

# Achieve a Decarbonized Society

We are working to achieve a decarbonized society based on the Fuji Electric Basic Environmental Protection Policy and our Environmental Vision. In June 2019 we formulated the Fuji Electric Environmental Vision 2050 to determine the direction of the Company's environmental activities. Guided by this vision, we continue to achieve steady results.

Meanwhile, governments around the world are boldly seizing the initiative to "decarbonize," a movement that is starting to penetrate social and industrial sectors as a new growth strategy. Thus, in fiscal 2021 we will endeavor to rethink our Environmental Vision 2050 from the perspective of strengthening business operations and we have also decided to consider what specific initiatives are required for achieving our vision. We have established clear environmental targets that we need to actively address in the long run as we aim to achieve carbon neutrality in the overall supply chain in 2050 in order to realize a society with net-zero carbon emissions.

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## Action Plan to Reduce Greenhouse Gas Emissions

The Paris Agreement was adopted by COP21 in December 2015. Japan ratified this agreement in November 2016 and began promoting initiatives toward achieving the agreement's emission reduction targets. The three main points of the Paris Agreement are as follows.

1. All countries are obligated to submit their greenhouse gas reduction targets to the United Nations every five years and to implement initiatives toward achieving these targets.
2. Countries are expected to strive to limit the rise in average temperature to less than 2.0°C above preindustrial levels and to make efforts to keep this rise below 1.5°C.
3. Countries should seek to achieve zero emissions of greenhouse gases on a real basis in the second half of the 21st century.

Following the adoption of the Paris Agreement, in 2016 the Japanese government released a plan to combat global warming. It also submitted a 2030 greenhouse gas emissions reduction target of 26% versus fiscal 2013 levels to the United Nations. For the electrical machinery and electronics industries, the key initiatives of the government's action plan are improving energy efficiency of production processes and helping to limit emissions with products and services.

In response to this policy, in fiscal 2018 we established two targets for 2030: a 31% reduction in greenhouse gas emissions versus fiscal 2013 and a 50 million ton reduction in CO<sub>2</sub> emissions in society through our products. In fiscal 2019 we formulated our Environmental Vision 2050 and clearly documented our approach to targeting a reduction of 80% or more in greenhouse gas emissions across the supply chain.

Given the shift in society towards carbon neutrality, in fiscal 2021 we announced our commitment to helping realize a society with net-zero carbon emissions. We have also raised our fiscal 2030 reduction target to at least -46% (vs. FY2013) and we are currently considering what concrete measures to implement. Going forward, in addition to production activities, including procurement and transportation, we will aim to achieve carbon neutrality across the entire supply chain by working to reduce CO<sub>2</sub> emitted when our products are being used.

## Reducing Greenhouse Gas Emissions During Production

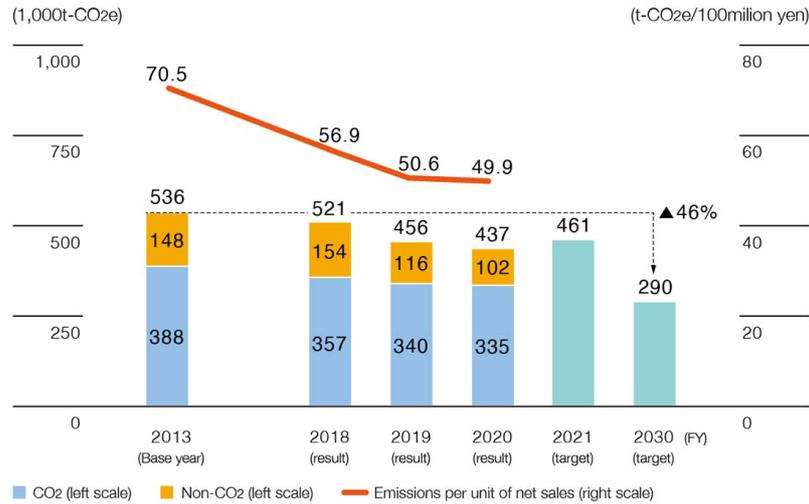
### Reduction of Total Greenhouse Gas Emissions

Fuji Electric aims to reduce greenhouse gas emissions from production processes by more than 46% by 2030 compared to fiscal 2013 and has clarified its stance on aiming to achieve carbon neutrality by 2050. We define greenhouse gas emissions as the sum of CO<sub>2</sub> emitted through energy consumption and greenhouse gases other than CO<sub>2</sub> (HFC, PFCs, SF<sub>6</sub>, and NF<sub>3</sub>) emitted in the production process.

The new emission target value (290,000 tons) for fiscal 2030 represents an annual reduction rate of around 4.2% from actual emissions in the base year of fiscal 2013. This reduction rate is in line with the "1.5°C scenario" for achieving carbon neutrality in fiscal 2050.

Even before formulating Environmental Vision 2050, we were working to reduce CO<sub>2</sub> emissions from production activities. The fiscal 2030 target is equivalent to a 63% reduction from the fiscal 2006 level (our base year for energy-saving activities) and an 83% reduction from fiscal 1990 (global base year for the Kyoto Protocol).

### Greenhouse Gas Emissions



**1. Scope:**

(1) Japan: All production sites and consolidated production subsidiaries\*

(2) Overseas: Consolidated production subsidiaries (Fuji Electric Consul Neowatt (India) was included in the scope of consolidation in fiscal 2020)

**2. Power coefficients:**

(1) Japan: Based on Keidanren's Action Plan for Commitment to a Low-Carbon Society (0.444kg-CO2e/kWh for fiscal 2020)

(2) Overseas: Latest average power coefficients for each country in IEA's Emission Factors 2020. Average value for 2018 used for fiscal 2020. \*In fiscal 2020, emissions from domestic offices (4,737t-CO2) are recorded under "use of lease assets" (category 8 of Scope 3) because we occupy office space as a tenant.

**Actual greenhouse gas emissions during production in fiscal 2020 and future reduction measures**

To achieve our fiscal 2030 emission target, we calculated the effects of specific measures and reflected them in our annual plan. The plan to achieve our Environmental Vision 2050 includes provisions to invest in additional energy conservation and gas exclusion equipment in case the projected effects of the specific measures fall short of our target.

**<Activities and Achievements in Fiscal 2020>**

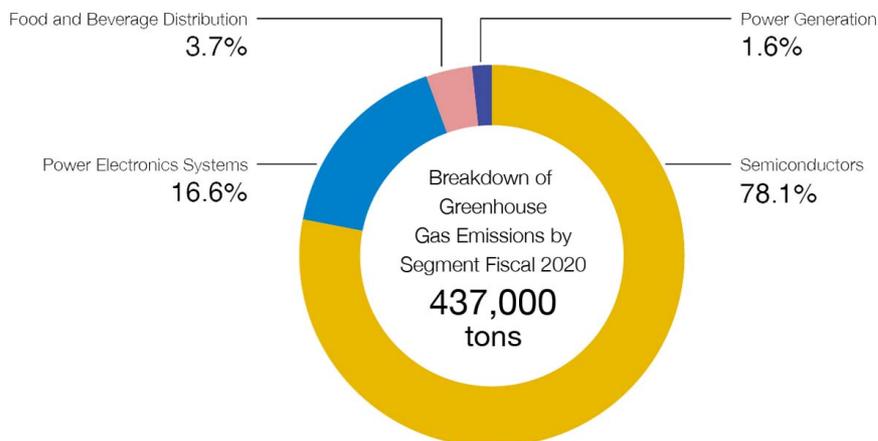
Actual volume of greenhouse gases emitted during production at our facilities in fiscal 2020 totaled 437,000 tons, meaning that we achieved our single-year target of 479,000 tons. This figure represents a 4.3% year-on-year reduction. Specific activities and reductions (year-on-year comparisons) are as follows.

- Energy-saving activities (installation of high-efficiency lighting, air conditioning, etc.): 4,000 tons
- Greenhouse gas replacement: 19,000 tons
- Power coefficient reduction effect: 4,000 tons

As mentioned above, we achieved a 27,000-ton reduction due to measures taken under our Environmental Vision. The breakdown in change is as follows.

- Change in scope of calculations: -40,000 tons (+1,000 tons for new facilities, -5,000 tons when excluding office departments)
- Production decrease on fewer orders owing to COVID-19: -4,000 tons
- Production increase on more orders for semiconductors: 16,000 tons

**Breakdown of Greenhouse Gas Emissions by Segment**



**Utilizing Renewable Energy for Production**

Fuji Electric first installed renewable energy (solar power generation) with a PCS (power conditioning system) field test in 1996.

Our solar power generation currently in operation was installed in 2005 following a 10kW solar power generation (proprietary developed solar power module) field test.

Beginning in 2005, we purchased seven years' worth of "green" energy certificates at one million kWh per year. From fiscal 2013 we were able to cover roughly 1.0 million kWh annually ourselves with the installation of mid-size (300–500kW) solar power generation equipment at production sites in Japan and overseas.

In fiscal 2018 we installed solar power generation equipment on the roofs of our plants in China and developed a general purpose PCS for the electricity sales business. The first project under this initiative was to install the equipment at our own plants and conduct field testing.

In fiscal 2019 we upgraded the equipment to a capacity of roughly 4.0 million kWh per year. However, the electricity generated only accounts for about 1% of the power we purchase.

Installation of solar power generation equipment in fiscal 2020

Japan — four plants: 563kW	: 0.59 million kWh
Overseas — four plants: 1,382kW	: 1.58 million kWh
two plants (purchase of rooftop power):	1.73 million kWh

### ■Emissions Trading System

Some of our operating bases are subject to emissions trading systems under regulations pertaining to their location and laws of their local countries.

Japan (Tokyo and Saitama Prefecture)

Under this system, the difference between actual emission volume and total CO<sub>2</sub> reduction targets set by the government based on past emission results is traded. The system is currently in Phase 2 and has stronger reduction targets than Phase 1, which ended in fiscal 2014.

Overseas (Shenzhen, China)

Shenzhen City imposes improvement targets for CO<sub>2</sub> emission intensity for companies and public institutions of a certain size (equivalent to the scale of Type 2 factories under Japan's Energy Conservation Law). Following Phase 1, when we were subject to uniform annual improvements of 6.1%, we moved to Phase 2 in 2016. In Phase 2, the improvement target is no longer uniform, but depends on actual emission results over the past three years. Since the emission intensity of our Shenzhen Factory was lower than the industry average, our target was slightly relaxed, from 6.1% to 5.59% per year.

There are also plans in Phase 2 to implement an emissions trading system for companies of a certain size (emissions of about 30,000 tons) or larger throughout the country. Such a system would only apply only to Shenzhen Factory out of our facilities.

Fiscal 2020 is the final year of Phase 2 for the above-mentioned three systems and emission credits must now be settled. The balance of emission credits at each plant following settlement are as follows.

Fukiage(Saitama): 31,396t-CO<sub>2</sub>

Tokyo: 5,919t-CO<sub>2</sub>

Shenzhen: 9,707t-CO<sub>2</sub>

[DATA » Emissions trading status](#)

### Topics Reducing CO<sub>2</sub> emissions during production at the Suzuka plant

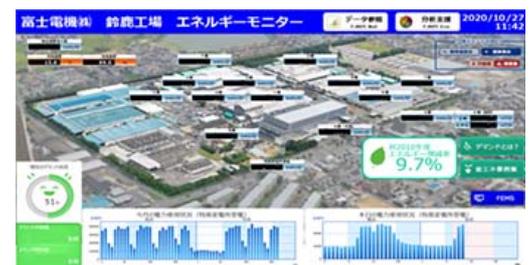
At the Suzuka plant—the mainstay factory of the Power Electronics Systems Industry business unit—we are carrying out energy-saving activities in which all employees can participate in an effort to reduce the amount of power we consume.

A total of 20 energy-saving management teams have been formed between departments on each floor of the plant. These teams formulate their own annual targets and action plans and follow-up on the results at monthly meetings. Uncovering areas where energy can be saved is made much easier with the use of an energy visualization system. By visualizing and identifying wasteful energy use, we can make a difference simply by turning

off the power used when manufacturing equipment is idle on weekends and holidays, for example.

We are also taking steps to use lighting more efficiently. In addition to replacing globes with LEDs, we are reducing the number lights installed and arranging them more efficiently with a combination of broad-reaching illumination and focal lighting in order to ensure appropriate levels of illumination in each work area.

These initiatives delivered a reduction in energy consumption of roughly 9% year on year in fiscal 2020.



Energy Visualization System

### Greenhouse Gas Emissions: Results and Future Measures

Our production activities use and emit CO<sub>2</sub> and four types of greenhouse gases. CO<sub>2</sub> emitted during production comes under Scope 1 and Scope 2 emissions.

- Scope 1: Gases emitted directly from a production facility due to combustion of fuel during operation of cogeneration power generation, boilers, drying ovens, and the like.
- Scope 2: Indirect emissions from power plants as a result of electricity use.

The four types of greenhouse gases we use and their main uses are as follows.

- HFC (CFC substitute): Used as refrigerants, solvents, and for dry etching of semiconductors.
- PFC (perfluorocompounds): Used for dry etching of semiconductors, as solvents, etc.
- SF6 (sulfur hexafluoride): Used as insulating gas and for dry etching of semiconductors.
- NF3 (nitrogen trifluoride): Used for dry etching of semiconductors.

Greenhouse gases other than CO<sub>2</sub> (hereinafter GHGs) are calculated by multiplying direct emissions from our factories by the global warming potential (GWP), which is a CO<sub>2</sub> conversion coefficient.

Until now, we have worked to reduce CO<sub>2</sub> emissions mainly through energy-saving activities aimed at increasing energy efficiency. However, it became clear that we could not meet our medium-term target by simply expanding conventional energy-saving measures. For this reason, we reviewed our investment criteria and incorporated investments in high-efficiency HVAC and LED lighting into a five-year renewal plan for each factory in order to reach our reduction target.

To reduce GHG emissions, moreover, we have formulated specific reduction plans for each factory and begun efforts to switch to alternative gasification and ensure more effective utilization. We are proceeding methodically with R&D and quality assurance related to alternative gasification.

In fiscal 2020 we pushed ahead with the use of non-CFC urethane foaming agent for use in the production of showcases at our Mie Factory. We also made progress on technological developments for production processes at our overseas semiconductor plant (Fuji Electric (Malaysia) Sdn. Bhd.) and the Fukiage Factory, which manufactures high-voltage circuit breakers, and as a result of switching to a more environmentally-friendly insulating gas to replace SF<sub>6</sub>, we have been able to reduce overall greenhouse gas emissions by about 19,000 tons.

In fiscal 2021 we will look to install more abatement equipment for existing semiconductor production lines.

### Greenhouse Gas Emissions Other than CO<sub>2</sub>



[DATA >> Greenhouse Gas Emissions](#)

[DATA >> Breakdown of Scope 1 Emissions, Breakdown of Scope 1 and 2 Emissions by Country](#)

### Smart Factory Initiative

Fuji Electric promotes the Smart Factory Initiative at production sites to optimize energy use through coordination between electrical and thermal energy technologies and production planning to use energy more efficiently.

### Reducing Society's CO<sub>2</sub> Emissions through Products

Fuji Electric aims to help reduce CO<sub>2</sub> emissions in society as a whole by innovating electric and thermal energy technologies.

The use of clean energy and energy-saving products by our customers also helps reduce CO<sub>2</sub> emissions during equipment operation. We calculate the CO<sub>2</sub> emission reduction effect of our products shipped after fiscal 2009 (products that have not yet reached their average service life) when they are in operation for one year.

#### CO<sub>2</sub> Emission Reduction Effect of Products Shipped in Fiscal 2020: Targets and Results

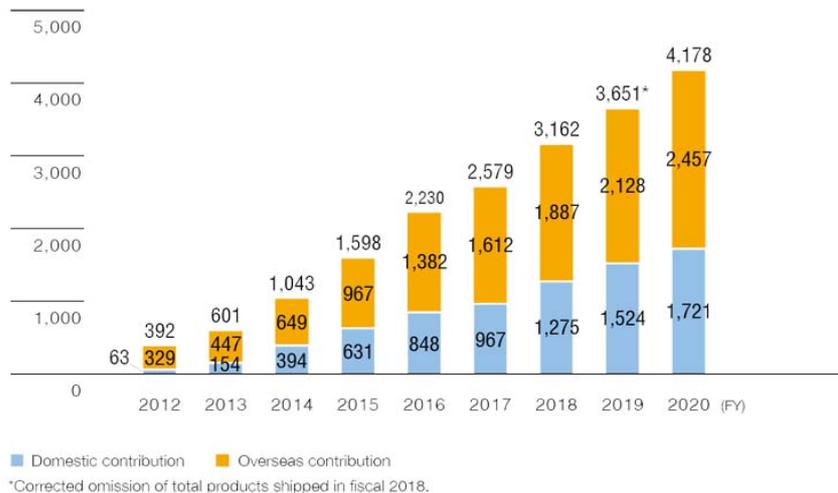
In fiscal 2020, we achieved our target with a reduction of 41.78 million tons thanks to clean energy in the power generation business and our use of energy-saving equipment, such as inverters in the power electronics system business, and IGBT modules in the electronic devices business. The increases in reduction effect break down as 1.79 million tons in the power electronics system business, 840,000 tons in the electronic devices business, and 2.58 million tons in the power generation business.

#### Fiscal 2020 Result for the Year

FY2020 Target	FY2020 Result	FY2021 Target
34 million tons annually	41.78 million tons annually	36 million tons annually

## Reducing Society's CO<sub>2</sub> Emissions through Products

(10 thousand tons of CO<sub>2</sub>)



### Products that Reduce CO<sub>2</sub> in Society: Clean Energy

Renewables, such as geothermal power and hydroelectric power, are clean energy sources that contribute to the prevention of global warming. This is because they use the power of nature to generate electricity and do not emit greenhouse gases. If we could use clean energy to supply electricity to households served by existing CO<sub>2</sub>-producing power plants, we could meet their electricity needs without emitting any CO<sub>2</sub> emissions. By promoting the proliferation of clean energy, Fuji Electric contributes to the reduction of CO<sub>2</sub> in society.

In fiscal 2020, in the power generation business, the delivery of four clean-energy biomass power generation units (total capacity of 337MW) that use woodchips and agricultural waste as a fuel source greatly contributed to reducing CO<sub>2</sub> emissions in society. When all four units operate for an entire year, they can supply roughly 2.3 billion kWh of renewable energy per year. This is equivalent to some 1.4 million tons of CO<sub>2</sub> per year emitted by thermal power fuel sources.

### Products Contributing to Reductions in Society's CO<sub>2</sub> Emissions—Energy-Efficient Equipment

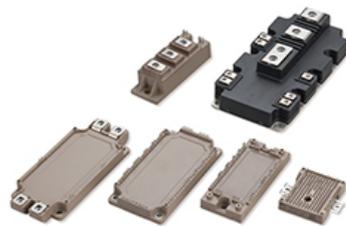
Products supplied by the Power Electronics Systems Industry segment, such as inverters, can be incorporated into factory and other equipment in order to realize energy savings in motor control and various other areas. Meanwhile, the Power Electronics Systems Energy segment offers products, such as uninterruptible power systems, that help conserve energy by improving efficiency through lower electricity consumption losses. Meanwhile, power semiconductors, a mainstay offering in the Electronics Devices segment, are used as key devices in such power electronics as well as in a wide range of other energy-efficient products, contributing to the energy efficiency of these products through highly efficient energy conversion and power control.

#### Product Introduction

##### Reduced power loss with IGBT modules (7th generation)

IGBT modules are key devices for stabilizing power conversion and supply. To reduce IGBT module power loss, we have been developing innovative devices and module technologies, and we have expanded our lineup to include 7th generation of IGBT modules.

Our 7th generation of IGBT modules reduces power loss from heat generation by about 20% compared with the previous generation and thus contributes to CO<sub>2</sub> emission reduction.



IGBT modules (7th generation)

##### General-purpose inverters: CO<sub>2</sub> reduction effect of 900 thousand tons/year thanks to energy-saving benefit.

Inverters are used in pumps, fans, conveyors, and the like to help their motors rotate freely. The use of power controlled by inverters decreases in proportion to the cube of the number of motor rotations. Accordingly, systems with inverters can enjoy energy savings of around 50% compared with conventional damper-controlled systems.

For instance, in fiscal 2020 we shipped around 11,500 MEGA-type general-purpose inverters (100kW equivalent). When combined with models shipped in previous years (which have not yet reached their average operating years), this translates to a CO<sub>2</sub> emissions reduction effect of around 900,000 tons per year. This reduction effect will continue for roughly 10 years (the average span of operation).

### Annual Reductions to CO<sub>2</sub> Emissions (1000t-CO<sub>2</sub>) Based on 2020 shipments of MEGA-type general-purpose inverters



## Target for Reducing Greenhouse Emissions Across the Supply Chain

Fuji Electric announced its commitment to help realize a society with net-zero carbon emissions. Going forward, in addition to production activities, including procurement and transportation, we will aim to achieve carbon neutrality across the entire supply chain by working to reduce CO<sub>2</sub> emitted when products are being used.

### Scope 3 Emissions

Greenhouse gases (Scope 3) emitted indirectly upstream to downstream in Fuji Electric's entire supply chain have been calculated since fiscal 2012 based on guidelines\*1 issued by the Ministry of the Environment. Since fiscal 2020 we have calculated Scope 3 emissions by expanding the scope of calculations to the entire Company after switching to the most recent database\*2 of emissions intensity, the basis for our calculations. We have also expanded the scope of calculations for category 1 as follows.

Category 1 (emissions during production for products and services purchased): Scope expanded from raw materials purchased to all materials purchased directly throughout the Company

\*1: Basic Guidelines on Accounting for Greenhouse Gas Emissions Throughout the Supply Chain Ver. 2.1 issued by the Ministry of the Environment.

\*2: For 2030 activity targets, refer to the section "Reducing Society's CO<sub>2</sub> Emissions Through Products."

#### Scope of Calculations for Greenhouse Gas Emissions

- Scope 1: Direct emissions from fuel use and production processes at the Company
- Scope 2: Indirect emissions from use of electrical and thermal energy purchased by the Company
- Scope 3: Indirect emissions from upstream/downstream on the Company's supply chain

### Scope 3 Emissions

Bold figures are verified by Independent Organization

(unit:tons of CO<sub>2</sub>)

Category	Details	fiscal 2019	fiscal 2020	Scope and Method of Calculations
<b>Upstream</b>	1 Products and services purchased	235,863	1,793,999	Scope: Products and services procured directly with Company materials (scope of calculations below) Purchase amount by product type X industry-related database*1 Subsidiaries not counted in the global procurement system are estimated using sales weightings
	2 Capital goods	138,334	103,033	Scope: Company-wide capital investments Fiscal 2020 plant and equipment investments X emissions intensity of electrical and electronics units (see *1)
	3 Fuel and energy purchases (outside Scope 1/2)	30,482	52,932	Emissions from fuel used at Company production sites and in connection with procurement of electric power
	4 Transport and delivery (upstream)	12,262	13,637	Japan: Emissions pertaining to own transport*2 (estimated from all arrangement slips) Overseas: Estimated from domestic transport (sales weighting)

Category		Details	fiscal 2019	fiscal 2020	Scope and Method of Calculations
	5	Waste discharged from business operations	5,572	5,926	Emissions related to disposal of waste generated by Company plants (overseas component estimated with emissions intensity for Japan)
	6	Business travel	1,927	3,597	Emissions related to business travel of Company employees (overseas component estimated with emissions intensity for Japan)
	7	Commuting	8,758	13,662	Emissions related to commuting to Company offices and plants (overseas component estimated with employee ratio)
	8	Use of lease assets (upstream)	–	5,674	Japan: Emissions from offices with tenancies (leases) Overseas: Estimated with ratio of employees in office departments
<b>Downstream</b>	9	Transport/delivery (downstream)	-	–	Emissions in this category are minimal because we handle product transportation ourselves
	10	Processing of sold products	-	–	Excluded from calculations owing to no sales of intermediary products requiring downstream processing
	11	Use of products sold	3,803,081	3,612,289	Emissions from consumer products shipped throughout Japan and overseas during the fiscal year if used to the end of their lifespan (scope of calculations below)
	12	Waste processing of products sold	-	–	Excluded from calculations because most of our products are made from metal and emissions during recycling are expected to be very minimal
	13	Use of lease assets (downstream)	0	0	No applicable emissions
	14	Franchise	0	0	No applicable emissions
	15	Investment	0	0	No applicable emissions
<b>Total</b>			4,236,279	5,604,750	

#### Category 1 (products and services purchased) scope of calculations

All purchased materials, parts, and subcontracted services

- Materials: steel, copper, plastic, etc.
- Parts: electronic components, mechanical components, etc.
- Subcontracted services: processing and assembly, services and utilities, etc.

#### Category 11 (use of products sold) scope of calculations

Consumer products\*3

- Power supply parts for televisions and computers
- Vending machines, showcases, change dispensers
- Compact UPS
- Document management systems

\*1. Ministry of the Environment's Basic Guidelines on Accounting for Greenhouse Gas Emissions Throughout the Supply Chain (Ver. 3.0)

\*2. Emissions from the transportation of waste were excluded from calculations starting in fiscal 2020 because they overlapped with category 5, which also included emissions from the transportation of waste.

\*3. Calculated within the scope of impacts on the end product. We are currently formulating a calculation method that includes products for industrial applications. We plan to publicly disclose this method in fiscal 2021 after expanding the scope of products subject to calculation to cover at least 80% of total emissions from all of our products.

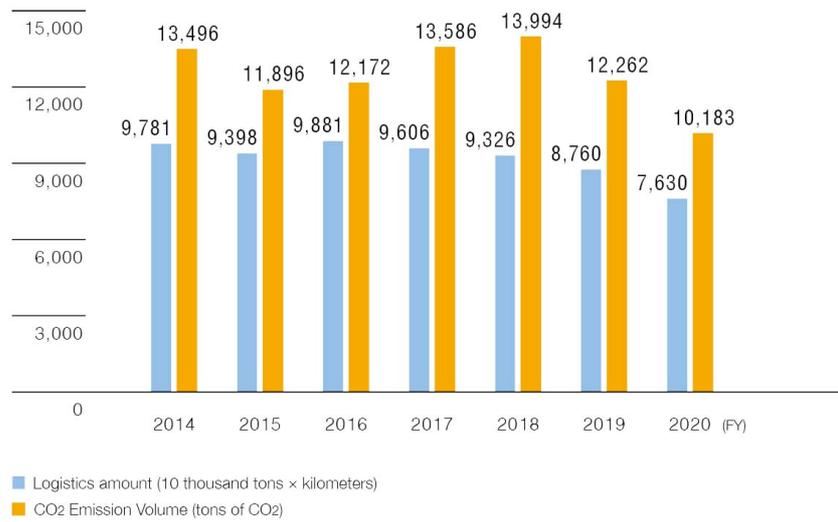
### Energy Conservation Initiatives in Logistics

In order to reduce CO2 emissions in the logistics sector, since 2006 specified shippers that transport more than 30 million ton-kilometers of goods per year have been required to monitor and rationalize their energy use. For this reason, Fuji Electric established its the Guidelines for Consigner's Obligations to help address the needs of each business site. Furthermore, to better understand the environmental impact of our logistics activities, we manage shipping data centrally using the FeSMART\* environmental management information support system.

In addition to promoting work-style reform efforts in the transportation sector, we are working to further improve transportation efficiency. In fiscal 2020, we reduced CO2 emissions per transport load by around 5% from the previous year.

### Environmental Impact of Logistics (In Japan)

(10 thousand tons × kilometers/tons of CO<sub>2</sub>)



### Energy Conservation Initiatives in Logistics

Owing to the impact of the COVID-19 pandemic, distribution volume decreased considerably in fiscal 2020 in the transport-heavy vending machine business. As a result, logistics volume for Fuji Electric overall dropped 13% year on year and CO<sub>2</sub> emissions decreased 17% year on year.

In this environment, we are continuing to streamline logistics operations and by stepping up our efforts with the batch delivery method\*, we have improved our CO<sub>2</sub> emissions intensity per logistics load for the second straight year.

\*A distribution method in which products are first shipped to regional delivery centers by 10-ton vehicles, then transported individually to each delivery destination by 4-ton vehicles. Compared with the individual delivery method of using only 4-ton vehicles, this method requires fewer vehicles and thus reduces the environmental impact.