Fuji Electric
Innovating Energy Technology

ESG Explanatory Forum

Initiatives for Realizing a Sustainable Society

— Promotion of Environmental Vision 2050—

October 10, 2019

Fuji Electric Co., Ltd.

Fuji Electric Basic Environmental Protection Policy

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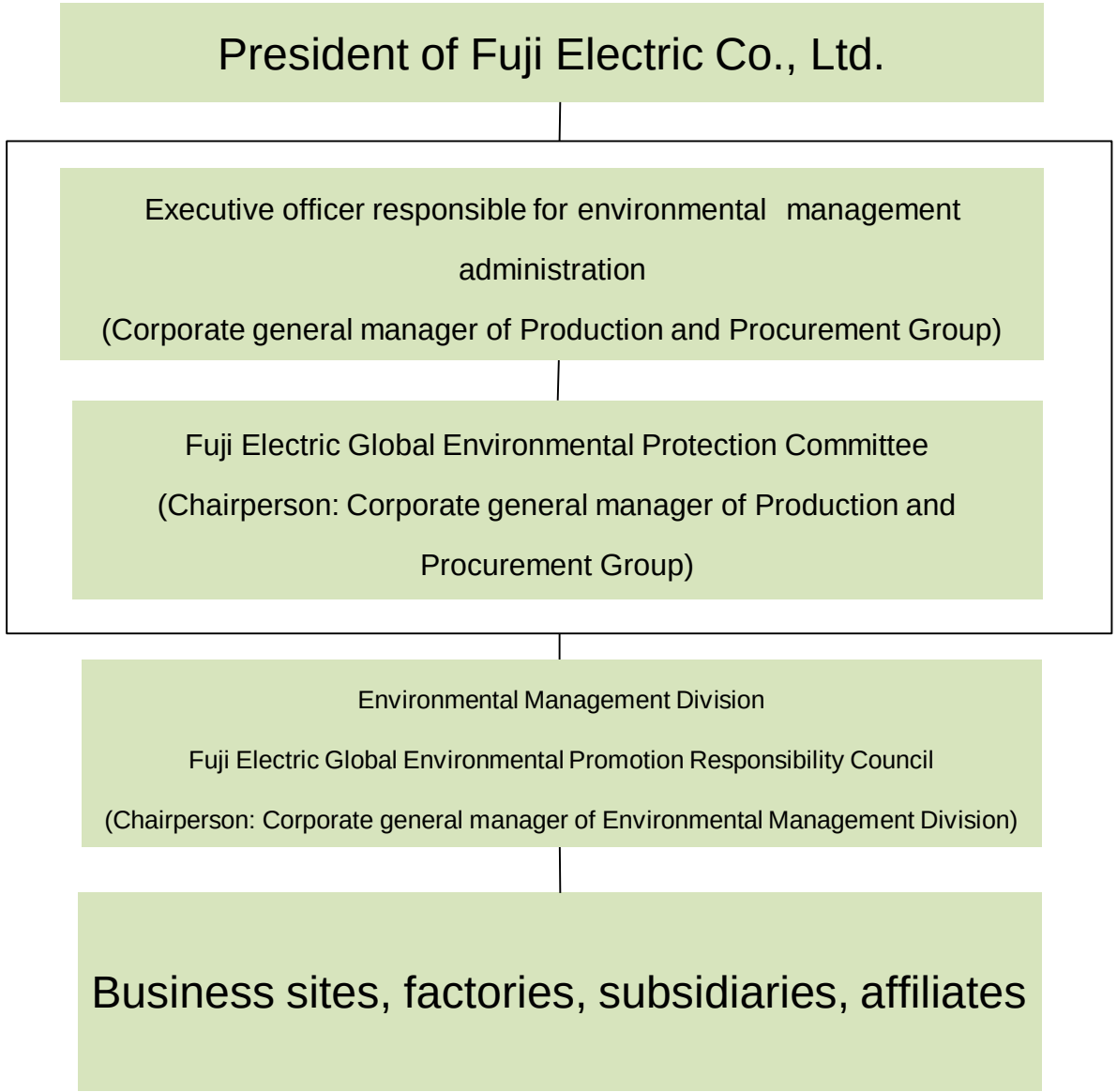
Established in 1992
Revised in 2003

Fuji Electric is keenly aware of its social responsibilities as a good corporate citizen of global society, and we regard efforts to protect the global environment as one of our most important management tasks. We strive to realize a sustainable society through global actions in accordance with the following basic principles.

1. Offering products and technologies that contribute to the global environmental protection
2. Reduction of environmental burden throughout product life cycles
3. Reduction of environmental burden in business activities
4. Compliance with laws, regulations, and standards
5. Establishment of environment management systems and continuous improvements of the systems
6. Improvement of employees' environmental awareness and social contribution
7. Promotion of communication

Environmental Management System



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Established in April 2009
*1: Revised in 2014 and 2017

Environmental Vision 2020

Stop Global Warming

- Reduce CO_2 emissions during production by 20% (compared with FY2006 level)
- Raise the energy efficiency of products, reducing CO_2 emissions by 30 million tons[*1] through energy-saving and energy-creating products

Create a Recycling-Oriented Society

- **Increase the number of eco-products by promoting the 3Rs (reduce, reuse, recycle) in our products**
- **Achieve zero emissions at operational sites by reducing waste and the use of energy and chemical substances**

Meet Our Corporate Social Responsibilities

- **Strive to enhance environmental awareness through environmental citizen movements, activities to protect the natural environment, and environmental education**

Environmental Vision 2020—Stop Global Warming

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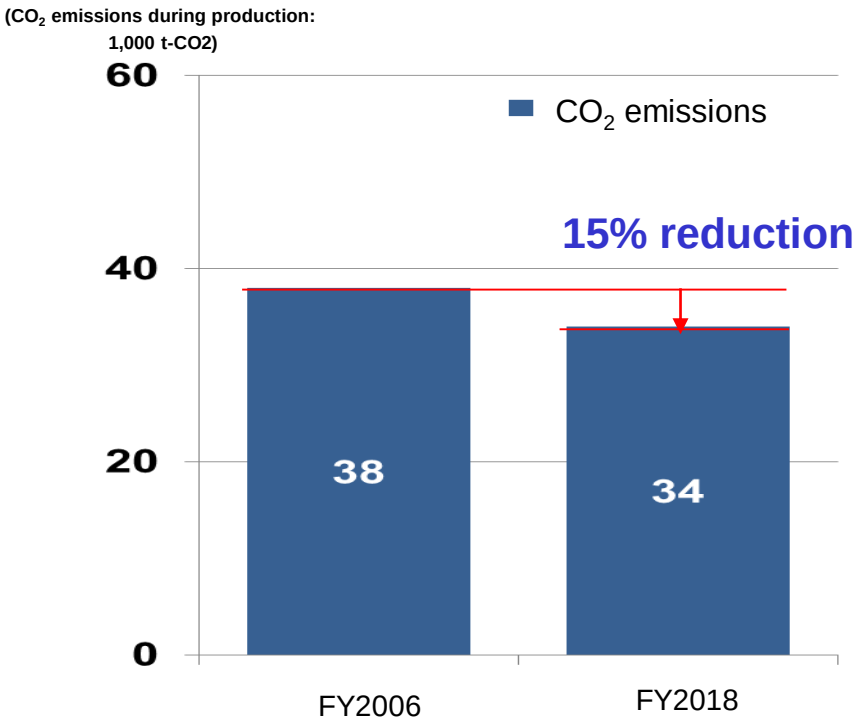
■FY2018 Performance

15% reduction in CO_2 emissions during production achieved through introduction of high-efficiency equipment and other energy conservation activities

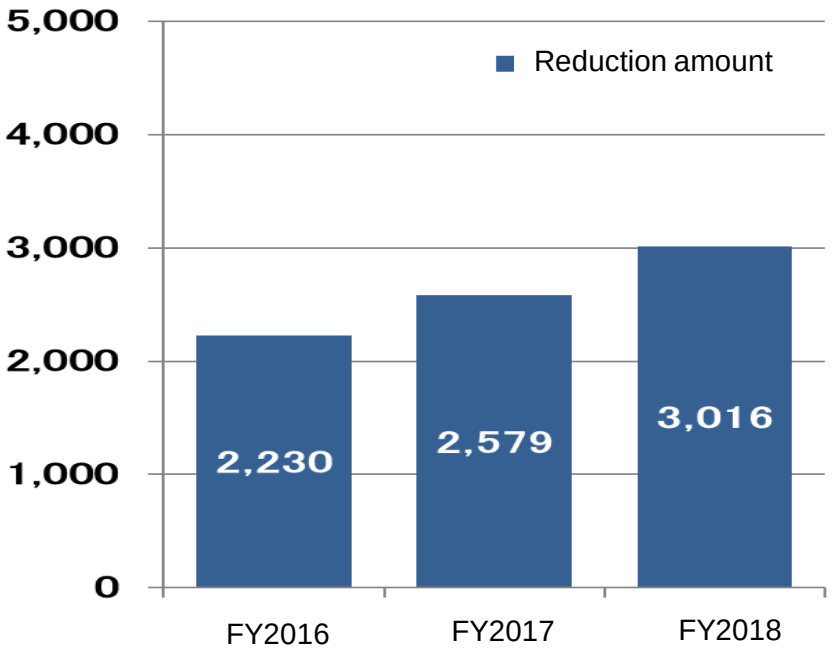
【CO_2 Emissions during Production】

Calculated using FY2006 power coefficient



【Reductions in Society's CO_2 Emissions】

Calculated using power coefficients for respective fiscal years

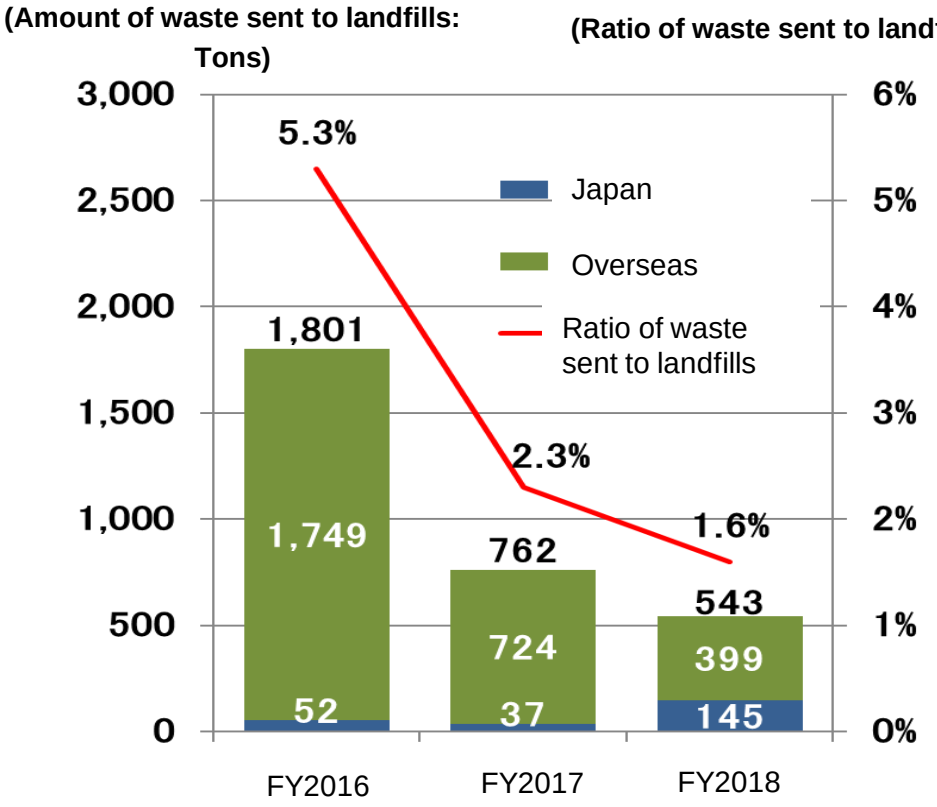


Note：Calculated based on the Ministry of Economy, Trade and Industry's Guideline for Quantifying Greenhouse Gas Emission Reduction Contribution

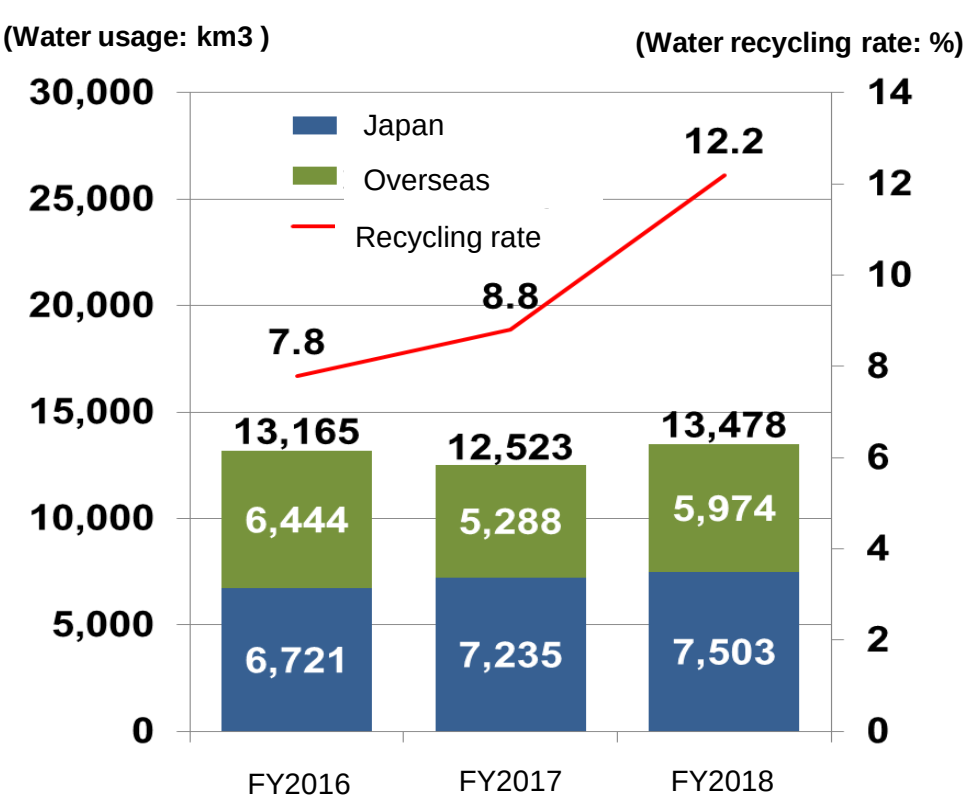
■FY2018 Performance

Reduction in ratio of waste sent to landfills to 1.6% following change in sludge treatment method, etc.
Increase in water recycling rate to 12.2% despite higher water usage in conjunction with increased production

【Amount and Ratio of Waste Sent to Landfills】



【Water Usage Volumes and Recycling Rate】



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Promotion of environmental preservation activities and environmental education

Activity Type	Major Examples (FY)
	2008 / 2009 / 2010 / 2011 / 2012 / 2013 / 2014 / 2015 / 2016 / 2017 / 2018 / 2019
Environmental citizen movements	**Encouragement of employees to wear cooler clothing and turn down lights**
Activities to protect the natural environment	**Farmland restoration (Kumamoto, Yamanashi)** **Forest preservation activities (Tokyo, Nagano)** **Tree planting activities (China, Philippines, Thailand, etc.)** **Biodiversity preservation activities (Tokyo, Kumamoto, Thailand, etc.)**
Environmental education	**Environmental compliance training for employees (new directors, etc.)** **Environmental education for children (Kumamoto, Yamanashi)** **Nature experience programs for children (Tokyo, Shizuoka)**

Forest restoration project (Nagano)

Farmland restoration (Kumamoto)

Coral planting (Thailand)

Environmental Vision 2050—Background

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Need to comply with Japan's Plan for Global Warming Countermeasures*1 and Fifth Basic Environment Plan*2 in light of international consensus represented by the Paris Agreement aimed at ramping up global efforts to combat the threat of climate change

*1: Plan putting forth directives for Japan's global warming countermeasures

- ✓ Strategic initiatives aimed at accomplishing long-term targets
  Target a reduction of 80% in greenhouse gas emissions by 2050
- ✓ Initiatives for achieving medium-term targets (reduction targets for FY2030)
  Greenhouse gas reduction target of 26% from FY2013 level by FY2030
- ✓ Reduction of environmental impacts through product and service supply chain

*2: Plan detailing the vision for a sustainable society

- ✓ Low-Carbon Society
- ✓ Recycling-Oriented Society
- ✓ Society in Harmony with Nature

Environmental Vision 2050—Establishment

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We aim to achieve a “Low-Carbon Society,” “Recycling-Oriented Society,” and “Society in Harmony with Nature” by expanding the use of Fuji Electric’s innovative clean energy technology and energy-saving products.

Realize a Low-Carbon Society

Target a reduction of 80% or more in greenhouse gas emissions across the supply chain

Realize a Recycling-Oriented Society

Promote green supply chains and 3R activities to reduce environmental impact to zero

Realize a Society in Harmony with Nature

Aim for zero influence on the ecosystem by corporate activities contributing to biodiversity

【 Fiscal 2030 Target】

Reducing Environmental Burden

- Reduce greenhouse gas emissions during production by 31%

【 (Greenhouse gas emissions’ base year: Fiscal 2013)】

Creating Environmental Value

- Reduce 50 million tons of CO_2 emissions through products annually

Initiatives under Environmental Vision 2050

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- **Contribute to reduced environmental impacts through provision of clean energy and energy-saving products**
- **Expand production-stage initiatives in upstream areas of supply chain**

＜Upstream＞	Supply Chain	＜Downstream＞
Business Partners Raw materials, components **Scope 3 upstream:** Mining, product, disposal, transportation, etc.	**Fuji Electric** Production Stage **Scope 1: CO_2 and non-CO_2 greenhouse gas emissions from fuel combustion** **Scope 2: CO_2 emissions from power plants due to electricity consumption**	Customers Product use **Scope 3 downstream:** Product use, disposal, transportation, etc.

Environmental Vision 2050

Low-Carbon Society	Target a reduction of 80% or more in greenhouse gas emissions across the supply chain		
	Fiscal 2030 Target	Reduce greenhouse gas emissions during production by 31%	Reductions in CO_2 emissions from products (energy-saving): 50 million tons/year
			Clean energy, energy-saving products
Recycling-Oriented Society	Green procurement	Environmental contribution products (3R products) Waste reduction and water recycling during production	
Natural coexistence society	Coordination with business partners	Reduction of environmentally hazardous chemical substances	Environmental contribution products

Environmental Vision 2050—Realize a Low-Carbon Society

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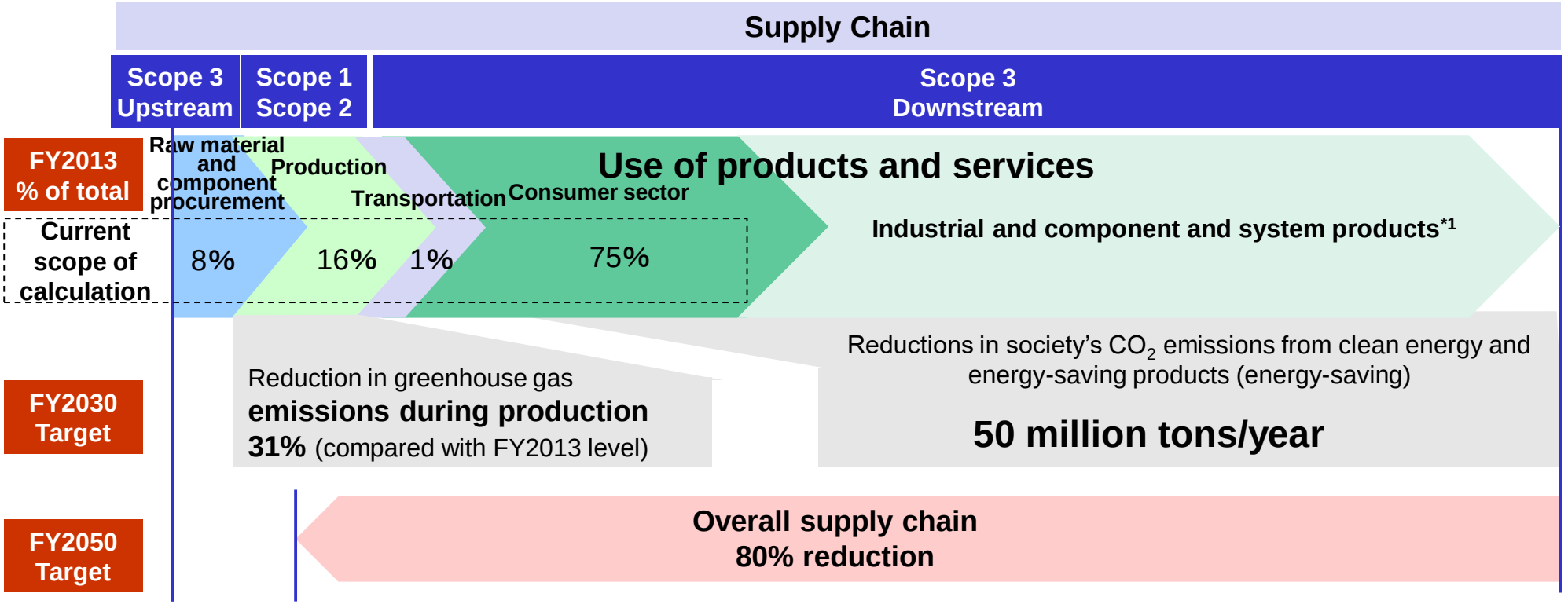

Challenge

Raw Material and Component Procurement

Expand greenhouse gas emission reduction initiatives in upstream areas of supply chain

Production

Implement plan for reducing greenhouse gas emissions during production

Use of Products and Services

Reduce greenhouse gas emissions from use of sold products

Maintain understanding of emissions covered by Scope 3

*1: Emissions from use of products sold to the industrial sector are included in customers' emissions reports and have therefore not been included in the calculations of the Company's emissions. Emissions from use of products sold to the consumer sector are calculated based on the emissions to which the Company's products are directly linked, which include those related to lost electricity from the power supply components of televisions and computers, electricity consumption by vending machines, and refrigerant gas contained within vending machines.

FY2030 Targets:
Plan for Reducing Greenhouse Gas Emissions during Production

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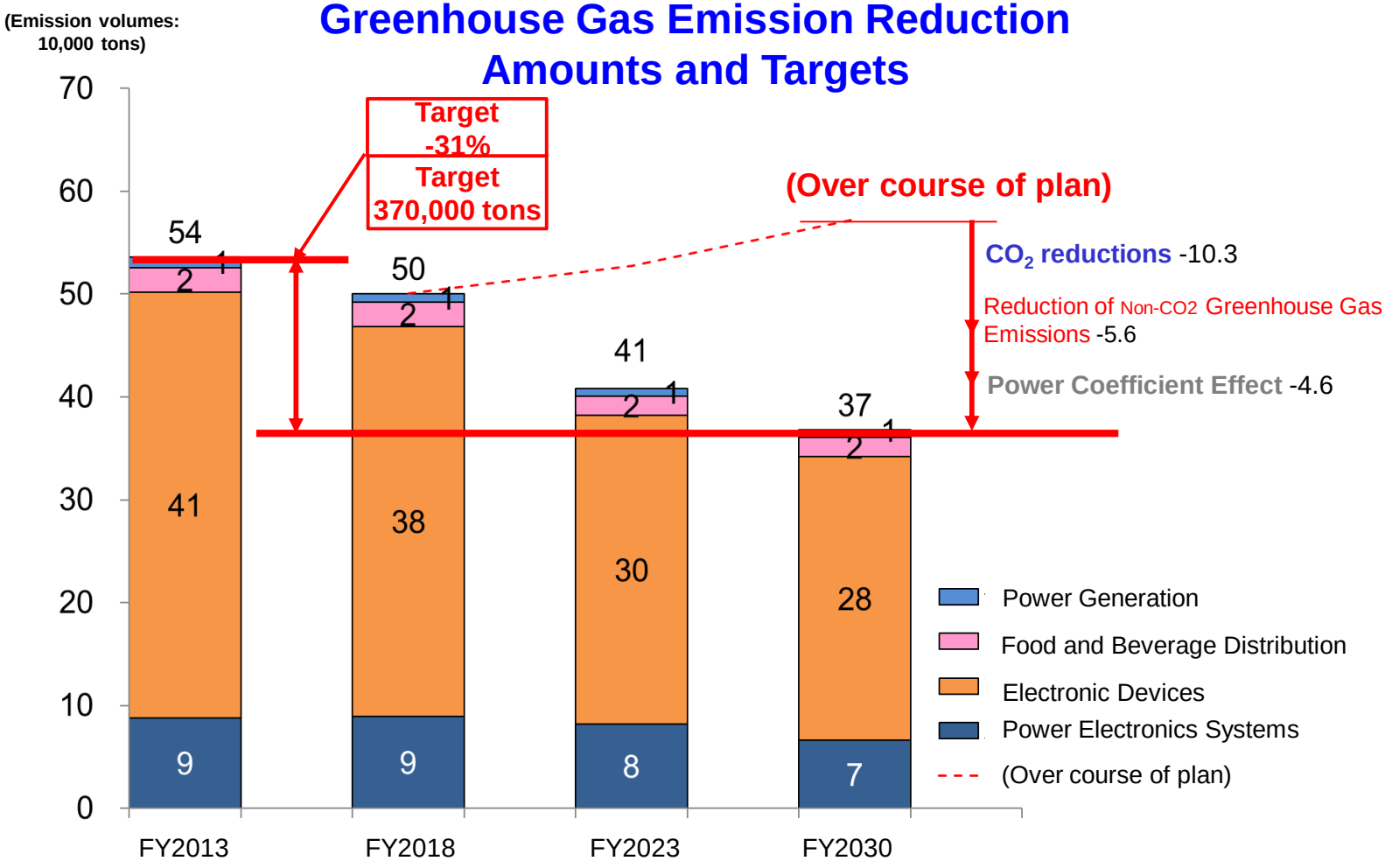
■Reduce greenhouse gas emissions during production by 31% (compared with FY2013 level, reduction target: 370,000)
Lower CO_2 emissions through energy conservation and non-CO_2 greenhouse gas emissions through installation of abatement systems

Greenhouse Gas Emission Reduction Amounts and Targets



【Reduction of CO_2 Emissions】
-10.3 tons
Conversion to LED lighting and inverters, improvement of air-conditioning efficiency, energy-efficient operation of equipment, etc.

【Reduction of Non-CO_2 Greenhouse Gas Emissions】
-5.6tons
Abatement systems, reduction/substitution of SF6, PFC, and HFC

【Power Coefficient Effect】
-4.6 tons
FY2013 0.567
FY2030 0.370
(t−CO_2/MWh)

Power Coefficient
0.567 **0.496** **0.370**

Reduction of Greenhouse Gas Emissions during Production (Example)

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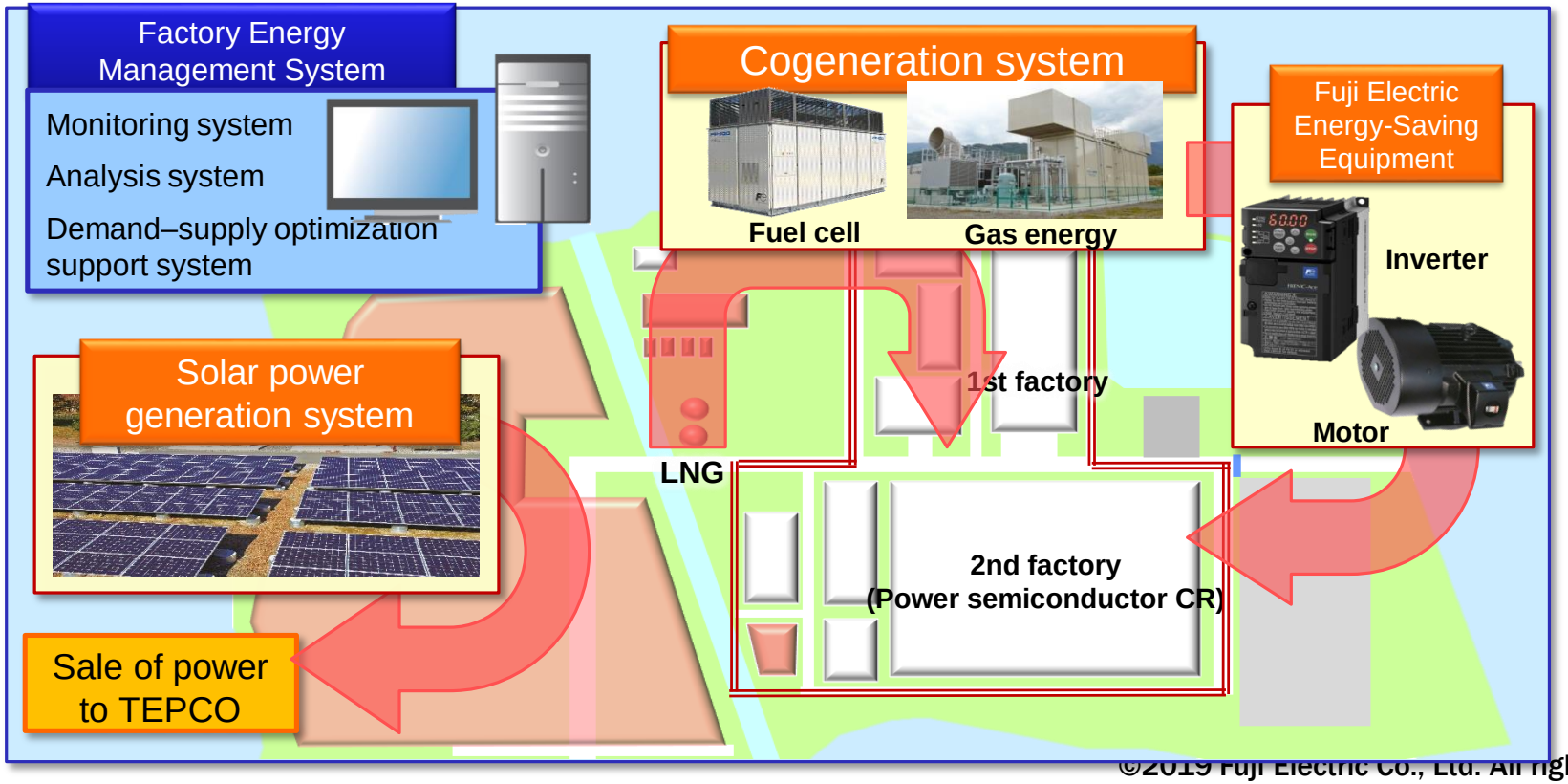
■ **Yamanashi Factory**

- **Reduction of CO_2 emissions during production with clean energy technologies (Receipt of Grand Prize of Minister of Economy, Trade and Industry in FY2016 Energy Conservation Grand Prize)**
- **Ongoing limitation of non-CO_2 greenhouse gas emissions through installation of abatement systems in new equipment**

Improvements to Energy Efficiency via Effective Utilization of Waste Heat Resulting in Reduction of 34% in CO_2 Emissions (Compared to prior to introduction)



■**Wuxi Fuji Electric FA Co., Ltd. (China) and Fuji Electric Manufacturing (Thailand) Co., Ltd.**

・**Utilization of renewable energy in production activities**

Introduction of Solar Power Generation Systems

Rates of CO_2 emission reduction through renewable energy introduction

Wuxi Fuji Electric FA (Capacity: 1,200 kW) ･･･20%

Fuji Electric Manufacturing (Thailand)

(Capacity: 500 kW for existing facilities, 870 kW for newly constructed facilities) ･･･30%

(Supply of 70%–90% of electricity used during daytime hours after completion of 3rd factory)

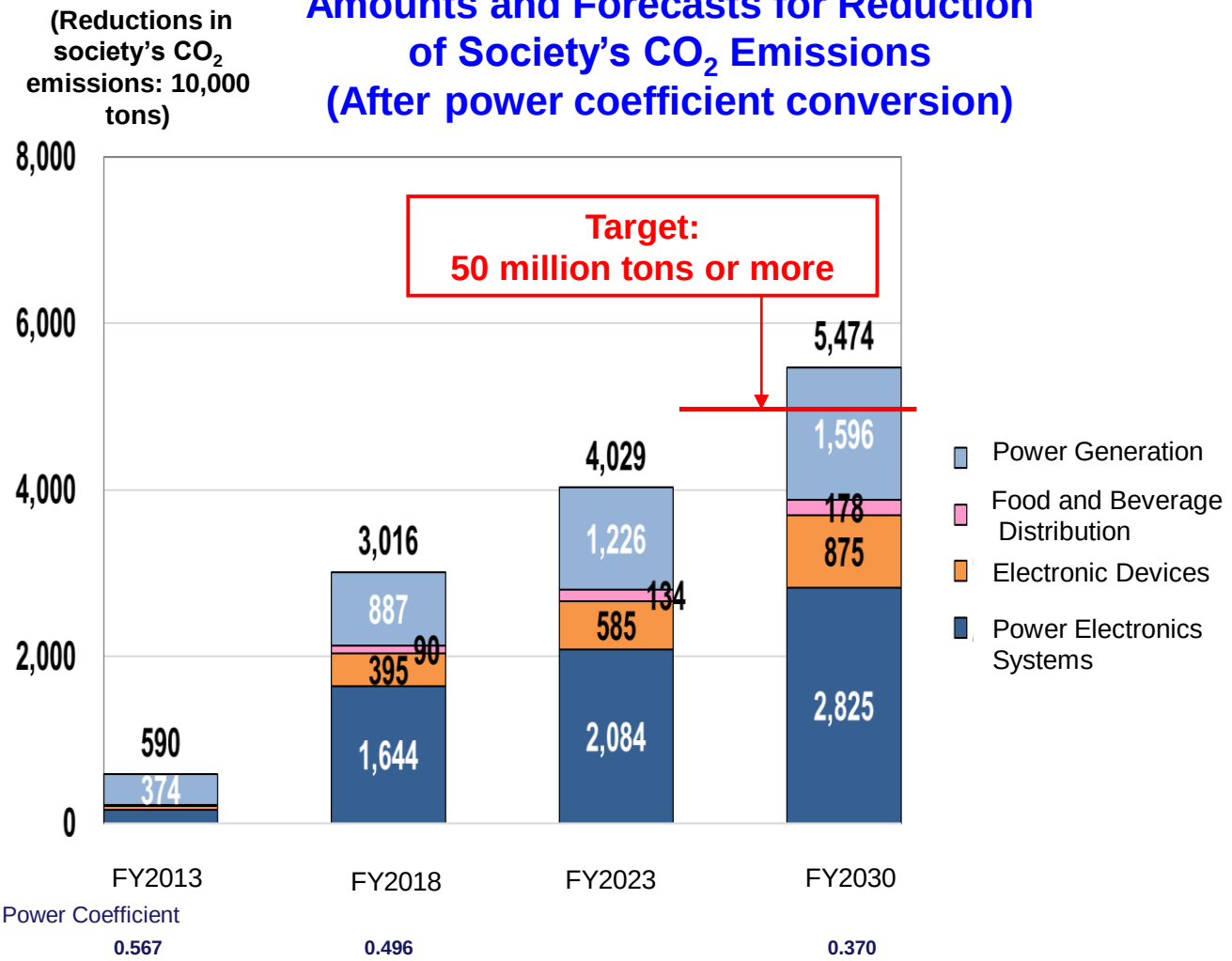
Wuxi Fuji Electric FA Co., Ltd.

Fuji Electric Manufacturing (Thailand) Co., Ltd.

FY2030 Targets:
Plan for Reduction of Society's CO_2 Emissions through Products

■ Reductions in society's CO_2 emissions through environmental contribution products: 50 million tons/year
・Contributions with energy-saving products, clean energy, low-loss power semiconductors, and other products

Amounts and Forecasts for Reduction of Society's CO_2 Emissions (After power coefficient conversion)



Note: Calculated based on the Ministry of Economy, Trade and Industry's Guideline for Quantifying Greenhouse Gas Emission Reduction Contribution

【Environmental Contribution 】

【Power Generation】
Geothermal, solar, wind, biomass, etc.

【Food and Beverage Distribution】
Vending machines, showcases, etc.

【Electronic Devices】
SiC modules, automotive IGBTs, etc.

【Power Electronics Systems】
Inverters, high-efficiency motors, transformers, UPSs, etc.

Net Sales and Reductions of Society's CO_2 Emissions by Segment

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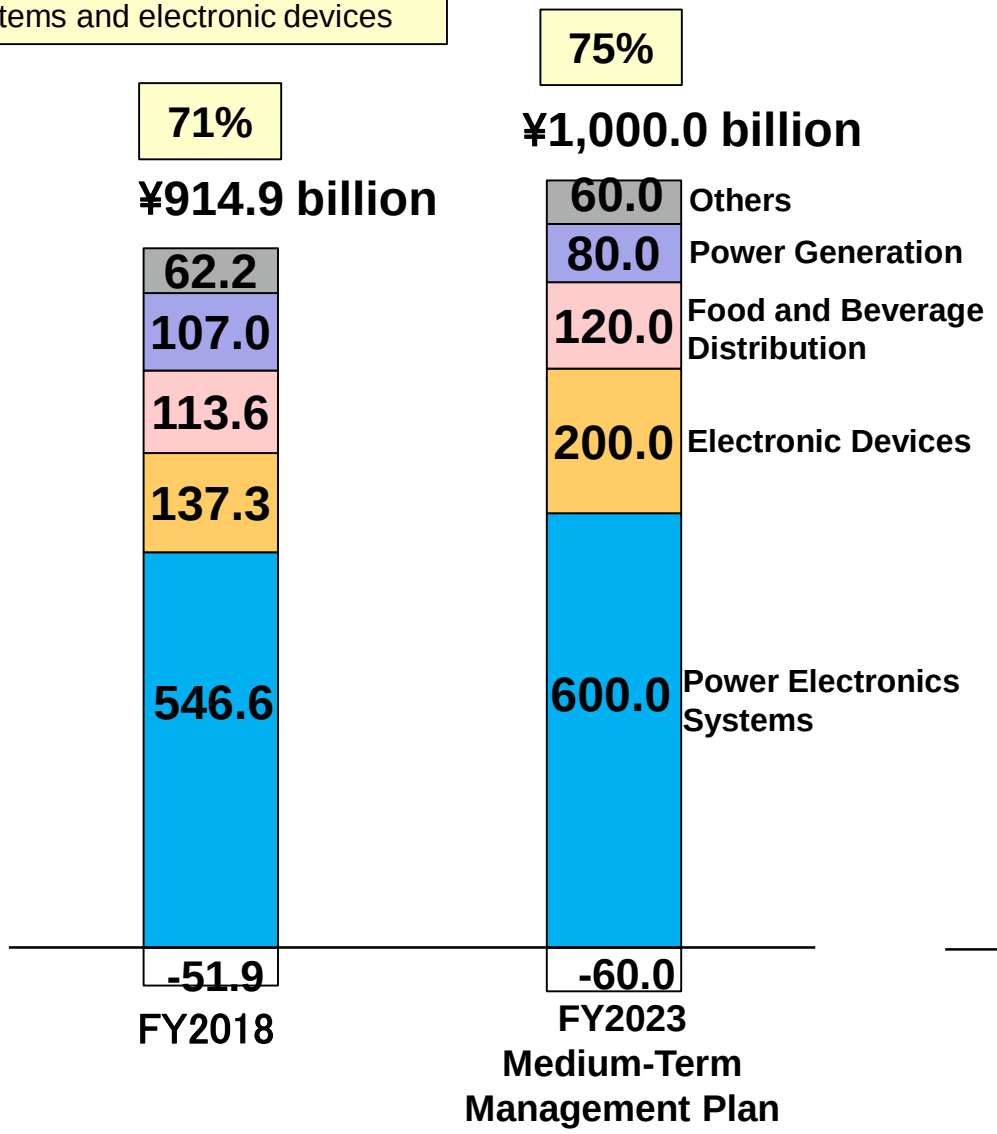
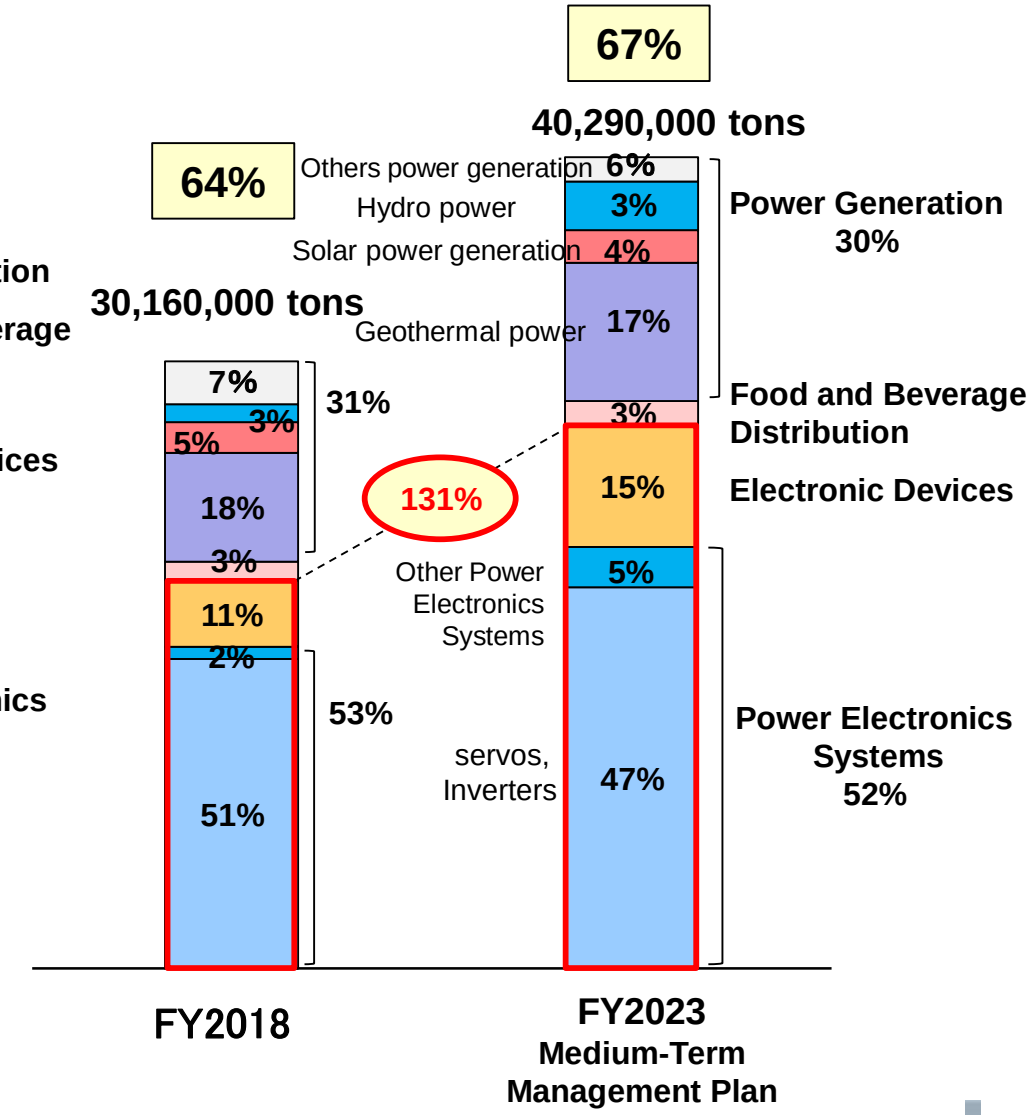
Net Sales by Segment

% attributable to power electronics systems and electronic devices



Reduction of Society's CO_2 Emissions by Segment



Fuji Electric's Clean Energy, Energy-Saving, and Environmental Contribution Products

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Clean Energy and Energy-Saving Products

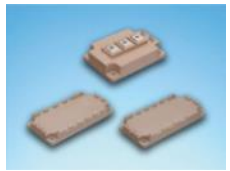
Clean Energy

% of net sales in FY2018: 7%

Geothermal power

Solar power PCSs

Wind power



SiC modules

% of net sales in FY2018: 76%

Inverters

High-efficiency motors

UPSs

Transformers

Traction converters for railcars

Magnetic switches

Contactors

Automotive IGBTs

Showcases

Vending machines

Environmental Contribution Products

% of net sales in FY2018: 13%

SOx scrubbers

Tunnel ventilation equipment

EMSs

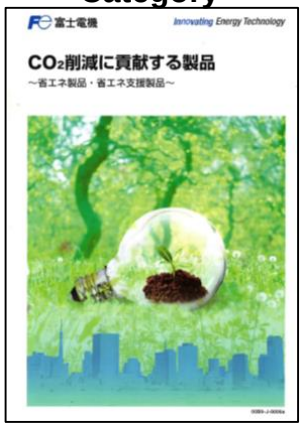
Smart meters

Electricity monitors

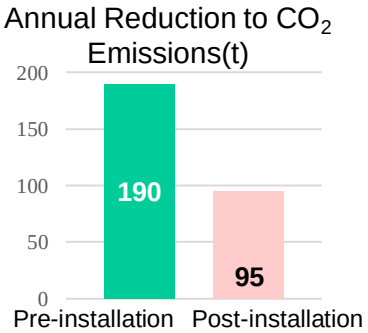
Gas analyzers

Radiation measurement equipment

Energy-Saving Product Category



Example of an inverter



CO_2 reduction: approx. 95 t-CO_2/year

Standards: FER-K9903, eco-product and super eco-product standards

Fuji Electric's Environmental Contribution Products (Power Electronics)

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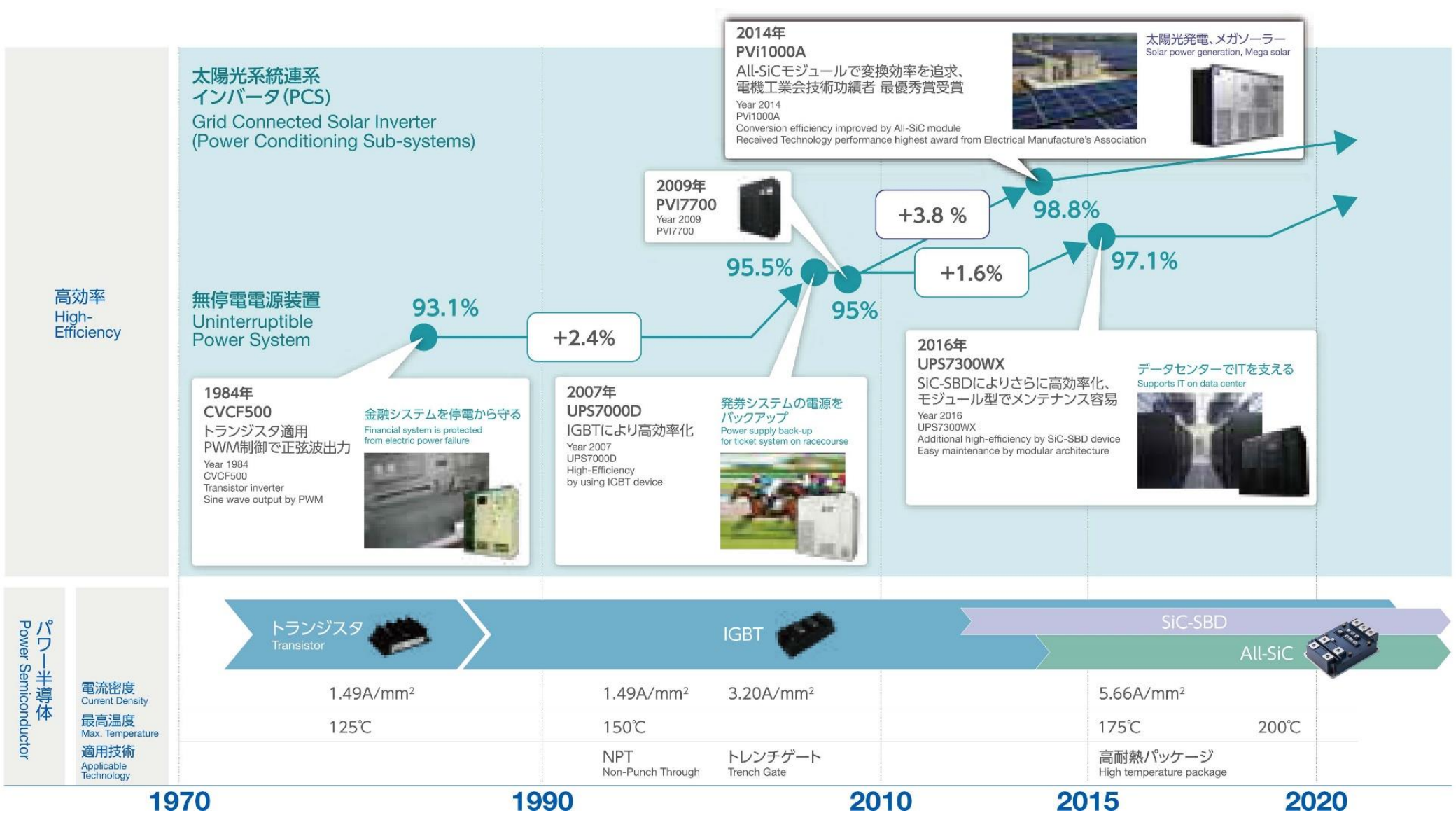

Fuji Electric's Environmental Contribution Products (Power Electronics)

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軽量化 Reduction in Weight

高速鉄道用主変換装置 Main Power Converter for High Speed Railcars

2,570kg → 61%down → 997kg → 6%down → 940kg

1963年
0系
主整流器
直流電動機制御
Year 1963
0 Series
Main Rectifier
with DC Electric Motor Control

2016年
N700A
主変換装置
IGBT搭載
Year 2016
N700A Series
Main Power Converter
by IGBT

N700S
主変換装置
SiC-SBD搭載
N700S Series
Next Generation Converter
by SiC-SBC

小型化 Reduction in Size

モータ可変速(低圧インバータ) Variable Speed Motor (Low Voltage Inverter)

7,803cm³ → 52%down → 3,718cm³ → 69%down → 1,140cm³

1983年
FVR-G2
トランジスタインバータ
誘導電動機の可変速を
手軽に実現
Year 1983
FVR-G2
Transistor Inverter
Easily realized induction
motor variable speed control

ファンの風量を自在に調節。
省エネのキーコンポーネント
Able to control fan airflow easily.
Key component for energy saving

1995年
FRENIC5000G9S
IGBT搭載、低騒音、
小型化
Year 1995
FRENIC5000G9S
IGBT inverter
Low noise
Size reduction

現場の生産性向上を支える
Enhanced productivity on site

2014年
FRENIC-Ace
第7世代IGBT搭載、
小型化を追求、多機能化
Year 2014
FRENIC-Ace By 7th Gen. IGBT
Size reduction is achieved
Multi-functional

設備の自動化に貢献
Contributes to automation equipment

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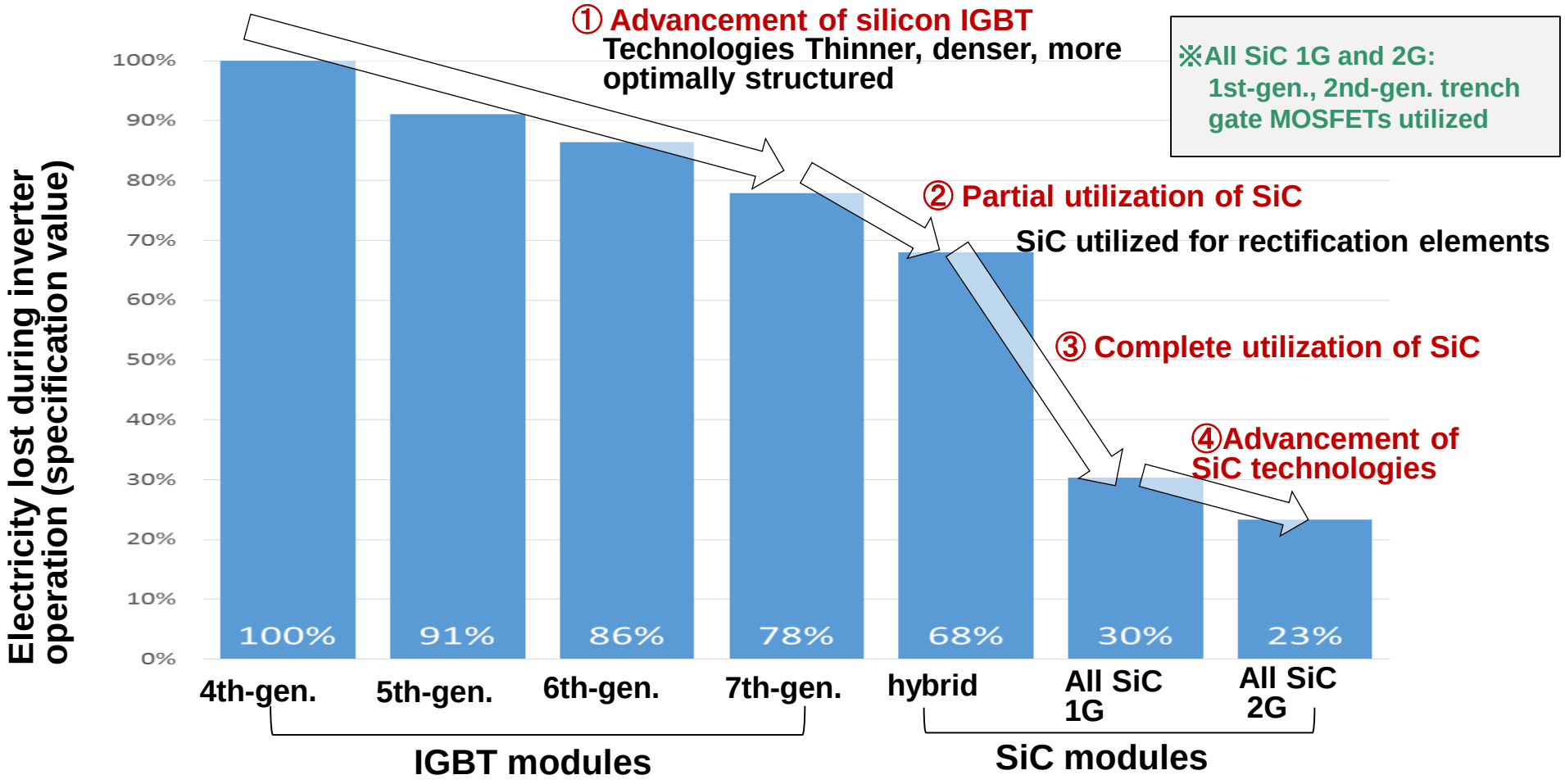
Reduction of 77% in electricity lost in latest all-SiC modules in comparison to 4th-generation IGBT modules



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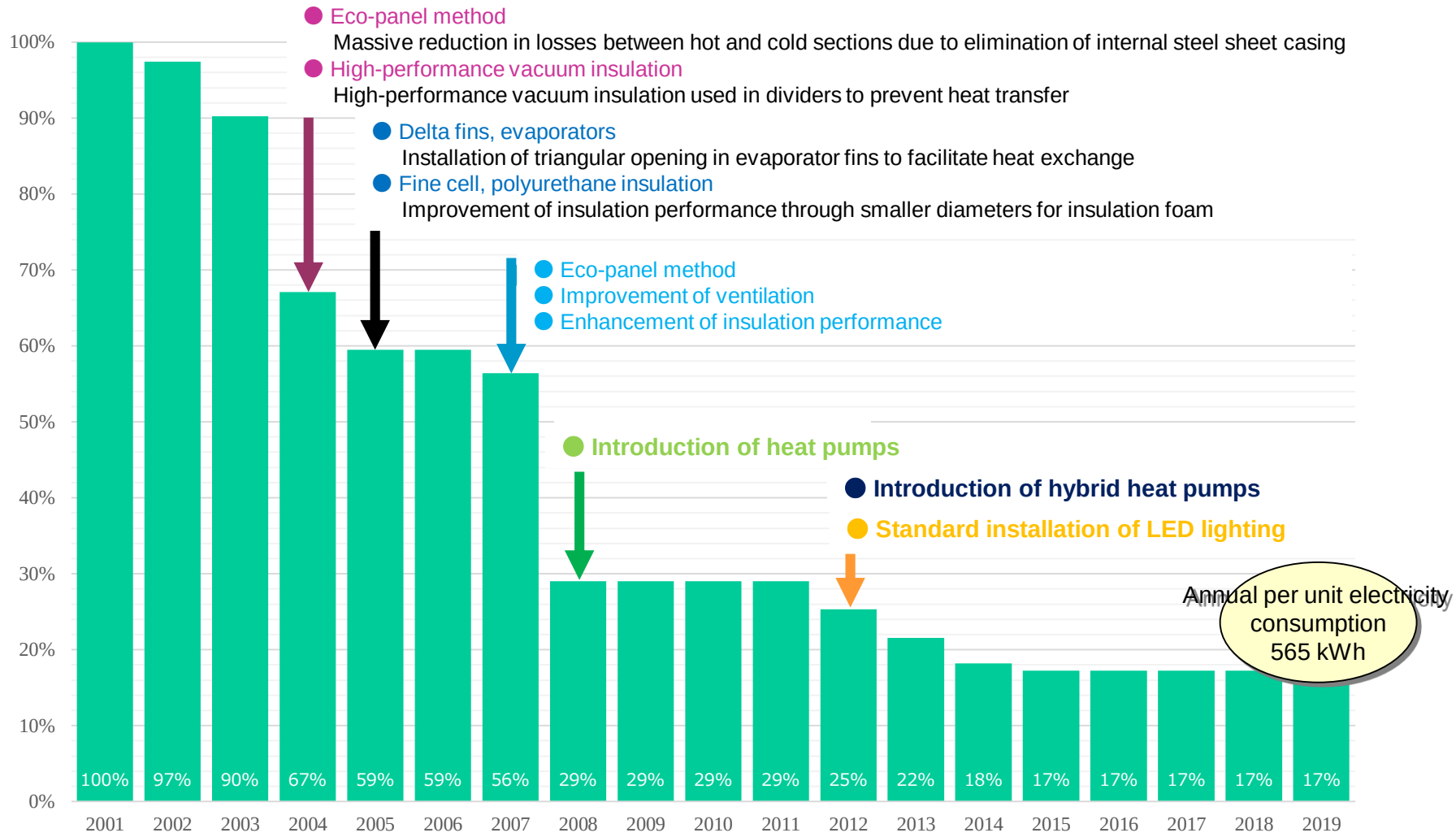
Annual electricity consumption reduction of 83% in comparison to 2001



Note: Figures for 2001 models for 30-slot, five-layer serpentine rack vending machines (the most common model of can vending machines) are used for base figures.

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Promote green supply chains and 3R activities to reduce environmental impact to zero

1. Increase number of eco-products by promoting the 3Rs in products

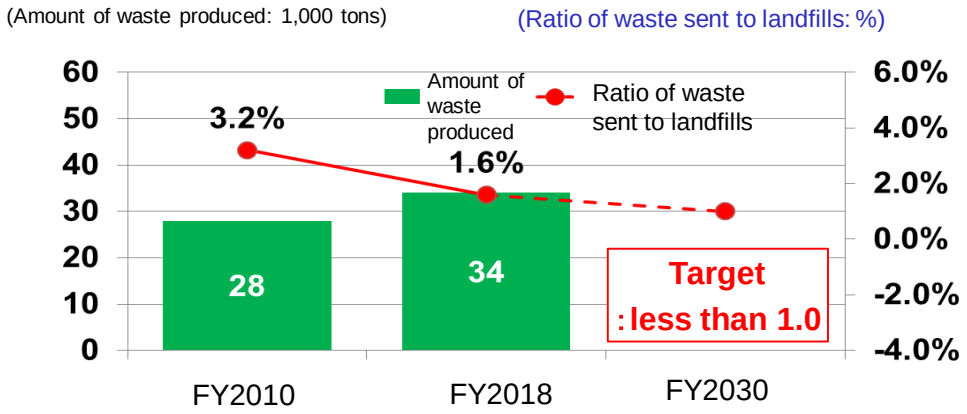
・Develop and design materials and products with consideration of the 3Rs

2. Minimize environmental impacts during production

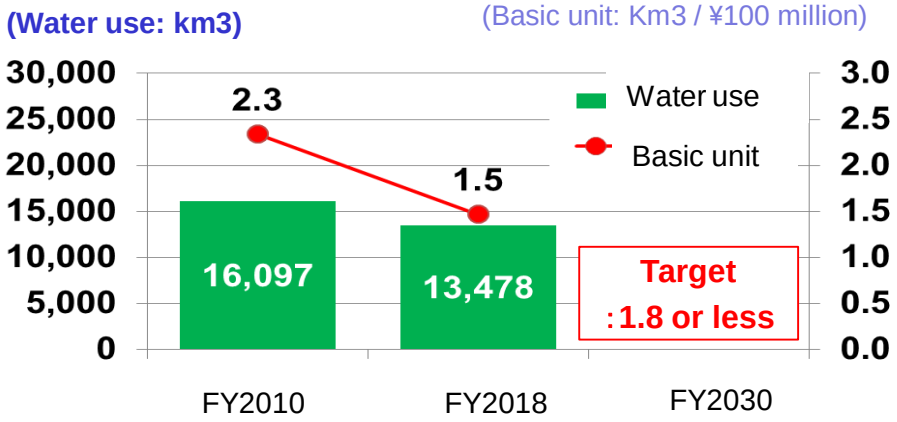
・Achieve ratio of waste sent to landfills of less than 1% at factories included in the scope of consolidation

・Keep water use per unit of net sales below 1.8 km3 per ¥100 million by promoting efficient use through increased recycling of water

【Global Ratio of Waste Sent to Landfills】



【Water Use per Unit of Net Sales】



3. Advance environmental initiatives together with customers

・Coordinate environmental preservation activities with business partners and conduct environmental education activities

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Promote green supply chains and 3R activities to reduce environmental impact to zero

Green Supply Chains

Business Partners' Environmental Preservation Activities

Components, materials

Coordination

Fuji Electric's Environmental Preservation Activities

【Procurement】
- Purchase of environmental contribution products and materials

Design

【Products】
- Reduction of size and weight
- Selection of recyclable materials

Procurement/ Purchasing → Production → Distribution → Use

【Production】
- Reduction of waste
- Improvement of water recycling rates

Disposal

【Waste】
- Ease of sorting
- Revision and weight reduction of packaging

Waste Reduction Initiatives (Example)

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■Fuji Electric (Malaysia) Sdn. Bhd. (electronic devices factory)

・Reduction of amount of waste sent to landfills

Recycling of sludge extracted during wastewater treatment processes for use in cement

Reduction in amount of waste sent to landfills in FY2018: 70% (in comparison to FY2016 level)

AKBK Sustainable Resource Management Centre waste recycling plant

Effective Utilization of Water Initiatives (Example)

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■Matsumoto Factory (electronic devices factory)

・Reduction of water use and promotion of water recycling

◆ Electric water purifiers

Elimination of need for wastewater treatment for ion-exchange resin regeneration solutions and consequent reduction in water resource use

◆ Wastewater recovery systems

Recovery of factory wastewater to be recycled and reused in factory cooling towers and toilets (approx. 1,000 tons per day)

◆Pure water recycling initiatives

Categorization of wastewater from manufacturing processes to recycle relatively high-quality water for use in place of pure water

Wastewater recovery system

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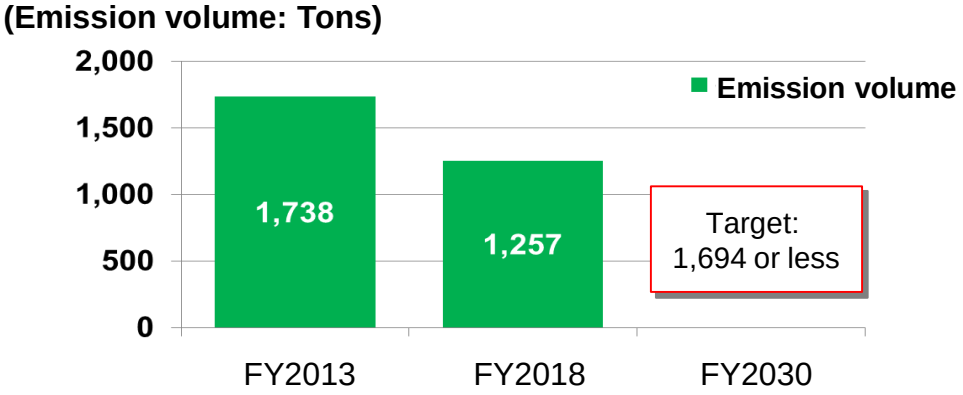
Aim for zero influence on the ecosystem by corporate activities contributing to biodiversity

1. Reduce environmental impacts of business activities and products

- Appropriately manage hazardous chemical substances (volatile organic compounds) to keep emission volume below 1,694 tons
- Evolve technologies used in environmental contribution products

【Global Chemical Substance (Volatile Organic Compound) Emission Volumes】



2. Promote environmental preservation through social contribution activities

- Undertake in forest restoration projects and community cleanup activities
- Conduct tree planting and beach cleanup activities to preserve marine and river environments
- Provide environmental education for employees
- Hold science classes, training, and workplace experience programs
- Conduct factory tours, etc.

Initiative Example—Exhaust Gas Cleaning Systems for Ships

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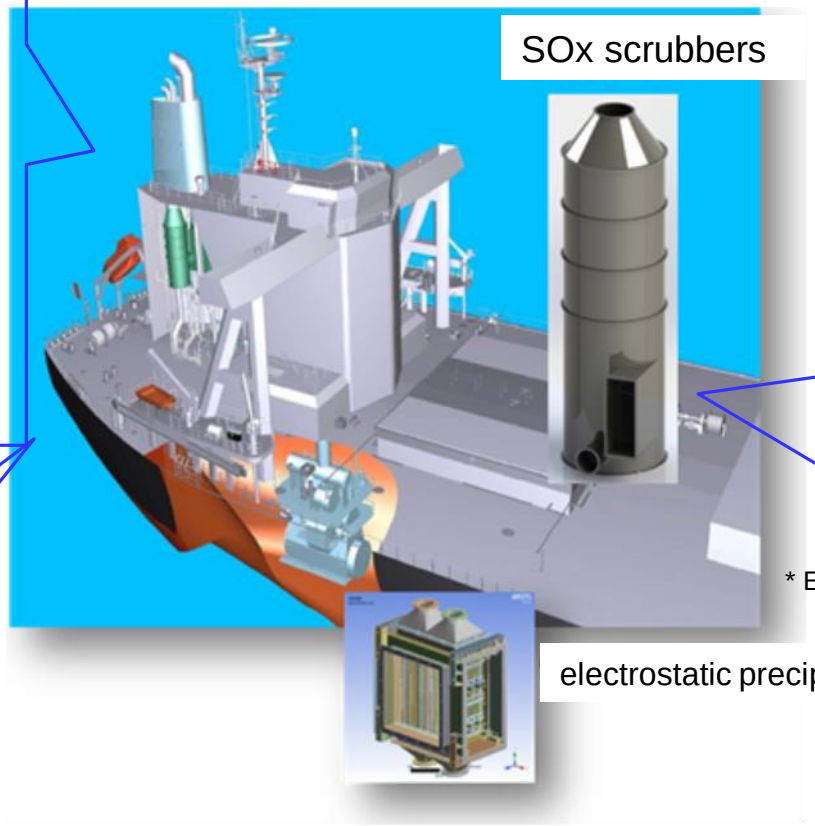
Address standard ocean area SOx regulations to be instituted in 2020
Remove more than 98% of SOx included in ship exhaust gas
Reduce size by over 50% in comparison to conventional SOx scrubbers

Sampling-type SO_2/CO_2 meter

Laser-type SO_2/CO_2 meter

pH/PAH turbidity water quality meter



EGCS* control gear

Flow control inverter

* EGCS: Exhaust gas cleaning system for ships

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