aqueduct* to keep track of current and future water risk. We use the results of this assessment to prioritize countermeasures for each production base and take clear action. This includes reporting to government authorities as required. As of July 2016, we have identified bases inside Japan and overseas at high risk of water shortages, flooding, etc.

The Mitsubishi Electric Group continuously reviews data from all production bases on water use and reuse, checks every six months to make sure there are no major fluctuations in the values reported, and implements countermeasures as needed. All production bases endeavor to decrease water use and increase water reuse. Examples of effective water use are shared with other bases through regional meetings and key person research so they can make use of the information. Product development takes effect on water sources and life cycle evaluation into account, reducing our products' impact on the environment.

* WRI Aqueduct: Water risk assessment tool developed by the World Resources Institute (WRI)

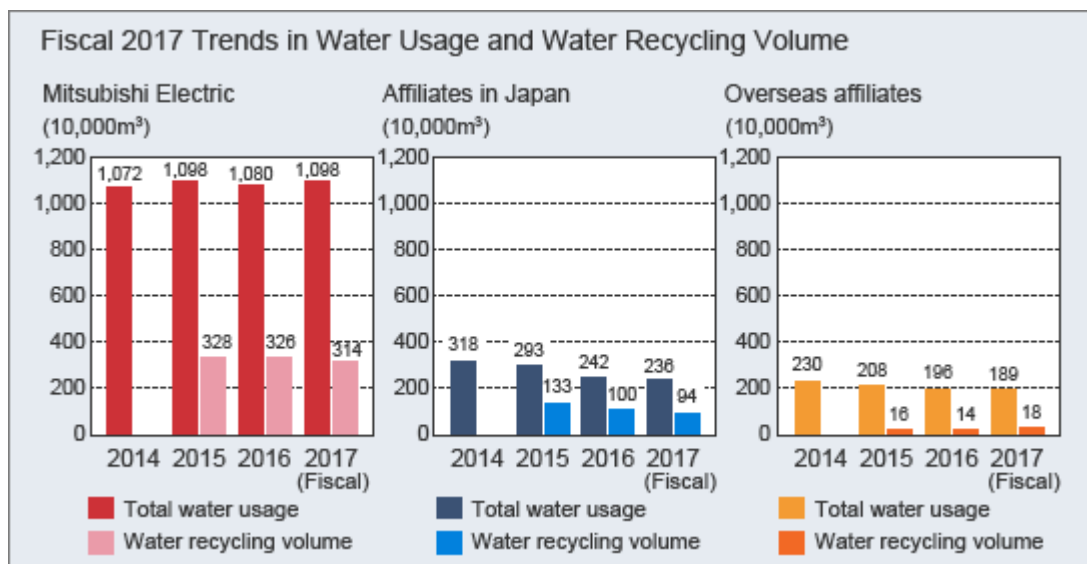
Result of Activities in Fiscal 2017

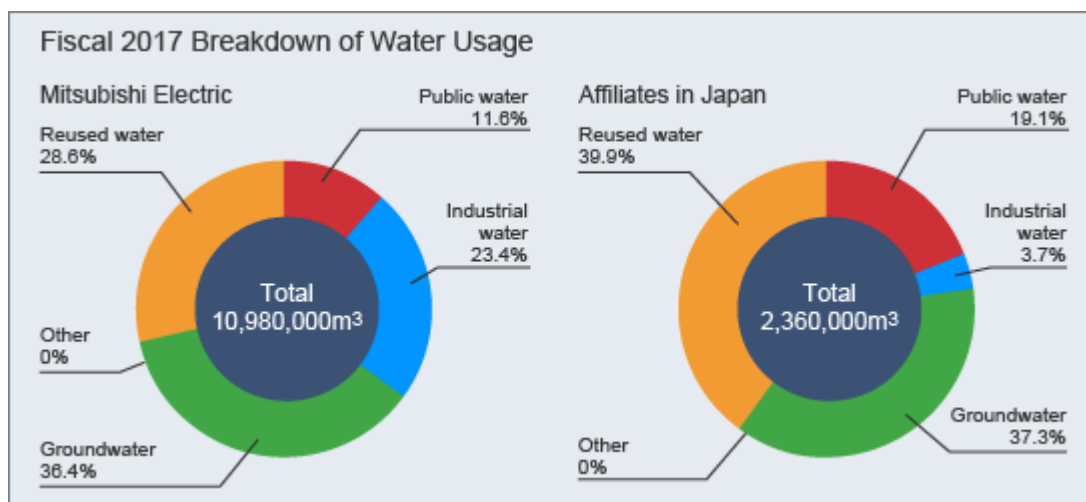
Total water use for the group in fiscal 2017 was 1,523 tons, with a reuse ratio of 28%. This is the result of activities such as clarifying prioritization of countermeasures for each production base, implementing measures to reduce water risk, and replacing old utilities with highly efficient equipment.

Mitsubishi Electric recycles and reuses washing water from the production process, and makes use of gray water such as purified waste water to supply toilets and cooling towers. This has reduced our water use to 1,098 tons, and brought our reuse rate to 28.6%.

Our affiliate companies in Japan are adopting similar measures, with water usage at 236 tons and a reuse rate of 40%.

Overseas affiliate companies are focusing on using purified waste water as gray water, resulting in water use of 189 tons and a reuse rate of 9.5%.





Fiscal 2017 Water Reuse Ratio

(Units: %)

	2012	2013	2014	2015	2016	2017
Mitsubishi Electric	33	32	33	30	30	29
Affiliates in Japan	52	47	48	45	41	40
Overseas affiliates	7.4	6.6	5.7	7.5	7.1	9.5
Total	34	32	32	30	29	28

Fiscal 2017 Breakdown of Water Use by Overseas Region

(Units: m3)

	Water Usage			Waste Water			
	Total Usage	Public Water/Industrial Water	Groundwater	River Water/Spring Water	Total Usage	Sewage	Public Water System
China	902,590	780,057	0	1,845	639,021	625,640	13,381
Southeast Asia	917,605	843,214	11,951	0	534,305	455,665	0
Europe	19,060	19,060	0	0	13,410	5,387	0
North America	26,993	26,607	0	0	22,214	22,214	0
Central and South America	24,494	21,472	2,750	0	9,262	6,512	2,750
Total	1,890,742	1,690,410	14,701	1,845	1,218,212	1,115,418	16,131

Case Study: Green Cycle Systems Corporation

Green Cycle Systems Corporation (GCS), part of the Mitsubishi Electric Group, recovers plastic from end-of-life home appliances. By 2011, they had achieved reuse of 99% of the water used in this process and have maintained this level of reuse ever since.

Water is used in the GCS plant as part of their process for sorting mixed crushed plastic waste into individual types of plastic. The water becomes contaminated with fine particles of plastic and cannot be reused as-is, so GCS have developed a process where the fine particles are adsorbed and removed by microbubbles*, improving their water recycling and reuse ratio. Aside from exceptional cases such as treating salvaged sludge or evaporation, the process needs almost no new water and so does not consume large quantities of water.

* Microbubbles: Microscopic bubbles approximately 1/100th the size of normal bubbles (0.1 mm/100 microns in diameter or smaller). Unlike normal bubbles, microbubbles drift slowly through the water as they rise and are used for their ability to adsorb tiny particles.



View of the plant



Water recycling equipment

Case Study: Mitsubishi Electric Dalian Industrial Products Co., Ltd.

Mitsubishi Electric Dalian Industrial Products Co., Ltd., which manufactures factory automation equipment and other products, reuses purified domestic waste water as gray water.

Treatment systems using advanced technology such as membrane bioreactors, or catalytic oxidation which is widely used in Japan, are installed at the plant and housing buildings. Reusing this water for washing and in toilets has saved approximately 14,000 tons of water per year, and also reduced costs.

With the recent government-led introduction of corporate environmental credit assessments*, China has started to require greater measures for environmental protection. We will continue to look for ways to use resources sustainably, not only to comply with national regulations but also to respond to social demand.

* Corporate environmental credit assessment: Assessments carried out by regional authorities under the Corporate Environmental Credit Assessment Law which came into force in December 2013. The assessments evaluate the environmental practices of companies with significant environmental impact, such as release of large quantities of pollutants, and place them into one of four ranks based on the results. Companies with poor evaluations may be subject to disciplinary action.



Aerial view of Mitsubishi Electric Dalian Industrial Products Co., Ltd.



Grey water tap

Receiving "A-List Company" Recognition, the Highest Evaluation from CDP*

In fiscal 2017, Mitsubishi Electric was named an A-List company in the CDP's "Water 2016" program. The CDP awarded us this highest evaluation in recognition of our exceptional activities in terms of measures and strategies for water resources. For the CDP Supply Chain Program, we also received A-List recognition in the CDP Supplier Water category. We will continue to press forward with our efforts.

* CDP: An international NGO that examines, evaluates and discloses environmental initiatives of corporations and cities.



Environment – Managing Chemical Substances

Tracking the Use of 3,208 Controlled Chemical Substances with Our Own Chemical Substance Management System

Mitsubishi Electric and its affiliates in Japan have been managing chemical substances on a voluntary basis since 1997. The main substances we manage include refrigerant fluorocarbons (HFCs*1 and HCFCs*2), volatile organic compounds (VOCs), and the 10 substances designated under RoHS. Together with 462 substances designated under the revised PRTR Law*3 (PRTR*4) that came into force in November 2009, there are currently 3,208 controlled substances managed by our Chemical Substance Management System, which also incorporates purchasing information for materials and components.

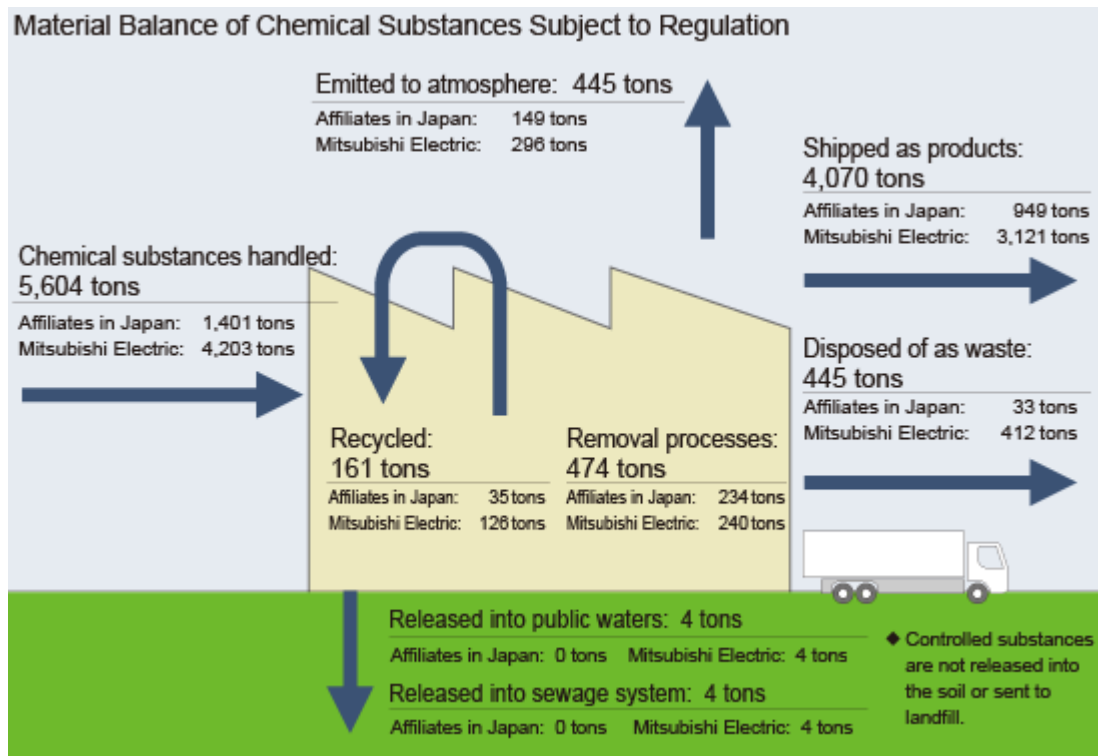
In fiscal 2017, Mitsubishi Electric used 4,203 tons of 141 different chemical substances (4,962 tons of 145 different chemical substances in fiscal 2016), and our Japanese affiliates used 1,401 tons of 41 different chemical substances (1,471 tons of 41 different chemical substances in fiscal 2016). Details on the release and transfer of these substances are shown in the figure below. We will continue to track and manage our use of these substances, and eliminate any unnecessary use.

*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 the Management Thereof.

*4 PRTR: Pollutant Release and Transfer Register. A system under which companies track the quantity of substances potentially harmful to human health or the ecosystem which are released into the environment or transferred inside waste material, and report this data to government authorities. The authorities then use these reports and other statistics to produce estimates on release and transfer, and announce them publicly.



Environment – Environmental Communication

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, both online and through corporate publications. We also run a site aimed at elementary school students, including the Eco Changes Lab with information about our Eco Changes initiative, where children can enjoy learning about environmental issues through comics and games.

Environmental Report Website



▶ Japanese site 



▶ Global site



▶ Eco Changes Lab 

Environmental Sustainability Report



Japanese



English



Chinese

Eco Changes Statement

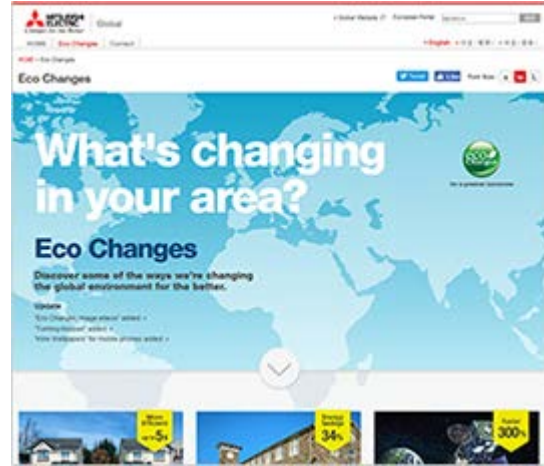
Mitsubishi Electric announced "Eco Changes - from in the home to outer space", the environmental management statement for the Mitsubishi Electric Group in Japan, in June 2009. We also launched a dedicated site to introduce a range of Eco Change projects. The site is designed to be fun and easy to understand for visitors of all age groups.

We also announced "Eco Changes – for a greener tomorrow" for Europe and America in June 2010, and "eco changes *jin yu jieneng, jin xin huan bao*" in China in April 2012 to develop our environmental communications globally.

Eco Changes Sites



▶ Japanese site



▶ Global site

Environmental Statement Booklet



Japanese



English

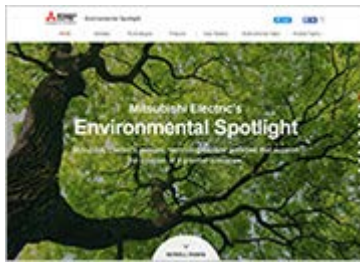


Chinese

Examples of Environmental Communications around the World

Global

Aiming to become a global, leading green company, the Mitsubishi Electric Group has an online presence introducing our superior advanced environmental technologies and products, as well as the range of activities we and our suppliers undertake that contribute to the environment all over the world. The site engages visitors with images, text, and video.



▶ Mitsubishi Electric's Environmental Spotlight site

China

We launched Eco Changes in China in April 2012 under a new environmental statement, "*jing yu jie neng, jin xin huan bao*", which translates as "experts in energy conservation, dedicated to environmental protection." In August 2014 we started a new corporate advertising campaign based around the theme One Mitsubishi Electric Declaration. The campaign positions us as a provider of wide-ranging one-stop solutions, leveraging the strengths of our diverse range of businesses to do everything from making everyday life easier and building environmentally-friendly cities to providing state of the art business support and more.



Corporate advertisement for China

Asia

Our advertising in India focuses on how we make the world more eco-friendly through our businesses and products.



Corporate advertisement for India

Europe

In Europe, our corporate advertising introduces our products and businesses, and also furthers our aim of environmental communication.



Corporate advertisement for Turkey

The Americas

We promote our Eco Changes initiative in North and South America through magazine ads and on our site.



Corporate advertisement for Brazil

Japan

We promote Eco Changes through a number of media channels to increase awareness. In fiscal 2017, Mitsubishi Electric took out newspaper ads publicizing the results of environmental initiatives undertaken at our plants, and also placed banner ads for our Eco-Planet site for children on sites for school projects to draw in visitors.



Corporate advertisement for newspapers and magazines



Newspaper ad publicizing energy-saving achievements at our plants



Banner ad for our Eco-Planet site

These ads were placed on school project sites during elementary school summer holidays.



Key Technologies site

Introduces environmental technologies using easily understood animation and other tools.

Environmental Exhibitions

Eco-Products 2016 (Japan)

The "EcoPro 2016 - International Exhibition on Environment and Energy" event was held over three days, December 8 to 10, at the Tokyo Big Sight convention center, and attracted 167,093 visitors.

To promote ourselves as a leading global green company, we created a booth around the theme of "Eco Changes Today with an Eye on Tomorrow." We presented the products and technologies of the Mitsubishi Electric Group alongside their contribution to the environment, and illustrated our contribution to the creation of an abundant society through a succession of scenes: Home (morning), Transport, Office, Home (evening). We also presented other themes such as results of innovative research, CSR activities, and preparations for Tokyo 2020.

The main stage had a summary of the products displayed in the different booths and their contribution to the environment.

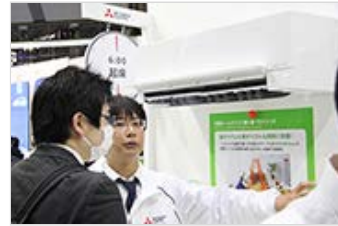
We also held cooking workshops using the Zitang range grill, showing visitors how they could use food scraps they might otherwise throw away to make fried rice and giving them a deeper understanding of how to be environmentally responsible.



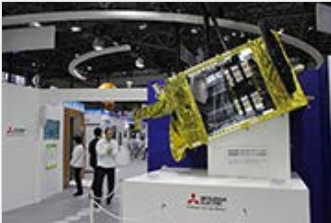
Exhibition booth



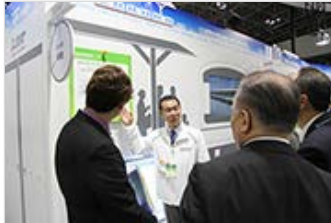
Main stage



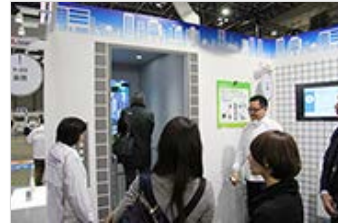
Home (Morning) Area
Kirigamine FZ Room Air
Conditioner



Home (Morning) Area
Geostationary satellites Himawari
8 and 9



Transport Area
S-EIV® railway station energy
saving inverter



Office Area
Technology for ultra high speed
elevators



Experimental Technology Zone
Air quality sensor capable of
highly sensitive detection of
PM2.5



Experimental Technology Zone
Shaberi Egaki UI (speech and
drawing recognition UI)

Environment – The Environment and Business

Aiming to become a global, leading green company that contributes to creating an affluent society, the Mitsubishi Electric Group develops 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 the environmental issues for which risks and opportunities have been recognized and evaluated, and introduce the measures and initiatives being implemented to reduce environmental impact.

▣ Evaluation of the Importance of Environmental Issues



▣ Public Utility Systems Group



▣ Energy & Industrial Systems Group



▣ Building Systems Group



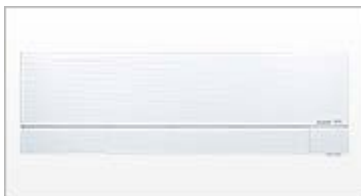
▣ Electronic Systems Group



▣ 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 – Evaluation of the Importance of Environmental Issues

As well as reducing the environmental impact of our business activities, we are working on solutions to the environmental issues faced by society while responding to our customers' needs. In order to determine which environmental issues should be prioritized when reducing the environmental impact of our business activities, each of our ten business groups (the organizational unit for environmental management) has evaluated the level of importance of the main environmental issues, from the perspectives of the likelihood that a risk or opportunity will arise in our business and the magnitude of its impact, based on the respective value criteria. Going forward, the Mitsubishi Electric Group will continue to perform these evaluations, assign priority according to the level of importance, and promote the strengthening of countermeasures against environmental risks and the expansion of business opportunities.

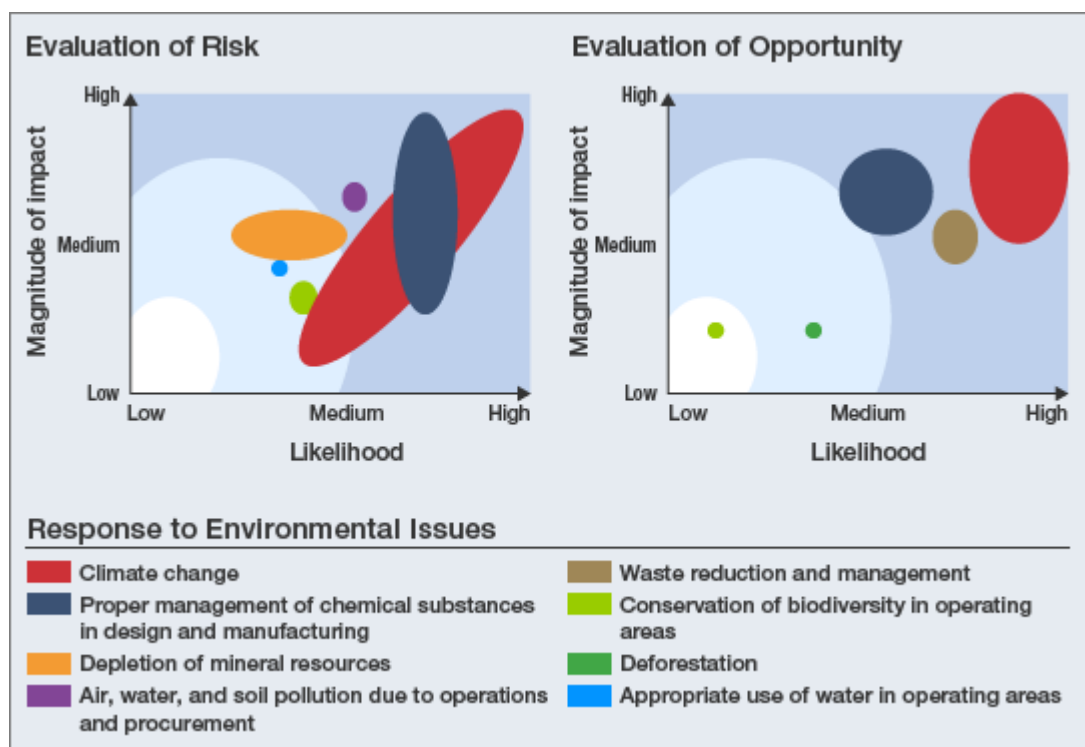
Risk and Opportunity Importance Evaluation Chart (as of the End of Fiscal 2017)

The chart below shows the results of our evaluation. The horizontal axis indicates the likelihood of occurrence of the risk or opportunity, and the vertical axis indicates the magnitude of impact of the risk or opportunity. Although we are working on initiatives to solve all eight of these environmental issues, each business group has selected up to four issues being tackled with particular priority, and the chart below has been created based on the weighted average of the scores for level of importance. The size of the colored ranges shows how many business groups evaluated each environmental issue, and the shape indicates the variation.

From the trend of the colored ranges on the chart, in terms of both risk and opportunity, it can be seen that the most important environmental issue for the Mitsubishi Electric Group is climate change.

The proper management of chemical substances in design and manufacturing, which relates to chemical substance regulations that are becoming stricter around the world, and the depletion of mineral resources, which relates to the use of rare metals and rare-earth elements, are also highly important environmental issues. In this manner, we conduct our activities based on an awareness of the risks and opportunities in regard to the environmental issues that are closely related to each part of our business.

Importance Evaluation Chart



Environment – Public Utility Systems Group

Business Overview and Environmental Issues for Which Risks and Opportunities Have Been Recognized and Evaluated

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

The 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, energy-saving business related to water treatment processes, and initiatives for the smart community business. At 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 have also been implemented to prevent soil and water pollution and to reduce and control the waste products generated during manufacture, including carefully managing the toxic substances used in painting facilities.

Environmental Issues for Which Risks and Opportunities Have Been Recognized and Evaluated

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

Message from the 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

The 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 the use of fewer resources and less power with smaller size, greater efficiency, and higher performance as the basis for our aim to realize a low-carbon society.

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 on total energy and environmental solutions for railways. This involves not only the train itself, which consumes the most energy, but also involves the use of IoT*1 and new energy management technologies allowing energy creation and storage at stations, vehicle bases, and across the whole network, with the goal of "total optimization of energy used by railways".

Among these activities, an inverter for rolling stock equipped with a large-capacity, full-SiC power module won the Ministry of Economy, Trade and Industry Minister's Award, the top prize of Excellence in Energy-Conservation Equipment Awards in fiscal 2016, as well as the Excellence Award of the Eco Products Awards and the Ichimura Industrial Award. In addition, the application of SiC power modules in our Station Energy Saving Inverter (S-EIV), which uses surplus regenerative electric power generated when rolling stock is braking as a power source for station lighting and air conditioning, won the Agency for Natural Resources and Energy Director-General's Award in the New Energy Award fiscal 2017. Moving forward, we will continue to work towards saving energy by expanding the applications of SiC power modules.

We have also been focusing on "energy conservation in water treatment processes" which involves wastewater treatment and the purification of plant wastewater. We are developing technologies to efficiently generate OH radicals*2 which can remove persistent organic substances from wastewater,



Kei Uruma
Executive Officer
In Charge of Public Utility
Systems

something that is difficult to achieve with conventional technology, to enable efficient water treatment through a simple system. We have also developed a water processing technique using the membrane separation bioreactor (Eco-MBR)*3 which uses ozonized water to clean the membrane filters for treating and recycling municipal and industrial wastewater, enabling it to treat twice as much water per membrane filter surface area as conventional methods. Furthermore, the Public Utility Systems Group is expanding its activities outside of Japan, conducting demonstrations and testing in China and Singapore.

Going forward, we will contribute to the realization of a safe, secure, and comfortable society by making full use of the wide ranging technologies that we have developed over the years, as well as ongoing technological development.

*1 IoT: Internet of Things

*2 OH radical (Hydroxyl radical): An extremely strong oxidant.

*3 Immersion-type membrane separation bioreactor (Eco-MBR): A method of cleaning membrane filters used for processing and recycling municipal and industrial wastewater using ozonized water.

Initiatives Contributing to the Environment and Society

Total Energy and Environmental Solutions for Railways

With 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 for Rolling Stock Incorporating Full-SiC Power Module**

Climate change

We produced an inverter equipped with a full-SiC power module for use in rolling stock, which was launched at the end of fiscal 2015. It enables energy savings of approximately 40% compared to conventional vehicles. This product is now being used by many customers.



Application of large-capacity full-SiC power module
Inverter for rolling stock

- **Production of Station Energy Saving Inverter (S-EIV)**

Climate change

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.). Each station where the system is installed saves approximately 600 kWh per day (equivalent to the electricity used by 60 households). This is contributing to energy saving at station buildings. Furthermore, in order to further increase energy savings, we also plan to introduce to the market a hybrid version that combines a storage battery with the power system.

Smaller, Lighter Air-Conditioning System for Rolling Stock

Air, water, and soil pollution due to operations and procurement

In addition to introducing smaller-diameter piping and achieving a 20% reduction in heat exchanger size, we have readjusted materials to reduce the weight by 6%, thereby enabling the production of a more compact, lighter 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

Highly Efficient, More Compact Ozone Generator

Climate change

Ozone generators are used in advanced water treatment processes and paper pulp bleaching because of their superior oxidation and ability to eliminate bacteria, odors, and colors. By using technology developed to efficiently produce ozone from sources such as liquid oxygen, and applying it to the generation of ozone directly from the air, we have achieved a more compact and higher efficiency design, resulting in a 15% reduction in system power consumption.



Ozone generator

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

Climate change

We have developed a water treatment technology that uses gas-liquid interface electrical discharge to generate OH radicals, which are used to treat persistent organic substances in wastewater, enabling water to be treated with a simplified system that is twice as efficient as the conventional technique and can reduce operating costs. 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.

Development of Water Treatment Technology Utilizing a Membrane Separation Bioreactor

Climate change

We have developed a water treatment technology using an immersion-type membrane separation bioreactor (Eco-MBR) which uses ozonized water to clean the membrane filters for treating and recycling municipal and industrial wastewater. The Eco-MBR system is compact and energy-efficient, and is capable of high-speed filtration, which enables the device to treat twice as much water per membrane filter surface area compared to conventional methods.

Development of an Energy Management System for Disaster Prevention Centers

Climate change

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, solar power, wind power, and storage batteries, and we delivered such a system to Satsuma Sendai City, Kagoshima Prefecture in fiscal 2016. Moving forward, this system will be incorporated into building management systems and water treatment plant systems, and so on, with the goal of achieving an even more advanced energy management system.

Reducing Power Consumption and Weight of Diamond Vision

Climate change

By increasing the efficiency of the power and drive circuit for the LED drive, optimizing the drive voltage, and introducing a high-efficiency LED, we have reduced power consumption per unit of area by 3%. In addition, by reviewing the housing structure, we have reduced the screen weight by 40%.



Diamond Vision

Initiatives for Reducing Environmental Impact

Continuous Improvement Activities

Initiatives to reduce energy consumption and CO₂ 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**

Climate change

New lines built at the Kobe Works and Itami Works employ LED lighting, higher efficiency air conditioners, and solar power generation 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 (the heat source for drying ovens) to heat water to wash products.

- **Distribution Improvements**

Air, water, and soil pollution due to operations and procurement

We are promoting the reduction of CO₂ 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

Climate change

In response to growing railway demand overseas, in addition to our overseas sites in countries such as North America, Mexico, and Italy, we started operations in India in fiscal 2016. We will continue to promote local production for local consumption in order to reduce CO₂ produced during transportation.

Environment – Energy & Industrial Systems Group

Business Overview and Environmental Issues for Which Risks and Opportunities Have Been Recognized and Evaluated

Delivering Equipment and Systems that Support Stable Electricity Supply

The Energy & Industrial Systems Group provides a wide range of systems and products that play a vital role in power generation, transmission, power distribution, and power retailing. On the product side this includes generators, transformers, switchgear, and vacuum circuit breakers, while systems include plant monitoring, grid stabilization, grid protection & control systems, and DC technologies. With the realization of a sustainable society now an important theme globally, we are more committed than ever to contributing to the realization of a society in which power companies and end users alike can live safely, securely, and comfortably. This will be accomplished through the development of high-efficiency equipment and by increasing our involvement in businesses related to smart grids and smart communities, as well as continuing our activities to reduce the impact we have on the environment. We manufacture equipment and systems at the Energy & Systems Center (Hyogo Prefecture and Kanagawa Prefecture), Transmission & Distribution Systems Center (Hyogo Prefecture), and Power Distribution Systems Center (Kagawa Prefecture) as well as 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 SF₆ 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.

Environmental Issues for Which Risks and Opportunities Have Been Recognized and Evaluated

- 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 the Energy & Industrial Systems Group

Helping Achieve a Sustainable 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 that support power systems from power generation to transmission and distribution, we recognize that achieving a sustainable society represents one of our most important missions. Based on this, the Energy & Industrial Systems Group is now focusing on the following initiatives.

1. Development of high performance equipment and expansion of applications

With our aim to reduce greenhouse gases throughout a product's life, we are developing and commercializing high-efficiency generators, switchgear that reduce environmental impact, transformers that reduce energy loss, and equipment that eliminates or reduces the use of SF₆ gas, which has a high global warming potential.

2. Stepping up our involvement in businesses related to smart grids and smart communities

Utilizing technologies and know-how acquired at our in-house verification and testing facilities, we are expanding the delivery of products such as monitoring and control systems, smart meter systems and battery energy storage systems. These systems contribute to the realization of "high-quality power distribution systems with economy and reliability", "optimize energy use by achieving interconnectivity utilizing ICT" and "resilient energy infrastructure that operates seamlessly even at the time of an emergency".

Moving forward, we are also working on the development of power stabilizing equipment and systems capable of responding to new demand. This includes promoting the expansion of nuclear power generation business based on the energy policies of each country, supply and demand management with the growing use of renewable energy, integrated management including demand control of distributed energy sources, supply and demand management by interconnecting between each electric power utilities company.



Yasuyuki Ito
Senior Executive Officer
In Charge of Energy &
Industrial Systems

In terms of reducing the impact of our business on the environment, we will contribute to the creation of a safe, secure, and comfortable society through ongoing initiatives to reduce the energy used in our production and testing processes, as well as strict management of chemical substances.

*ICT: Information and Communication Technology

Initiatives Contributing to the Environment and Society

Development of Indirect Hydrogen-Cooled Turbine Generators That Reduce Environmental Impact

Climate change

With the increasing global demand for power and the growing problem of global warming due to CO₂ emissions, turbine generators are now required to achieve higher output, higher efficiency, and higher reliability. We are working on the development of larger-output and higher-efficiency indirectly hydrogen-cooled turbine generators that have a relatively simple structure. As a result, we successfully developed the new VP-X Series generator, which achieves a 900 MVA class output, the world's highest class output* for an indirectly hydrogen-cooled generator. Performance evaluations and verification tests have also been completed using the actual machine.

In the past, the 900 MVA class high output range could only be accomplished by water-cooled systems, so it was necessary to install and operate auxiliary equipment such as stator cooling water feeders. Indirectly hydrogen-cooled systems do not require such equipment, which is an advantage in terms of maintenance and operation.

In addition, through the application of several newly developed element technologies, the VP-X Series achieves higher output, higher efficiency, and a smaller size compared to conventional indirectly hydrogen-cooled generators. As these element technologies can also be applied in part to existing machines, we can also provide new services to achieve higher output and higher efficiency by replacing or updating parts.

* Mitsubishi Electric's own research, as of December 8, 2014.



High efficiency VP-X turbine generator



870 MVA generator for verification test

Development and Dissemination of Switchgear That Reduce Environmental Impact

Climate change

With the goal of reducing greenhouse gas emissions, we are promoting the widespread use of the 70 kV class C-GIS (cubicle-type gas insulated switchgear), equipped with a vacuum circuit breaker that uses no SF₆ gas thanks to 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 500 kV 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



Gas circuit breaker

Development of Transformers That Reduce Environmental Impact

Climate change

Proper management of chemical substances in design and manufacturing

Air, water, and soil pollution due to operations and procurement

We supply customers in Japan and overseas with low-heat generation, highly efficient transformers that contribute to a reduction in transmission power loss from the plant to the customer, as well as the reduction of CO₂ emissions. We are also developing compact transformers in order to reduce the volume of materials used. In addition, for rolling stock, we have developed and delivered natural-air cooling transformers that use airflow generated by the running train to cool the transformer. As the system uses high efficiency transformers that generate less heat, and is cooled by airflow alone, without employing an electric-motored fan, it offers a significant contribution to energy conservation.



High-efficiency transformer



On-board transformer (for rolling stock)

Power Electronics Systems for Electric Power, Smart Meter Systems, Battery Energy Storage Systems and Smart Medium and Low Voltage Direct Current Distribution Network Systems, Essential for Smart Grids and Smart Communities

Climate change

Proper management of chemical substances in design and manufacturing

Depletion of mineral resources

In the smart grid and smart community sector, which is seen as one of the most effective measures against climate change, over the last 30 years we have abundant experiences spanning the delivery of power electronics for electric power facilities, including capacitors and harmonic filters, contributing to advanced operations of power systems. Furthermore, we have built up know-how and techniques with our verification and testing facility that is based on assumed distribution networks in 2020. Utilizing the technologies and expertise gained in this way and feedback from customers, we are expanding our business.

- **Power Electronics Systems for Electric Power**

We offer an integrated service from the development of the latest, high-capacity low-loss power devices to the construction of systems for large-scale electric power facilities. In order to improve flexibility in electric power operations and solve various problems in electric power systems, highly sophisticated power electronic technologies are applied. We will continue to contribute to building power distribution facilities that support the foundation for the realization of smart grids.

- **Smart Meter Systems**

Smart meter systems will be the core component for fully liberalizing retail power sales. Information about when and how much electricity was used will be indispensable to allow consumers to freely select an electricity supplier. We have developed a system that enables large volumes of meter data to be collected accurately at low cost, and this system is now in operation in several utilities. In addition, these smart meter systems are capable of providing as much electric power as required for individual users' power-/energy-saving actions via alternative channels.

- **Battery Storage Systems**

Battery storage systems are essential for the flexible operations of power systems. These systems are the key to balancing power generation when using renewable energy, for which output fluctuates, and power generation using fossil fuels. We have installed battery energy storage systems for small-scale power systems in locations such as remote islands, and testing is in progress. Battery energy storage systems are also helpful as a countermeasure for the excess power or fluctuations that result from using renewable energy in the main power grid system. Mitsubishi Electric is focusing on expanding products that take full advantage of renewable energies such as wind and solar power without restricting outputs, and is contributing to the realization of a low-carbon society and the stable operation of power systems.

- **The "D-SMiree" Smart Medium- and Low-Voltage DC Distribution Network System**

We have produced the next generation DC distribution system D-SMiree, which contributes to alleviating concerns regarding environmental, resources as well as energy problems through energy saving, energy creation, and energy storage. By proposing a DC distribution method rather than the conventional AC distribution method, we can achieve energy saving (reduction of conversion frequency), energy creation (optimal interconnection of multiple power generation sources, including solar and wind power), and energy storage (optimal charge and discharge control of storage batteries by leveraging an energy management system). This will contribute to the change from an energy consuming society to an energy society based on local production for local consumption.



Demonstration facility exterior



Demonstration facility electrical lab

Reduced Environmental Impact Monitoring and Control System

Climate change

Depletion of mineral resources

Proper management of chemical substances in design and manufacturing

This monitoring and control system achieves even higher functionality and performance than conventional models, reduces volume and weight by up to 30%, and contributes to resource and space saving. It also reduces power consumption by up to 33% compared to conventional systems. In addition, the CPU card and I/O unit are designed to be compatible with previous-generation hardware. Enabling the system to be introduced with minimum equipment updates reduces the impact on the environment, including the volume of resources used.



Instrumentation and control system

Initiatives for Reducing Environmental Impact

Staying Focused on Preventing Environmental Pollution and Reducing CO₂ during Production

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

The Energy & Industrial Systems Group's manufacturing bases (4 at Mitsubishi Electric, 8 affiliates in Japan, 2 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 preventing 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 CO₂ from production by systematically installing solar power systems, electrifying steam-powered equipment, and conserving energy by reusing factory exhaust heat as well as by promoting activities that minimize emissions of SF₆ gas.

Raising the Effectiveness of Environmental Activities by Sharing Information between Factories

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

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 2017 Implementation Status

- **Environmental Promotion Conferences**

Sessions: 3 (1 joint meeting; 1 managers' meeting; 1 working-level meeting)
Topics: Establishment of activities to reduce CO₂ emissions during production by improving facility operations and JIT manufacturing processes
Main results: Reduced CO₂ emissions by 1,457t-CO₂/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 the Transformer System Manufacturing Plant (Itami district) (Hyogo Prefecture), Tada Electric Co., Ltd. heat exchanger plant (Okayama Prefecture), Ryoden Kasei Co., Ltd (Hyogo Prefecture), Ryosan Industry Corporation Headquarters Plant (Hyogo Prefecture), Ryosan Industry Corporation Asahi Plant (Aichi Prefecture), and Marugame Ryoden Technica Corporation (Kagawa Prefecture)

Environment – Building Systems Group

Business Overview and Environmental Issues for Which Risks and Opportunities Have Been Recognized and Evaluated

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

The Building Systems Group provides building management systems including everything from elevators and escalators to access control, building management, and surveillance cameras to public and private building owners in over 90 countries. As these are essential components of social infrastructure, 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 CO₂ emissions throughout society and enable us to contribute to reducing environmental impact.

Counting the Inazawa Works, the Building Systems Group has manufacturing bases in 11 countries around the world including Thailand and China. Inazawa Works serves as the mother plant developing and manufacturing elevator and escalator components such as traction machines, device components, and control equipment. Environmental initiatives such as reducing CO₂ 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.

Environmental Issues for Which Risks and Opportunities Have Been Recognized and Evaluated

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

Message from Building Systems Group

Actively Proposing Building Solutions That Reduce Energy Consumption and Lessen Environmental Impact by Deepening the Coordination among Elevators and Escalators, Building Management Systems and Building Management Services

The Building Systems Group is in charge of manufacturing building systems and the elevators and escalators that provide vertical transportation. We contribute to the creation of a society with more vitality and comfort, proactively carrying out business while placing a priority on user safety and security throughout the product lifecycle, as well as being involved in activities to protect the environment.

This business group develops products with high energy- and resources-saving performance, continues to manufacture products that are becoming ever smaller and lighter, and has introduced some of the latest energy-conscious technologies. In the manufacture of all our products we give due consideration to reducing environmental impact, including emitting less CO₂, using fewer hazardous metals and chemical substances, and promoting recycling. When existing facilities are upgraded, we attempt to reduce the volume of waste by using existing equipment where possible, as well as reducing power consumption.



Nobuyuki Abe
Senior Vice President
In Charge of Building
Systems

Furthermore, we provide a total building solution that links the equipment inside the building, such as energy management, security and crime prevention systems, elevators and escalators and air conditioning and lighting to achieve improvements in energy conservation, comfort, convenience and efficiency, which also complies with the ZEB* basic energy policy of the Ministry of Economy, Trade and Industry.

* ZEB (Zero Energy Building): A building with zero net energy consumption on an annual basis.

Initiatives Contributing to the Environment and Society

The Building Systems Group is contributing to society by providing smaller and lighter elevators and escalators, and building systems that offer higher energy- and resources-saving performance while using fewer hazardous substances. We are also pressing forward to realize even more effective use of resources and greater energy savings through the renewal of existing facilities to make them more efficient.

High-Speed Elevators – NEXCUBE (for Japan) and NexWay (for Overseas)

Climate change

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-SiC (silicon carbide) 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. Further energy savings (up to 10%) can be achieved by employing an energy-saving elevator group control system that controls the allocation of multiple elevator cars.



Full-SiC semiconductor module and control device

AXIEZ Series – Standardized Elevators for the Japan Market

Climate change

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. Further reductions in power consumption can be achieved by using 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 to 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

Climate change

Air, water and soil pollution due to operations and procurement

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. Further reductions in power consumption can be achieved by using 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. In August 2016, we launched our NEXIEZ-S Series elevators with a capacity of 4 to 6 passengers, for use in low-rise housing and offices. Even more weight reduction was achieved by the simplification of the structure around the cage, and the reduction in the number of parts by part integration.



Elevator for India
NEXIEZ-LITE

Elevator Renewal Menu "Elemotion+"

Climate change

Waste reduction and management

To maintain the safety, security and comfort of elevators, renewal at appropriate times* is essential. The Elemotion+ menu facilitates the renewal of existing rope-type elevators to the latest model equipped with an inverter-controlled system and a gearless traction machine equipped with a permanent magnet motor. This provides safe, secure, smooth and comfortable rides, as well as a reduction in power consumption of up to 60%. Further energy savings are possible by incorporating LED lamps for the ceiling lighting of the elevator cars. Moreover, Elemotion+ offers a variety of replacement equipment, enabling the customer to make decisions based on budget and preferred installation time, and also contributing to reducing the volume of waste. In December 2016 we launched our new product Elemotion+ [ZERO], for zero days of stoppage during renewal work. We are promoting elevator renewals by making it easy for customers to plan renewal work.

* Mitsubishi Electric regards 25 years after completion of a building as an indication for renewal.



Elemotion+ [ZERO]

S-Series Escalator

Climate change

We have developed technology for reducing energy consumption while maintaining convenience, so in addition to an automatic operation function that stops the escalator or runs at low speed when there are no passengers, operating speed varies depending on the traffic conditions.

Our S Series escalators also employ a motor that meets the requirements of the Top Runner system established by the Law Concerning the Rational Use of Energy (Energy Conservation Act) as well as a control system that improves motor efficiency under light loads, a regenerative converter to effectively utilize regenerated power, and LED lighting*1. This leads to further reduction in electricity consumption, and the system achieves energy saving of approximately 35%*2.

*1 All lighting specifications are options.

*2 Compared to existing product. For SAL model with a step width of 1,000mm, step height of 5,000mm, 100 passengers per hour, and wait time of between 20 to 30 minutes.



S-series escalator

Facima Building Automation System

Climate change

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 from the Mother Factory to Overseas Manufacturing Companies

The Building Systems Group manufactures elevators and escalators at manufacturing companies in 11 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**

Climate change

Proper management of chemical substances in design and manufacturing

A wide range of processes are involved in the production of elevators 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 reduced. In painting processes, large amounts of heat energy are used 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**

Climate change

Air, water and soil pollution due to operations and procurement

Additional photovoltaic module panels were installed at our newly built Training Center (SOLAE Place) and other facilities, bringing the total number installed to 1,613. Their combined output is 383kW 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 environmentally friendly products (such as LED lighting, water-saving toilets, and recycled materials).

- **Upgrading Aging Facilities and Introducing LED Lighting**

Climate change

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**

Climate change

Waste reduction and management

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**

Climate change

Air, water and soil pollution due to operations and procurement

Waste reduction and management

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 and custom-order elevators, but also the "Elemotion+" renewal model, for which future demand is expected to rise. 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**

Climate change

Proper management of chemical substances in design and manufacturing

We are engaged in initiatives to reduce the use of lead in compliance with regulations being enacted around the world, including Europe's RoHS directive. Elevators are not currently 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.

Environment – Electronic Systems Group

Business Overview and Environmental Issues for Which Risks and Opportunities Have Been Recognized and Evaluated

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

The 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. Our main sites in Japan are the Kamakura Works and our Communication System Center in Amagasaki, Hyogo Prefecture. At these sites, as well as reducing CO₂ from production, we are involved in initiatives including preserving biodiversity, local cleanup activities, and visits to local elementary and junior high schools to teach children about the environment.

Environmental Issues for Which Risks and Opportunities Have Been Recognized and Evaluated

- Climate change
- Deforestation
- Conservation of biodiversity in operating areas

Message from Electronic Systems Group

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

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 fiscal 2018, 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. Launched in 2014, the DAICHI-2 Advanced Land Observing Satellite (ALOS-2) contributes to safeguarding people's lives and solving global-scale environmental problems. Additionally, the geostationary meteorological satellites Himawari-8 (launched in 2014 and operating from July 7, 2015) and Himawari-9 (launched in November 2016 and in standby operation from March 10, 2017) provide even greater observation capabilities for monitoring global warming and weather phenomena. We are also researching space-based solar power generation, a method of 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.



Masamitsu Okamura
Executive Officer
In Charge of Electronic
Systems

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 and extending the service life of wind turbines.

We are also working to reduce CO₂ 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

Climate change

The Japan Aerospace Exploration Agency (JAXA) selected Mitsubishi Electric as the primary contractor for GOSAT-2.*1 The satellite is scheduled for launch in fiscal 2018 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.

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, 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 observing 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



Greenhouse Gases Observing Satellite (GOSAT-2)

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

Climate change

The weather forecast is part of our daily lives. Following Himawari-7, which continues to operate smoothly, Mitsubishi Electric developed the Himawari-8 and Himawari-9. Himawari-8 was launched in 2014 and began operation on July 7, 2015. Himawari-9, which has the same performance as Himawari-8, was launched in 2016, and began standby operation (as a backup for Himawari-8) on March 10, 2017.

Equipped with world-leading next-generation meteorological observation sensors, Himawari-8 and Himawari-9 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, with a significant reduction in imaging time.



Meteorological satellites Himawari-8 and Himawari-9

Contributing to Understanding Disaster Situations and Monitoring of Oceans and Forests

Deforestation

Satellite applications such as disaster scene observation and monitoring 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.

"DAICHI-2" is continuing and developing the missions of mapping, 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 and observation of forest deterioration in tropical rainforest zones such as Southeast Asia and Brazil.



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

Ecological Contributions through Various Uses of Highly Precise Positioning Data

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.



First quasi-zenith satellite "MICHIBIKI"

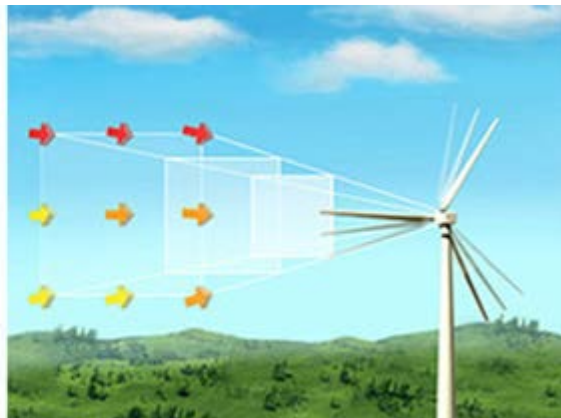
Doppler Lidar Systems for Wind Resource Assessments

The purpose of Doppler Lidar (Light Detection and Ranging) systems is to measure wind velocity and direction by detecting aerosols and their movement in the atmosphere. By conducting remote research of wind conditions, Doppler Lidar now enables real-time measurement of the wind that conventional anemometers are incapable of, such as monitoring and forecasting wind direction in cities (e.g., heat-island phenomenon, environmental impact of substances from automobile emissions, and air pollution), and applications for larger wind generation plants and expanding wind farms. Based on the data obtained, optimum control can be achieved.

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 is also possible to install Doppler Lidars on offshore wind turbines, or existing wind turbines, 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 turbines

Initiatives for Reducing Environmental Impact

Initiatives for Reducing CO₂ Emissions in Production

Climate change

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 CO₂ 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 – CO₂ Emissions Cut by Approx. 23%

Climate change

The design building of Kamakura Works, which was completed in January 2015, has successfully cut CO₂ emissions by implementing the following measures.

- **Energy Consumption Control**

Not only are we 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 we are 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 from atmospheric radiation, achieving greater insulating performance.

Environment – Communication Systems Group

Business Overview and Environmental Issues for Which Risks and Opportunities Have Been Recognized and Evaluated

Providing Communications Equipment and Services That Contribute to the Advancement of the Information Society

The Communication Systems Group is contributing to the advancement of the information society through products and services supplied to customers such as communications carriers, financial services and retail distribution companies, and government agencies in Japan and overseas. These products and services include communications infrastructure equipment that uses optical and wireless information communications technologies (ICTs) and network camera systems equipped with imaging technologies. The field of telecommunications has seen dramatic advances in technology and changes in demand. To satisfy our customers, we are striving to develop cutting-edge technologies and build an efficient yet flexible production system, with the Koriyama Factory in Fukushima Prefecture and the Communication Networks Center in Amagasaki, Hyogo Prefecture as bases for those activities.

Environmental Issues for Which Risks and Opportunities Have Been Recognized and Evaluated

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

Message from Communication Systems Group

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

Telecommunication networks that incorporate optical and wireless ICTs and security systems that utilize imaging technologies such as Video Content Analysis (VCA) and Artificial Intelligence (AI) are key elements of the social infrastructure that is essential to our daily lives and the growth of industry. However, as these devices develop greater functionality and are used by more and more people, electricity consumption increases rapidly.

Under these circumstances, 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 (relays) for service providers.

The second is "achieving energy savings in services provided using our products". Here, our optical and wireless access systems are used in automated meter readers for smart grids, while our communications gateway equipment is now being used in HEMS/BEMS to help make it easier to monitor electricity use. We are also developing network equipment in the field of IoT, which supports production efficiency and reduced energy consumption.

The third is "environmental contributions during installation work". Here, we are producing network cameras for the reduction and reuse of communications cables.

At the same time, we are promoting a reduction of CO₂ generated during production and product shipping. We are also working to reduce energy consumption in our factories and offices by updating to high-efficiency air conditioners and reducing standby power, and increasing shipping efficiency by improving freight loading efficiency and modal shift.

Going forward, we will continue refining our optical and wireless information communication technologies and imaging technologies while delivering high value-added systems to our customers. This will enable us to help expand our communications and network camera markets, especially for security systems, around the world, while mitigating environmental impacts.



Takashi Nishimura
Executive Officer
In Charge of
Communication Systems

Initiatives Contributing to the Environment and Society

Promotion of More Energy-Efficient and Compact Optical Access Systems

Climate change

Depletion of mineral resources

Waste reduction and management

The GE-PON ONU customer network terminating unit for optical access systems uses a passive optical network (PON) to provide a single optical fiber connection to up to 64 users, which makes the unit more compact and energy-efficient. In addition, this unit achieves a 75% reduction in power consumption and 69% reduction in material usage compared to conventional units because of its use of low-power consumption parts and reduced number of parts.



Subscriber terminal equipment for optical access systems

Providing Equipment That Delivers Energy Management Services

Climate change

We supply gateway equipment for 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 that is then used to deliver demand response services that strike a balance between electricity supply-demand and energy management systems, such as HEMS.



Gateway equipment

Promotion of the Reduction and Reuse of Communications Cables

Waste reduction and management

We are working to reduce and reuse communications cables during installation work through production of the MELOOK3 (coaxial type) digital network camera system, which can use existing analog camera cables for high-definition and highly functional digital network camera systems without the need to lay new LAN cables for digital CCTV.

Initiatives for Reducing Environmental Impact

Environmental Assessment Evaluations

Climate change

Depletion of mineral resources

Waste reduction and management

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

Climate change

Waste reduction and management

In addition to reducing CO₂ during production and in product use, we are streamlining product transportation and reducing CO₂ by improving loading ratios 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 are environmentally friendly.

Ongoing Reductions in CO₂ Emissions during Production

Climate change

At the same time as we are working to improve productivity by increasing the speed of the equipment and reducing cycle times through improvements, we are continuing to reduce energy consumption by replacing high energy consumption equipment and old air conditioners and lighting with high-efficiency types. Starting in fiscal 2017, we have been working to minimize the consumption of LPG (liquid petroleum gas) on the paint drying line, which consumes a large amount of energy.

Koriyama Factory – Reduced Use and Appropriate Handling of Chemicals Such as Organic Solvents

Proper management of chemical substances in design and manufacturing

Waste reduction and management

The Koriyama Factory is involved in every step of the manufacturing process from materials processing, including 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. Furthermore, as well as using risk assessments to keep track of the danger and harm of chemical substances, we conduct emergency training for potential emergency situations and work to prevent environmental accidents.

Communication Networks Center – Achieving Greater Energy Efficiency through Production Line Improvements

Climate change

The Communication Networks Center, which designs nearly all of the products made by the Communication Systems Group and assembles communications equipment, has improved 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 has significantly reduced the amount of electricity it uses for the lighting and air conditioning equipment necessary for production. In addition, the Center is reducing the energy used for utilities by its design and sales offices by upgrading to more efficient air conditioning and making operational improvements.

Environment – Living Environment & Digital Media Equipment Group

Business Overview and Environmental Issues for Which Risks and Opportunities Have Been Recognized and Evaluated

Providing a Broad Range of Environmentally Friendly Products and Services

The Living Environment & Digital Media Equipment Group manufactures air conditioners, ventilating units, water heaters, photovoltaic systems, lighting solutions, kitchen appliances, home electronics, and digital media equipment, and supplies environmentally friendly products and services for an extensive market that includes homes, offices, and factories. With production bases located in Japan, Europe, Americas, Asia, and China, our operations are worldwide. At these production bases, we are promoting energy savings by introducing the Company's energy-efficient products and improving productivity at the above-mentioned factories. At the same time, we are striving to intensify control of chemical substances throughout the supply chain and properly manage waste, exhaust, and wastewater.

Environmental Issues for Which Risks and Opportunities Have Been Recognized and Evaluated

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

Message from Living Environment & Digital Media Equipment Group

Developing Environmentally Friendly Products and Reducing Our Own Environmental Impact

The Living Environment & Digital Media Equipment Group focuses on the air conditioning and refrigeration systems business, one of Mitsubishi Electric's growth drivers. In addition to expanding operations in various segments such as room and package air conditioners, we are pressing forward with the creation of new businesses and strengthening present ones. From fiscal 2018 onwards, we plan to increase our development and manufacturing activities in existing businesses, with a production framework spreading over five major locations: Japan, Europe, USA, Asia, and China. At the same time, we are building the foundation of a cyclical business, including synergies with Mitsubishi Electric Hydronics & IT Cooling Systems S.p.A. (MEHITS, formerly DeLclima), acquired in 2015, and expanding our business scope through the creation of new businesses.

As we expand our businesses, it is important for us to contribute to reducing our environmental impact through energy-saving initiatives for our customers and recycling. As part of this, we are supplying a broad range of environmentally friendly products and services for the home, office, and industry. These include energy-saving products that reduce CO₂ from power generation as well as photovoltaic systems that generate renewable energy and do not produce CO₂ during power generation.

Meanwhile, as activities to reduce CO₂ from production, the Living Environment & Digital Media Equipment Group is proactively introducing its core energy-saving products—namely, high-efficiency air conditioners, heat-pump hot-water supply systems, LED lighting fixtures, and photovoltaic systems—at production sites. We are also promoting energy-saving activities by improving productivity linked to just-in-time improvement activities based on e-F@ctory concepts.



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

Initiatives Contributing to the Environment and Society

Kirigamine ADVANCE FZ Series Room Air Conditioners Won the METI Minister's Award, the Top Prize of the Fiscal 2016 Energy Conservation Grand Prize

Climate change

The Kirigamine ADVANCE FZ Series is equipped with the world's first*1 twin-propeller fan system in which the left and right fans operate independently, delivering substantial energy savings and unprecedented levels of comfort. In recognition of these achievements, the air conditioner model received the METI (Ministry of Economy, Trade and Industry) Minister's Award, the top prize of the Fiscal 2016 Energy Conservation Grand Prize, in the Products and Business Models category.

*1 Launched on October 30, 2015, in house review



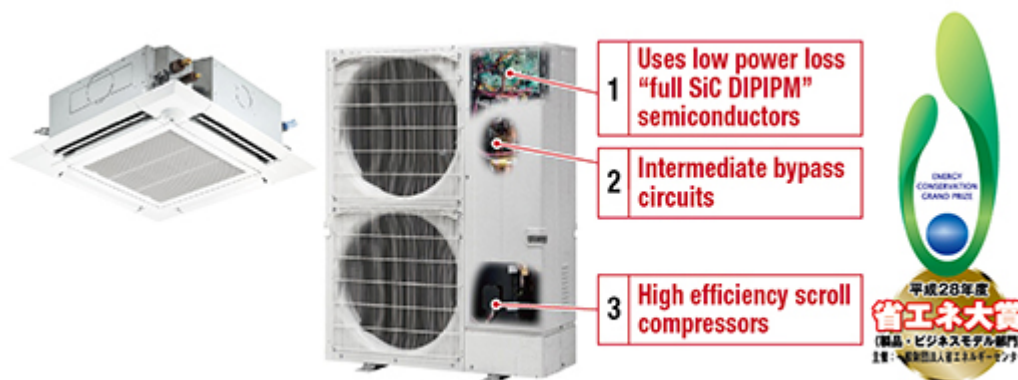
Kirigamine ADVANCE FZ series room air conditioners

Awarded the Fiscal 2017 Energy Conservation Center Chairman's Award Slim ZR Series Package Air Conditioners for Retail Stores and Offices Have Achieved the Industry's Top Annual Performance Factor (APF*2)

Climate change

The Slim ZR Series is equipped with the world's first*3 "full-SiC DIIPM*4", achieving the industry's top energy-saving performance*5 with the Slim ZR P280 (10hp). It was awarded the Fiscal 2017 Energy Conservation Center Chairman's Award

- *2 Annual Performance Factor: An indicator introduced in 2007 that enables the evaluation of energy efficiency approximately equal to that under actual usage conditions.
- *3 As of February 5, 2016. In-house review. For package air conditioners for retail stores and offices.
- *4 SiC: Silicon Carbide, DIIPM: Dual-In-line Package Intelligent Power Module (semiconductor power module with a built-in control element with protective functions)
- *5 As of February 5, 2016. In-house review. P280-class package air conditioners for retail stores and offices. Based on the APF 2015 rating for PLZX-ZRP280EFK in the JIS B 8616:2015 package air conditioner category.



Package air conditioners for retail stores and offices "Slim ZR" series

Grand Multi Series Building Air Conditioning System Achieves Industry's Top-Class APF

Climate change

The Grand Multi Series is equipped with the world's first*6 flat-tube heat exchanger, optimized refrigerant distribution, and a high-efficiency compressor. As a result, it has achieved the industry's top-class APF*7.

*6 As of product release in October 2013, in-house review.

*7 As of February 2016, in-house review. For building multi-split air conditioners.



Grand Multi Series building air conditioning system

MILIE LED Lighting – Realizing Low Power Consumption and Comfort

Climate change

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. These include My Series high-efficiency LED base lights for offices, GT Series high-ceiling LED base lights for factories, warehouses, and gymnasiums, AK Series high-luminosity LED downlights and spotlights for retail stores and MILCO.S lighting control systems that provide energy savings and comfort automatically.



MILIE LED lighting

DIAMONDSOLAR® Photovoltaic System That Makes Full Use of Natural Energy

Climate change

The DIAMONDSOLAR® system has a remarkable power generation capacity that uses a combination of high-output modules and high-efficiency power conditioners. In addition, the Multi Roof Series comes in a wide variety of shapes and can be used in combinations that maximize the power generation area of a roof, thereby generating plentiful electricity for daily life.



Multi Roof photovoltaic system

EcoCute That Can Be Used in Conjunction with a Photovoltaic System

Climate change

We have improved energy conservation by developing a high-efficiency heat exchanger for heat pump units, with all our models achieving the fiscal 2018 energy efficiency Top Runner standard*8. It can be installed to operate in conjunction with Mitsubishi photovoltaic systems*9 by connecting to Mitsubishi HEMS, enabling even greater energy savings.

- *8 Energy efficiency performance standard targets for achievement in fiscal 2018 in line with the Act on Rationalizing Energy Use, which went into effect on March 1, 2013.
- *9 Feature is available with Mitsubishi photovoltaic system models released in fiscal 2016 or later.



EcoCute

Initiatives for Reducing Environmental Impact

High-Efficiency Air Conditioners, LED Lighting, and PV Power Generation Systems Used at Manufacturing Sites and Affiliates

Climate change

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 CO₂ emissions from production. We have also installed photovoltaic systems that contribute to the reduction of peak electricity demand during the summer.

Promoting Energy-Saving Activities Linked to Just-in-Time Improvement Activities Based on the e-F@Ctory Concept

Climate change

We have introduced initiatives such as company-wide just-in-time improvement activities in the factory that reduce equipment operating loss, making improvements to logistics, and reviewing production methods, as well as other similar energy-saving activities that also result in higher productivity.

Intensifying Control of Chemical Substances That Affect the Environment and Human Health

Proper management of chemical substances in design and manufacturing

In response to the EU RoHS directive that specifically calls for eliminating the use of hazardous substances and the REACH regulation requiring that information on chemical substance content be provided, we are intensifying the control of chemical substances throughout the supply chain in product procurement, design, production, sales, and services.

Environment – Factory Automation Systems Group

Business Overview and Environmental Issues for Which Risks and Opportunities Have Been Recognized and Evaluated

Helping Customers in the Manufacturing Industry to Enhance Their Competitiveness

The Factory Automation Systems Group provides customers in the manufacturing industry with a wide range of products and solutions in the field of industrial mechatronics, including factory automation controllers, drive products, energy-saving support products, equipment in the field of electric power distribution control and processing machines.

The Factory Automation Systems Group has domestic manufacturing bases in Nagoya and Fukuyama, and overseas bases in China, Southeast Asia, and India. We are expanding overseas procurement and production as part of efforts to strengthen our global business network. At the same time, we are intensifying chemical substances control in the parts and materials procurement process and environmental management at factories. In addition, we are helping the businesses of our customers in Japan and overseas to improve their added value and competitiveness through products and services with better energy-saving performance. These activities are underway at our sales and service bases in Japan, China, Korea, Taiwan, Southeast Asia, India, the US, Europe, and South America.

Environmental Issues for Which Risks and Opportunities Have Been Recognized and Evaluated

- Climate change
- Depletion of mineral resources
- Proper management of chemical substances in design and manufacturing
- Air, water and soil pollution during 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. Mitsubishi Electric's Factory Automation Systems Group provides devices and systems that possess high energy-saving capability for production facilities in factories, where the bulk of energy is consumed.

We are helping our customers reduce the total cost of development, production and maintenance by taking advantage of our factory automation and information technologies, and are continuously supporting our customers' improvement activities. We aim to propose solutions for manufacturing that keep one step ahead, and we are also strongly supportive of manufacturing and management optimization from the aspects of production, product quality, the environment, safety, and security. Various data collected in real time from a production site go through preliminary processing according to usage, and data to be used onsite is then fed back immediately to the production site, while the data required for use at higher levels as information is supplied to IT systems. In this way, we provide an overall environment that is to the fullest extent optimized for manufacturing. We are also contributing to energy savings, one of our goals, by continuing to promote improvements using such a manufacturing environment.

In addition, we are verifying productivity and facility utilization ratios through the operation of a "model factory where e-F@ctory solutions are being used" at the Nagoya Works. In the factory, a large number of activities have indicated the benefits of reducing CO₂ from production, including improved productivity, shorter lead times, and less product quality loss.

We are committed to contributing to our customers' manufacturing activities by continuing to propose combinations of our highly energy-efficient factory automation products and cutting-edge factory automation solutions



Yoshikazu Miyata
Executive Officer
In Charge of Factory
Automation Systems

Initiatives Contributing to the Environment and Society

Mitsubishi Integrated FA Solution, e-F@ctory

Climate change

The primary goal of the integrated FA solution, e-F@ctory, is to reduce the total cost of development, manufacturing, and maintenance processes. e-F@ctory utilizes sophisticated technologies and information management to optimize factory operations through improved productivity, quality, and energy consumption, thus shaping the factory model of the future. The e-F@ctory received the "2015 Frost & Sullivan Southeast Asia Enabling Technology Leadership Award."



Mitsubishi integrated FA solution, e-F@ctory

Programmable Controller MELSEC iQ-R Series

Climate change

A newly developed high-speed system bus enables the MELSEC iQ-R Series to achieve a processing capacity 40 times greater than the MELSEC-Q Series. Furthermore, variation in control cycles has been minimized to ensure maximum stability in manufacturing quality by utilizing the synchronized operation of controllers connected via networks. This contributes to further improving the efficiency of production facilities and optimizing factory operations.

In recent years, the application of controllers has expanded to water treatment facilities, photovoltaic power generation systems, and electric power monitoring systems, also contributing to energy savings and environmental improvements for customers outside of the FA field.



Programmable controller MELSEC iQ-R series

Fiber 2D Laser Processing Machines eX-F Series

Climate change

The eX-F Series incorporates fiber laser technology into our Fiber 2D Laser Processing Machines eX Series to achieve superior oscillation efficiency. It includes various advanced features, such as Mitsubishi Electric's original high-efficiency servomotor, servo amplifier, and inverter-control cooling unit. This has achieved a 60% reduction in power consumption*1. In addition, the Eco Mode setting, which stops machine functions in stages, reduces power consumption by as much as 70% during standby*2. Energy-saving operation is further supported by the visualization of power and gas consumption via a monitor that displays energy use.

*1 Compared to the Mitsubishi Electric ML3015eX-45CF-R two-dimensional carbon dioxide laser processing machine

*2 Compared to power consumption without using Eco Mode



Fiber 2D laser processing machines eX-F series

Industrial Robot MELFA FR Series

Climate change

In response to the need for an efficient parts supply network, shorter startup time, and the flexibility to handle a variety of parts, we have developed intelligent technologies that use force sensors, 3D vision sensors, multifunctional electric hands, and more. Compared to conventional mass-production lines producing a single part, it is now possible to produce small lots of multiple items, productivity has been improved, the production area footprint has been reduced, and production efficiency and product quality have been improved even as system startup time has been reduced. We contribute to reducing energy consumption through the optimization of customers' production systems.



Industrial robot MELFA FR series

Energy-Saving Motor SF-PR Superline Premium Series

Climate change

If all of the approximately 100 million standard motors in Japan were replaced with highly efficient Top Runner-compliant motors (equivalent to IE3*3), calculations show that some 15.5 billion kWh of power usage could be saved 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 Top Runner-compliant SF-PR Series was awarded the Japan Machinery Federation Chairman's Award at the fiscal 2015 (35th) Excellence in Energy-Conservation Equipment Awards as an induction motor applying cutting-edge, high-efficiency design technology.

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



Energy-saving motor
SF-PR superline premium series energy-saving motor

Energy Measuring Unit Eco-Monitor Series

Climate change

By installing our energy measuring unit in switchboards and distribution boards, it is possible to measure various data such as energy consumption, voltage, and current. This unit not only measures and analyzes the overall energy consumption of factories and buildings, but also the individual energy consumption of departments, sections, lines, and equipment, and achieves efficient energy usage by managing the basic unit. The product won the Minister of Land, Infrastructure and Transport prize at the 55th product contest held during the JECA FAIR 2016 organized by the Japan Electrical Construction Association.



Energy measuring units
EcoMonitorPlus

Molded Case Circuit Breakers for DC Circuit (up to 1000VDC) HDVA Series

Climate change

With the growth in construction of photovoltaic power generation systems, particularly mega solar generators, direct current power delivery systems are being developed to increase power generation efficiency and reduce power costs. Mitsubishi Electric's HDVA Series direct-current high-voltage fuseless circuit breakers contribute to the wider implementation of systems and facilities that are useful in the achievement of an eco-conscious society. These include photovoltaic power generation systems and high-capacity storage batteries.



Molded case circuit breakers for DC
circuit (up to 1000VDC)
HDVA series

Initiatives for Reducing Environmental Impact

Reducing CO₂ during Production – Nagoya Works and FA Equipment Production Building

Climate change

In 2013, we completed construction of a main production building making use of the latest equipment. We are in constant pursuit of cutting-edge energy-savings.

(The results below 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 integrated FA solution e-F@ctory to measure and control the power consumption of air conditioning, lighting, and exhaust as well as airflow

Reducing CO₂ during Production – Fukuyama Works Smart Meter Production Building

Climate change

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 CO₂ emissions from production.

- Reducing heat transfer by 84% for the rooftop and 42% for the wall through full insulation measures and adopting a windowless structure for the production area
- Achieving greater energy efficiency by preventing excessive heating and cooling onsite using a centrally managing a City Multi air conditioner system with Move-Eye equipped with the G-150AD Web-based central controller
- Raising the efficiency of air conditioner operations by using an energy-efficient, compact air-cooled heat pump chiller
- Achieving significant energy savings by installing LED lighting (650 straight tubes and 24 ceiling lights) on the building's interior and roof overhangs (reducing energy consumption by 28,400kWh/year and reducing replacement costs by 370,000 yen/year)
- Further reducing energy consumption from lighting and air conditioning by approximately 7% (total savings approximately 120,000 yen per year) by means of a FEMS (Factory Energy Management System), which provides optimal control through linked production of lighting and air conditioning energy.

Switching to Higher Efficiency Equipment

Climate change

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

Achievement of Zero Emissions

Climate Change

Air, water and soil pollution during operations and procurement

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

Intensifying Chemical Substance Control and Environmental Risk Measures

Climate Change

Proper management of chemical substances in design and manufacturing

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

Regarding the management of chemical substances, we obtain a written guarantee that harmful chemical substances have not been used, and conduct analyses to determine if parts contain harmful substances as necessary.

Environment – Automotive Equipment Group

Business Overview and Environmental Issues for Which Risks and Opportunities Have Been Recognized and Evaluated

Strengthening Our Global Development, Production, and Sales Systems

The Automotive Equipment Group provides powertrain products, body control products, and car multimedia devices globally. 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. To reduce environmental load, our three development sites in Japan (Himeji Works, Sanda Works, and Automotive Electronics Development Center) function as mother factories that manage our 14 production sites in 11 countries overseas to ensure compliance with environmental guideline designs that take into consideration environmental regulations, product environmental restrictions in each country and region, and the disposal and recyclability of products, as well as preventing air, water, and soil pollution.

Environmental Issues for Which Risks and Opportunities Have Been Recognized and Evaluated

- Climate change
- Proper management of chemical substances in design and manufacturing
- Air, water and soil pollution during operations and procurement
- Conservation of biodiversity in operating areas

Message from the Automotive Equipment Group

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

The Mitsubishi Electric Group is contributing to the realization of a sustainable global environment with the aim of being a global, leading green company.

The Automotive Equipment Group is developing its business at the global level. It is engaged in initiatives to reduce CO₂ emissions both by installing its products in vehicles to achieve better fuel efficiency and by reducing energy consumption during the manufacturing process.

In regards to improving the fuel efficiency of automobiles, engines are becoming more efficient in order to achieve low fuel consumption. Mitsubishi Electric is helping to make vehicles more efficient through related products such as ignition systems for the precise control of combustion in highcompression ratio engines, turbo actuators that control the boost pressure of downsized turbo engines, and the control of these systems.

We are developing motorized equipment that is more compact and that has higher efficiency. Examples include a compact motor for electric power steering being applied in large vehicles, a belt-driven motor generator with an enhanced deceleration energy regenerative function, and quiet idling stop restarters.

As an example of energy saving during the manufacturing process, a new production building has introduced LED lighting and cutting-edge energy-saving technologies such as automatic light adjustment, and central monitoring and optimized control of air conditioning and ventilation equipment. We are managing the use of electricity by rigorously enforcing energy-saving measures such as photovoltaic generation in existing buildings. These achievements are being implemented at overseas manufacturing bases as part of our global energy-saving efforts.



Isao Iguchi
Senior Vice President
In Charge of Automotive
Equipment

Initiatives Contributing to the Environment and Society

Fuel Efficiency Technologies for Internal-Combustion Engines

Climate change

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 motor generator, ensures reduced fuel consumption for customers by integrating the start-stop functions of the engine control unit, transmission control unit and starter with the electricity-generating function of the alternator, enabling wide-ranging technologies such as engine assist during idle stop-and-start and energy regeneration during deceleration. In February 2015, our GXi alternator acquired Europe's ECO Innovation Technology certification.



Motor generator

Electric-Powered Products Contributing to the Popularization, Safety and Comfort of EVs/HEVs

Climate change

By optimizing Mitsubishi Electric's strengths such as semiconductor device design, circuit design, structural design and vehicle motion control technologies, we aim to provide more efficient electric-powered products* that integrate multiple technologies to achieve even better fuel economy and enhanced compliance with emissions regulations.

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

Main electric-powered products



Car Navigation Systems Helping to Conserve Energy

Climate change

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 to what extent the driver is driving in an eco-friendly manner.



DIATONE SOUND.NAVI high-end audio and car navigation system

Promoting Proper Management of Chemical Substances in Design and Production

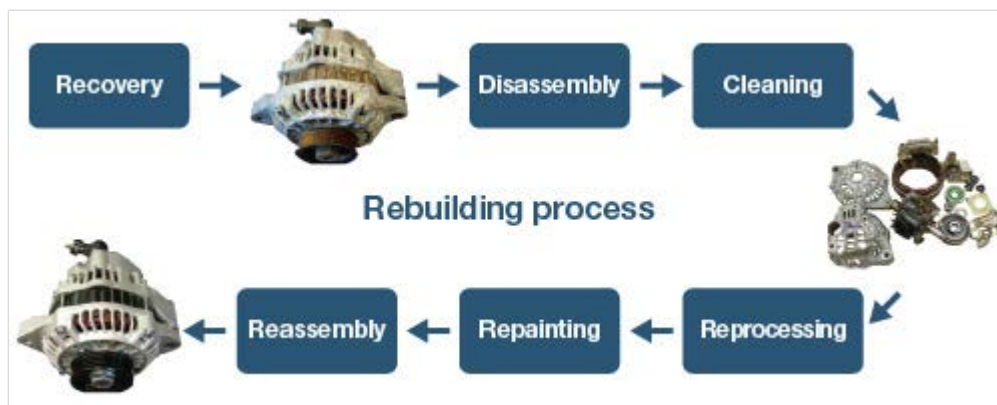
Proper management of chemical substances in design and manufacturing

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 around the world that cover its activities and products. Additionally, since the chemical substances management system of the International Material Data System (IMDS) has been introduced in the automotive industry, we ensure compliance with environmental guideline designs that consider the disposal and recyclability of automobiles.

Expanding the Rebuilding Business

Climate change

The Automotive Equipment Group is expanding our business to automotive electrical parts, such as alternators and starters. As opposed to selling disassembled parts as used parts (reuse) as is, rebuilt parts have been disassembled and functionality that has deteriorated over use is repaired and restored to its original function so that quality equivalent to a new part is achieved (recycle).



Rebuilding process

Initiatives for Reducing Environmental Impact

Roll out of Measures Implemented in Japan at Our International Sites

Climate change

Air, water and soil pollution during operations and procurement

The following measures have been promoted at Himeji Works, Sanda Works, and Automotive Electronics Development Center in Japan and are being introduced 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

Environment – Semiconductor & Device Group

Business Overview and Environmental Issues for Which Risks and Opportunities Have Been Recognized and Evaluated

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 wireless communication to satellite communications, optical devices supporting high-speed optical communications, and 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.

Environmental Issues for Which Risks and Opportunities Have Been Recognized and Evaluated

- Climate change
- Appropriate use of water in operating areas
- Proper management of chemical substances in design and manufacturing
- Conservation of biodiversity in operating areas

Message from Semiconductor & Device Group

Contributing to the Realization of a Low-Carbon Society by Providing Energy-Efficient Products

In order to achieve a sustainable global environment, it is imperative to minimize power loss when generating and using electricity. Power modules are key devices playing a significant role in reducing power loss and are being incorporated into home electric appliances, rolling stock, and industrial equipment. Products offered by Mitsubishi Electric, the world's No.1 power module manufacturer, are being used all over the world and are contributing to a reduction in energy consumption globally. In addition, Mitsubishi Electric's Semiconductor & Device Group has developed state-of-the-art power modules using silicon carbide (SiC), which contributes to a sustainable reduction of the energy consumed when compared to conventional silicon (Si) products. By enhancing the lineup of these power modules and expanding the market for them and our related businesses, we are contributing to reducing carbon emissions further.



Toru Sanada
Executive Officer
In Charge of
Semiconductor & Device

To address the issue of reducing 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. In addition, not only are we reducing the amount of energy consumed by devices themselves, we are also developing devices that reduce the electrical power required for cooling base stations, promoting a reduction in energy use by the IT industry as a whole.

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, as part of our measures against global warming caused by production, the Semiconductor & Device Group continually and proactively reduces its own energy usage through such measures as employing high-efficiency air conditioners in cleanrooms, improving wafer processing operations, and reducing the emissions of non-CO₂ greenhouse gases (SF₆, HFC, and PFC) through the introduction of detoxifying equipment.

Initiatives Contributing to the Environment and Society

Low Power Consumption Power Devices

Climate change

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. We are therefore developing semiconductor devices using silicon carbide (SiC), which offers low-power consumption capabilities and can be used in a wide range of applications.

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 2016, a full-SiC power module was used in a rolling stock inverter for the first time. In addition, in August 2016, we launched a super-mini full-SiC power module which achieves about 70% reduction*1 in power loss compared to our conventional products, as well as industry-leading low power consumption*2, contributing to reduced energy consumption by air conditioners.

In March 2017, we launched the silicon-carbide Schottky-barrier diode (SiC-SBD*3), which contributes to the reduced the power loss and physical size of power supply systems for photovoltaic power systems, air conditioners and more. This product reduces power loss by about 21%*4 compared to our conventional products.

We will continue to accelerate the development of new technologies and products to respond to market needs.

*1 Compared to super mini DIIPM Ver.6 series (Si product) PSS15S92F6 (15A/600V).

*2 As of August 17, 2016.

*3 SBD (Schottky Barrier Diode): Diode which utilizes the Schottky barrier formed at the junction of a semiconductor and a metal.

*4 Compared to the Si diode installed in our DIPFC™ power semiconductor module.



SiC-SBD power semiconductor

Development of 100Gbps*5 Compact Integrated EML*6 TOSA*7 Optical Transceiver for High Speed Communication

Climate change

Energy saving in IT has become a global social issue due to the accelerated speed and capacity of mobile communication networks. It has become necessary to increase the amount of optical transmission equipment in optical fiber communication base stations in order to process the rapidly increasing communication data at a high speed. However, since the space available for the installation of equipment is limited, there is increasing demand for smaller sized and longer distance transmitting optical transceivers in optical transmission equipment. In response to these needs, we have developed the compact integrated 100Gbps EML-TOSA, which has achieved the industry's longest*8 transmission distance of 40km, and significantly reduced package size. We started providing samples in July 2016. We will continue to contribute to the improved performance of equipment in the field of high speed optical communications, a field in which we are expecting a significant increase in demand.



100Gbps compact integrated EML TOSA

*5 Gbps (Gigabits per second): Unit of communication rate. 1Gbps indicates that 1 billion digital codes can be transmitted per second.

*6 EML (Electro-absorption Modulated Laser diode)

*7 TOSA (Transmitter Optical Sub Assembly): Compact optical device for transmission.

*8 Research by Mitsubishi Electric, as of March 16, 2016. In the IEEE 100GBASE-ER4 standard (100Gbps Ethernet standard set by the US Institute of Electrical and Electronics Engineers).

Initiatives for Reducing Environmental Impact

Making Cleanrooms More Energy Efficient

Climate change

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 take every possible step to reduce energy consumption; for example, by replacing conventional air conditioners with high-efficiency units and improving the efficiency of wafer processing equipment.

- **Use of High-Efficiency Air Conditioners** Climate change

Our Power Device Works at the Kumamoto site has changed over to higher efficiency air conditioners and integrated management, resulting in a 16.6 million kWh (equivalent to 7,000t of CO₂) reduction in annual electricity consumption.

- **Installation of Photovoltaic Systems** Climate change

A rooftop photovoltaic system with a rated power output of 300kW has been installed at our Power Device Works at the Fukuoka site, resulting in a reduction in consumption of approximately 290,000 kWh (equivalent to 120t of CO₂) per year.

- **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.

- **Application of Yellow LED Lamps** Climate change

At the Power Device Works and High Frequency & Optical Device Works, we have been systematically moving toward LED lighting. In fiscal 2016, we installed practical-use LED yellow lamps, which affect manufacturing conditions, for verification purposes as well. This realizes a 650,000 kWh (equivalent to 275t of CO₂) reduction in annual electricity consumption. Further conversions to LED lighting are planned for the future.

Focusing on Reducing Energy Consumption in Office Buildings by Combining Our Best Energy-Saving Technologies

Climate change

The design technology building at the Fukuoka-based Power Device Works is equipped with various environment-conscious features, including Mitsubishi Electric's own 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, a new technological control building for the LCD business also earned the recommendation rank of "A (very good)" under Kumamoto CABEE, in recognition of its high environmental performance.

* 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.

Focusing on Water Recycling and Preventing Contamination from Wastewater

Appropriate use of water in operating areas

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

Proper management of chemical substances in design and manufacturing

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.

Promotion of Activities for the Conservation of Biodiversity

Conservation of biodiversity in operating areas

We started a biological research project at our Power Device Works and High Frequency & Optical Device Works in fiscal 2016. As a result of examining the creatures and plants living on these sites with expert guidance, we were able to confirm the presence of many regional endemic species, including some designated as endangered species. To encourage the preservation of these local species, we will establish an environment that makes it easier for living things to thrive.

Environment – Information Systems & Network Service Group

Business Overview and Environmental Issues for Which Risks and Opportunities Have Been Recognized and Evaluated

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

The 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 are a one-stop provider of optimal solutions and IT services for a broad range of areas including social, public, and corporate systems. We cover the entire lifecycle of information systems and network systems, from the planning and concept stage to operation and maintenance.

Environmental Issues for Which Risks and Opportunities Have Been Recognized and Evaluated

- 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

With our motto "Comfort, Peace of Mind, Development - DiamondSolution", the Information Systems & Network Service Group is committed to enhancing customer satisfaction and helping achieve a sustainable society through solutions tailored to the management strategies and challenges of our customers, as well as solutions that resolve social issues.

In recent years, we have also been focusing on environmentally effective businesses with green IT, seeking 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 BCPs*1. Our cutting-edge proprietary technologies have helped companies to reduce data center power consumption by approximately 36%*2 compared to servers built and operated in-house. Efforts for saving energy in data centers also help companies to reduce CO₂ emissions from their business activities.

Going forward, in order to achieve smarter societies, we will leverage the many component 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 processing, and energy management systems including HEMS*4 and FEMS*5.

*1 BCPs: Business Continuity Plans.

*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



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

Initiatives Contributing to the Environment and Society

Using Data Centers to Help Customers Reduce Their Environmental Impact

Climate change

We operate data centers—which are specialized facilities containing servers and communications equipment—and offer housing services, where customer servers are relocated to one of our data centers, as well as 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 CO₂ emissions by approximately 36% compared to 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 on top of 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 enables more appropriate use of resources based on data processing volumes, leading to further cost reductions and improvements in energy savings.



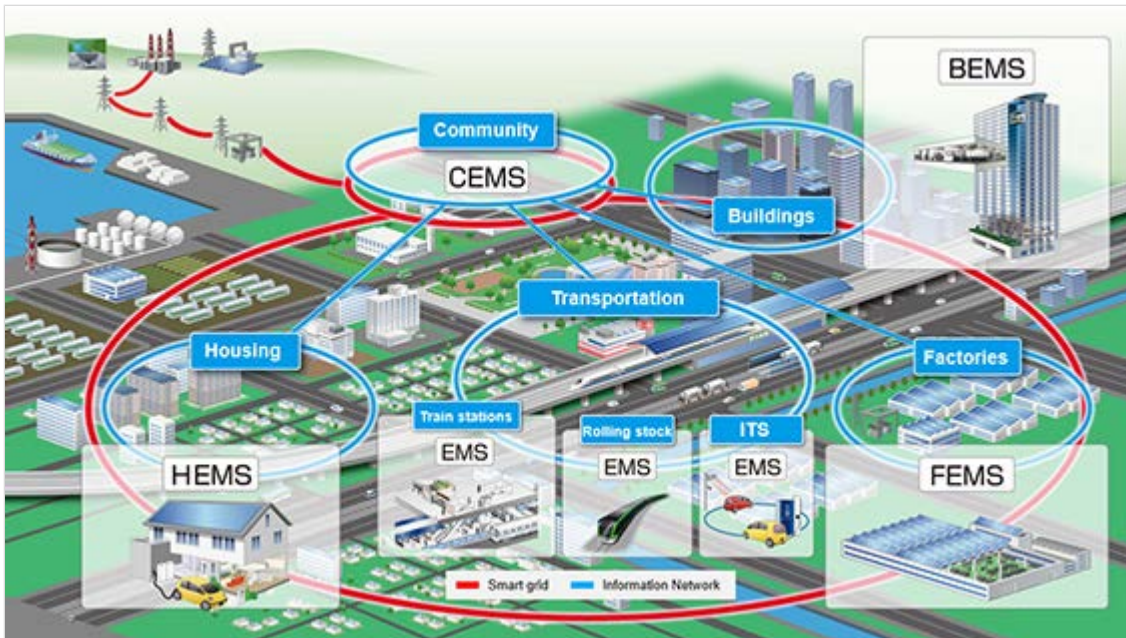
Data center

*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

Climate change

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

Initiatives for Reducing Environmental Impact

Continuous Activities Aimed at Reducing Environmental Impact

Climate change

Waste reduction and management

Our offices and factories 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

Climate change

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

Promoting Computer Recycling

Depletion of mineral resources

Waste reduction and management

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

Climate change

Deforestation

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 to realize further reductions in electric power use.

- 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**

Since fiscal 2010, we have provided recycling boxes for office paper on every floor and have been continuing our commitment to recycling office paper. Furthermore, since fiscal 2013, we have provided dedicated recycling boxes in order to recycle paper cups used for our tea and coffee machines.

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

Aiming to Become a Global, Leading Green Company by Helping to Solve Today's Social Issues – Mitsubishi Electric Group initiatives are introduced by Masaki Sakuyama, President and CEO of Mitsubishi Electric Corporation.

Chinese language version of the above page:

- ▶ 致辞

▶ Overview

From various angles we introduce special features of the Mitsubishi Electric Group that are creating value in the environmental field, including Corporate Mission and Business Lines, Management Objectives, Environmental Vision and Key Issues, Opportunities for Growth, and Strengthening the Environmental Management Foundation.

Chinese language version of the above page:

- ▶ 秒懂

▶ 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
- ▶ Environmental Considerations for Products
- ▶ Environmental Considerations for Procurement
- ▶ Creating a Society in Tune with Nature

Chinese language version of Group Environmental Policy:

- ▶ 三菱 机集 境方

Features and Initiatives of Environmental Management Aiming to

- ▶ Long-Term Perspective and Management Approach Towards Solutions for Environmental Issues
- ▶ Environmental Management Structure
- ▶ Environmental Audits
- ▶ Training of Environmental Personnel
- ▶ Environmental Risk Management
- ▶ Improving the Level of Environmental Initiatives

■ Environmental Report 2017

Specific Targets and Achievements in Fiscal 2017

- ▶ Targets and Achievements of the 8th Environmental Plan (Fiscal 2016–2018)

Chinese language version of the above page:

- ▶ 第8次 境 划 (2015-2017年度) 目 与成果

Initiatives for Environmental Conservation

- ▶ Environmental Considerations for Value Chain Management
- ▶ Reducing Greenhouse Gases Emitted in the Value Chain
- ▶ Reducing CO₂ from Production
- ▶ Contribution to Reducing CO₂ from Product Usage
- ▶ Reducing CO₂ from Logistics
- ▶ Effective Utilization of Resources
- ▶ Reducing Resource Inputs
- ▶ Strengthening Collaboration for Resource Recycling Business
- ▶ Recycling End-of-Life Products
- ▶ Reducing the Use of Disposable Packaging Materials
- ▶ Using Water Effectively
- ▶ Managing Chemical Substances

Environmental Communication

- ▶ Environmental Communication

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 告期 与范
- ▶ 物料衡算

▣ The Environment and Business

Evaluation of the Level of Importance of Environmental "Risks" and "Opportunities"

- ▣ Evaluation of the Importance of Environmental Issues

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

▣ A New Dimension in Water Recycling

Here we present entirely new water recycling technology that utilizes the power of electricity to break down substances in water that were previously difficult to manage. We discuss the features of this technology and give some examples of its applications, including "microbubbles" that remove grime with the power of bubbles, and ozone generators called "ozonizers" that produce delicious, safe, clear water with the power of ozone.

▣ Plastic Recycling Comes of Age

Until now, it was considered difficult to recirculate plastics, or recycle them from home electronics appliances for reuse in new home electronics appliances, as only 6% of the material could be recycled. However, Japan's first large-scale, high-purity plastics recycling system has raised that rate to 70%, more than 10 times the previous level. We will introduce the secret behind this technology, and how it evolved.

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

Office Building Energy Savings Simulation Technology

▣ 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.

▣ Archives

▣ Environmental Sustainability Report
