

Stop Global Warming

Fuji Electric is promoting the reduction of CO₂ emissions on a global scale and contributing to stop global warming by providing products and services, and striving to conserve energy at our plants and other operational sites.

- [Action Plan to Reduce CO₂ Emissions](#)
- [Reducing Greenhouse Gas Emissions During Production](#)
- [Reducing Social CO₂ Emissions through Products](#)
- [Energy Conservation Initiatives in Logistics](#)
- [Scope 3 Emissions](#)
- [Initiatives for Utilizing Renewable Energies](#)

Action Plan to Reduce CO₂ Emissions

The Paris Agreement was adopted by COP21 in December 2015. The main points of the agreement were that (1) All countries including major emission-producing countries will present and update their reduction targets every five years; and (2) As a common global long-term target, a temperature increase of 1.5°C from preindustrial levels, rather than 2.0°C, was needed. In Japan, in May 2016 the Cabinet approved the Plan for Global Warming Countermeasures, which incorporated the government's Action Plan for Achieving a Low-Carbon Society, a set of voluntary measures for the industrial sector.

The electrical machinery and electronics industry's Action Plan for Commitment to a Low-Carbon Society seeks to prevent global warming by focusing on improved energy efficiency in manufacturing processes and products and services that contribute to reduced emissions.

Fuji Electric has participated in the Action Plan for Commitment to a Low-Carbon Society since fiscal 2011, and through our Environmental Vision 2020 we are working toward achieving the following targets:

- (1) In addition to targets for reductions in manufacturing emissions and improvement of energy efficiency, we will aim for a 20% reduction by 2020 in global manufacturing CO₂ emissions compared with fiscal 2006 (381,000 tons), and in Japan we will aim for a 10% improvement in energy consumption per base unit compared with fiscal 2012..
- (2) We will aim to provide products that will contribute to a 17 million ton* reduction in society's CO₂ emissions by 2020.

*Contribution of products shipped since 2009, when calculations began, that have not reached the end of their service lives as of that year, assuming a full year of operation.

Relationship Between Environmental Vision 2020 and Long-term Global Targets for Global Warming Prevention

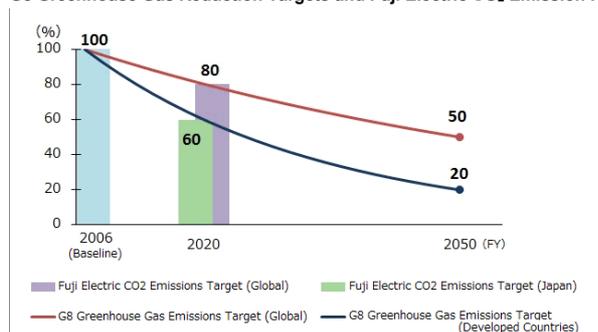
The IPCC's Fourth Assessment Report concludes that there is no doubt that warming has occurred in recent years due to climate change and that global warming is being caused by human activity. Based on this report, at the 2009 G8 Summit in L'Aquila, Italy, an official declaration was made in support of the goals of reducing global greenhouse gas emissions by 50% by 2050 and by 80% in developed countries by 2050. Achieving the G8's long-term targets starting from the baseline year (FY2006) established in the Environmental Vision, Fuji Electric's medium-term indicator for environmental management, will require annual reductions of 1.56% (for global target) and 3.59% (for developed countries). This is equivalent to reducing emissions by 20% (global) and 40% (developed countries) by fiscal 2020, compared to fiscal 2006.

Fuji Electric's Environmental Vision 2020 calls for reduction of CO₂ emissions from energy consumption at global production sites (global target) of 20% and a reduction of 40% in Japan (target for developed countries) by fiscal 2020, compared to fiscal 2006. Accordingly, our targets for CO₂ reduction are in line with global long-term targets related to the prevention of global warming, as represented by these G8 targets.

In addition, with respect to emissions of non-CO₂ greenhouse gases, Fuji Electric achieved a 92% reduction in fiscal 2009 on a global basis, compared to 1995, and has ended reduction activities. Since 2010, we have sought to manage and maintain this level. As has been shown, we continue to promote activities to prevent global warming based on targets equivalent to the long-term targets formed through international consensus.

* Intergovernmental Panel on Climate Change. The IPCC is an intergovernmental institution that compiles and assesses the views of experts on global warming to provide scientific criteria for making judgments related climate change. The Fourth Assessment Report was produced through the participation of over 2,000 experts from 130 countries and affirmed by government representatives in 195 countries. It compiles predictions made on changes in air and water temperatures, the impact on water resources and ecosystems, and the damage to human society, stating that global warming is a potential threat to the existential foundation of human life and other living organisms.

G8 Greenhouse Gas Reduction Targets and Fuji Electric CO₂ Emission Reduction Targets



Reducing Greenhouse Gas Emissions During Production

Fiscal 2015 CO₂ Emission Reduction Targets and Achievements

In Japan, we have been moving ahead with activities to reduce CO₂ emissions to conserve energy and curb energy costs since fiscal 2012.

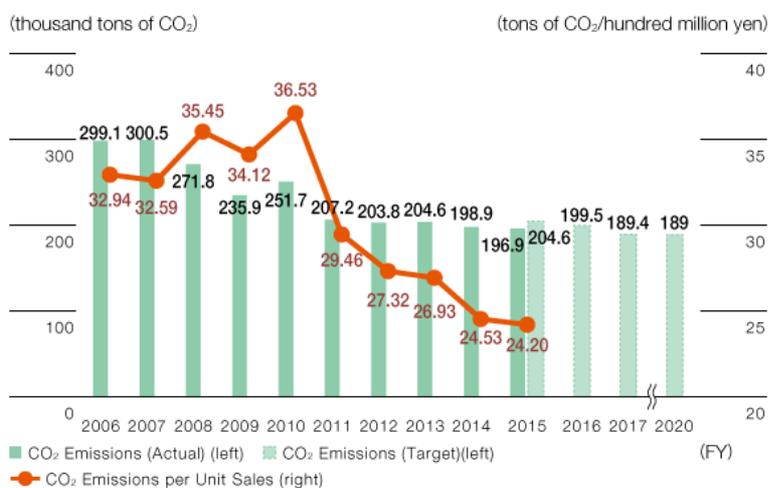
We continued to advance the Smart Factory Initiative in fiscal 2015, enhancing the efficiency of clean room air-conditioning systems and factory compressed air systems to reduce electricity consumption. We also stepped up activities for boosting employee awareness by creating and distributing posters and booklets promoting energy conservation. In fiscal 2015, these and other energy-saving activities resulted in economic benefits equaling 6.1% of fiscal 2014 energy costs as well as CO₂ emission reductions totaling 11,014 tons.

Fiscal 2015 CO₂ emissions from production were 197,000 tons (a 34.2% reduction from fiscal 2006), which surpassed the target of 205,000 tons (a 31.6% reduction from fiscal 2006).

Overseas, we switched over to air-conditioning equipment using inverters, revised standard temperature settings at bases, and took other energy-saving steps. As a result, CO₂ emissions decreased 927 tons in fiscal 2015, amounting to 126,000 tons (down 3.8% from fiscal 2010), which did not meet the target of 120,000 tons (down 7.9% from fiscal 2010).

While the total CO₂ emissions reduction target for overseas was not met, we achieved the worldwide target (worldwide Environmental Vision 2020 target: 20% reduction from fiscal 2006 levels by fiscal 2020) of emissions of 325,000 tons, or a 14.7% reduction from fiscal 2006, with emissions totaling 322,000 tons, for a 15.3% reduction.

CO₂ Emissions and CO₂ Emissions per Unit of Sales in Japan

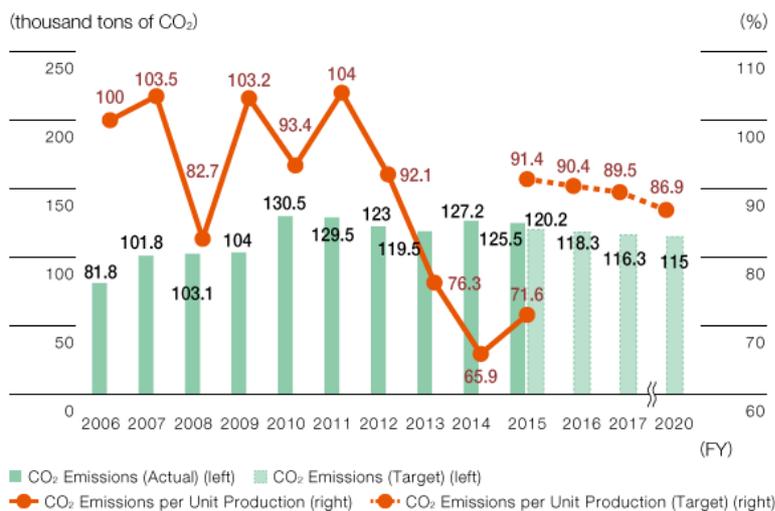


* Emissions per unit of sales is calculated by dividing the CO₂ emission amount by consolidated net sales.

Notes:

1. Collation of figures from the production bases and offices of all domestic consolidated subsidiaries, including Fuji Electric's offices.
2. Calculated using the Federation of Electric Power Companies of Japan's fiscal 2006 average power CO₂ emission coefficient (4.10 t-CO₂/10,000kWh) arranged for the targets in Environmental Vision 2020.

Overseas CO₂ Emissions per Unit of Production



* The amount of CO₂ emitted by production volume (presented taking the value for FY2006 to be 100).

Notes:

1. Total of figures for production sites at overseas consolidated subsidiaries (added Fuji Electric (Zhuhai) Co., Ltd. and Shanghai Electric Fuji Electric Power Technology (Wuxi) Co., Ltd.).
2. Overseas energy and electric power conversion coefficients obtained from the JEMA website (Ver. 3, March 2006).

3. Fiscal 2013 and 2014 figures adjusted to reflect credits traded from the China Emissions Exchange.

Third Party verification of CO2 Emissions and Emissions Trading System

In accordance with regulations, Fuji Electric receives third-party verification through emissions trading systems with regard to the total emissions of CO2 from its use of energy (fuel and electricity), at its two domestic production bases (Tokyo and Saitama Prefecture) and one overseas production base (Shenzhen, China). In fiscal 2015, the volume of CO2 emissions receiving third-party verification accounted for 15.6% of total CO2 emissions from the Company.

■Emissions trading system

In Japan (Tokyo, Saitama Prefecture)

Emission volume standards were set for both Tokyo and Saitama Prefecture in consideration of past CO2 emissions levels, based on which first-phase government reduction targets for total emissions volumes were established.

The first-phase reduction period for Tokyo and Saitama Prefecture ended in 2014, and total reduction goals were met for the period at both locations. In 2015, we acquired emissions credits based on third-party verification of the difference between actual emission reductions and reduction targets, which were carried over to the second phase (from fiscal 2015 to fiscal 2019).

Overseas (Shenzhen, China)

The City of Shenzhen has asked about 1,000 companies and public organizations to reduce CO2 emissions per production unit in fiscal 2015 by 32% compared with 2010. Accordingly, Fuji Electric's Shenzhen Factory has been assigned the goal of reducing its CO2 emissions per production unit by approximately 6.1% each year. China's emissions trading system calls for differences between actual emission reductions and reduction targets to be identified via third-party verification and for insufficiencies to be reconciled by procuring emissions credits from the market. To 2014, the Shenzhen Factory had reconciled its emission credits two times with the procurement of credits. In 2015, emissions were reduced despite increased production, for a significant improvement in emissions per production unit. As a result, actual emissions were well below its allocation, and 3,886 tons of emission credits were acquired. These will be rolled over, along with the outstanding credits up to the previous year, to the next period.

Emissions trading system

District	1st-phase reduction period	Emission volume verification organization	Reduction target
Tokyo (Tokyo Factory)	FY2010-FY2014	Japan Gas Appliances Inspection Association	7% reduction from emission volume standards
Saitama Prefecture (Fukiage Factory)	FY2011-FY2014	Japan Quality Assurance Association (JQA)	6% reduction from emission volume standards
Shenzhen, China	FY2013-FY2015	深圳市大兆能源科技有限公司	6.1% annual reduction in emissions per production unit

Performance of Emissions trading (The first-phase reduction period)

(tons of CO2)

District	Acquired emissions credits	Purchased	Amortized	Sold	Remaining (rolled over)
Tokyo (Tokyo Factory)	4,917	0	0	0	4,917
Saitama Prefecture (Fukiage Factory)	15,665	0	0	0	15,665
Shenzhen, China	3,886	9,493	7,835	0	5,544

Volume acquired: Credits acquired, representing the difference between emission standard for the first reduction period and reductions beyond that standard (Shenzhen acquisition is for fiscal 2015 only).

Reducing Greenhouse Gases other than CO₂ including SF₆

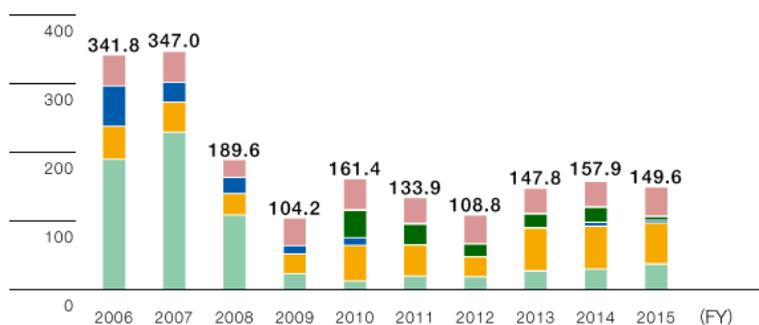
Apart from CO₂, greenhouse gases that cause global warming also include various alternatives for chlorofluorocarbon. In fiscal 2009, we completed the countermeasures of shifting to alternative gases and installing abatement apparatus for irreplaceable gases in some production lines of the semiconductor segment, where emissions of greenhouse gases were relatively large. (Fiscal 2009 emissions were 92% lower than 1995) Since fiscal 2010 our target has been to maintain the countermeasure level, and all newly installed manufacturing lines are equipped with abatement apparatus, as our reduction activities continue with a long-term perspective.

From fiscal 2015, our factory in Thailand began manufacturing high-voltage crossing gates and vending machines. We recognized that this would mean an increase in SF₆ and other emissions, so we began aggregating the data at that time (total for SF₆ and HFC – 296 tons).

Emissions in fiscal 2015 rose 2.8% in Japan and declined 18.7% overseas, but this was because of changes in the manufactured model mix. Total emissions were 149,510 tons, for a roughly 8,400 ton reduction from the previous year.

Emissions Other than CO₂

(thousand tons of GWP*)



* GWP: Global Warming Potential. A measure of the relative greenhouse effect caused by a gas, compared with the effect of CO₂, which is expressed with a GWP value of 1.

Notes:

1. Collation of consolidated subsidiaries for Japan and production bases of consolidated subsidiaries for overseas.
With the factory in Thailand commencing production of high-voltage crossing gates and vending machines from fiscal 2015, we began aggregating data for global warming gasses.
2. The global warming coefficient has been changed from fiscal 2013 to the IPCC Fourth Assessment Report in accordance with a COP17 decision.

Promoting Smart Factory Initiatives

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

Efforts in "energy visualization" produced results in fiscal 2015. Analysis of energy data found that energy was being wasted during non-working hours at night and on holidays. We had not been aware of this and implemented measures to conserve this energy. In addition, after we made it possible to compare energy consumption across divisions, the number of divisions introducing their own energy conservation initiatives increased.

Case Example from Smart Factory Initiatives

TOPICS

■ Air-Conditioning Control System Reduces Energy Consumption by Up to 23% and Increases Comfort and Energy Savings

Fuji Electric has developed air-conditioning control technologies based on discomfort indexes and introduced these technologies into its building management system (BAS). As a result, we were able to reduce energy consumption for air-conditioning inside buildings at the Tokyo Factory by as much as 23% per day during summer 2015, with average daily reductions of 7%. Even on days when temperatures exceeded 35°C, we were still able to achieve energy savings of 9%. The previous air-conditioning control system sought to decrease temperatures by measuring inside temperatures alone, resulting in significant energy lost to dehumidification. The new system, however, achieves optimal control based on discomfort indexes that account for both temperature and humidity levels, effectively reducing unnecessary dehumidification to maintain a comfortable environment while saving energy.

We aim to utilize this technology in the future to contribute to the 40% reduction target for building greenhouse gas emissions the government of Japan set to be achieved by fiscal 2030.



Humidity sensor



Operating configuration display

Reducing Society's CO₂ Emissions through Products

Fuji Electric is aiming to reduce society's CO₂ emissions by innovation in electric and thermal energy technology.

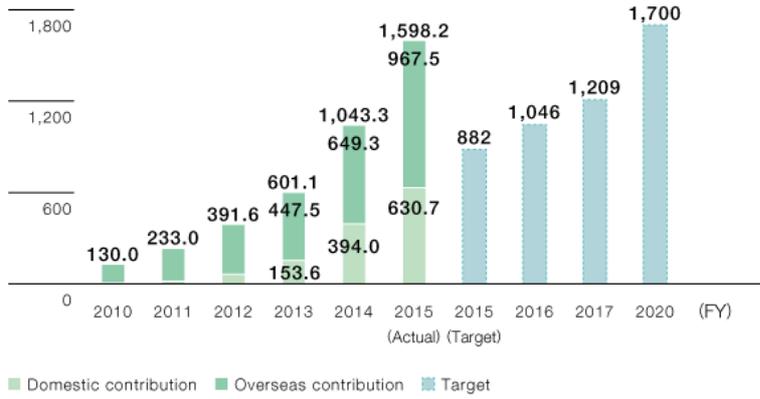
Fiscal 2015 CO₂ Emission Control Targets and Achievements through Products

In fiscal 2015, the contribution to CO₂ emission reductions from products was up 5,548,000 tons from fiscal 2014, to 15,892,000 tons, clearing our target of 8,820,000 tons. This reflected, among other factors, increased sales of inverters and electronic devices and deliveries of hydro power and biomass power generation facilities.

The products supplied during fiscal 2015 are anticipated to contribute to CO₂ emission reductions totaling 75,014,000 tons, if used for their average lifespans.

Reduced CO₂ Emissions through Products

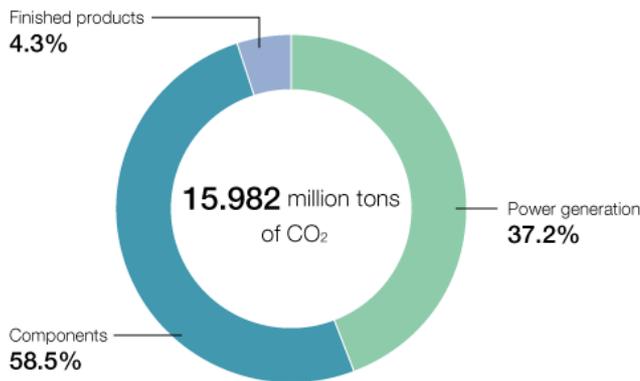
(10 thousand tons of CO₂)



* Amount of CO₂ emission reduction contribution based on one year of operation of products shipped for each fiscal year after fiscal 2009.

(Calculated making reference to the quantification method of GHG emission reductions stipulated in the electrical and electronics industries' Action Plan for Commitment to a Low-Carbon Society.)

Fiscal 2014 Breakdown of CO₂ Emissions Reduction Contribution Amount



Power generation: Thermal, geothermal, hydraulic, solar, fuel cells, biomass, wind power generation systems

Components: Power semiconductors, inverters, motors

Finished products: Vending machines, uninterruptible power supply systems, transformers, various types of power supply systems

Products that Contribute to Reducing CO₂ Emissions

Here, we will introduce some of Fuji Electric's eco-products that help prevent global warming by reducing CO₂ emissions.

[[Related Link : Eco-Product Certification System](#)]

Power Plants	
Geothermal Power Generation Facilities	
<p>Geothermal power is energy generated using the geothermal steam created by subterranean magma. As geothermal power generation does not require the burning of oil or coal, CO₂ emissions are substantially lower than those from thermal power generation. Furthermore, this power source is able to provide supplies of electricity that are more stable than other renewable energy sources.</p> <p>CO₂ emissions reduction: approx. 552,000 tons / year</p> <p>(Compared to thermal power generation) Effect calculated under typical operating conditions (when product in use) Geothermal steam turbine: output 147MW, utilization rate 90% CO₂ emission factor 0.476kg-CO₂/kWh</p>	 <p>Wayang Windu Geothermal Power Station in Indonesia</p>
Factories	
Inverters	
<p>Inverters are used in a wide variety of equipment, including elevators, building air conditioning systems, and factory manufacturing facilities. By optimally controlling the</p>	

Factories

rotation speed of the motors that move such equipment, inverters eliminate energy loss during operation and contribute to energy savings.

CO₂ emissions reduction: approx. 11.9 tons / year (50.0% reduction)

(Compared to damper control)

Effect calculated under typical operating conditions (when product in use)

Operating conditions: Motor output 15kW, air flow 85% (operation 2,000 hours), air flow 60% (operation 2,000 hours)

Damper control: Air flow 85% (load 91%), air flow 60% (load 76%)

Inverter control: Air flow 85% (load 61%), air flow 60% (load 22%)

CO₂ emission factor 0.476kg-CO₂/kWh



Data Centers

Module Type Data Centers

Significant reductions in electricity consumption were realized by using a hybrid air conditioner unit which uses both external air-cooling and an air conditioner using refrigerant at the same time. Also, the centers use a dedicated facility operation management system, to centrally manage electricity, heat source, air conditioning, and the environment for optimal operation.

CO₂ emissions reduction: approx. 156 tons / year (60.0% reduction)

(Compared to Non-hybrid Air Conditioner)

Effect calculation for when product is in use is based on typical operating conditions.

Operating conditions: Annual operation time 8760 hours

Conventional product: Average annual power consumption 62.4 kW

Current product: Average annual power consumption 25.0 kW

CO₂ emission factor 0.476kg-CO₂/kWh



3-level IGBT Modules

IGBT modules are a type of power semiconductor. They are used in UPSs and solar power generation facilities, and are essential to realizing energy savings.

CO₂ emissions reduction: approx. 987 kg / year (23.4% reduction)

(Comparison of 2-level and 3-level IGBT Module)

Effect calculation for when product is in use is based on typical operating conditions.

Operating conditions: With a 100 kW inverter annual operation time 2920 hours

CO₂ emission factor 0.476kg-CO₂/kWh



Stores

Building Energy Management Systems

Building energy management systems are used to monitor and efficiently control energy usage in stores and other buildings. By employing combinations of renewable energy systems and storage batteries, these management systems help equalize electric power loads.

CO₂ emissions reduction: approx. 23 tons / year (8.0% reduction)

(Benefit from introducing Fuji Electric's building energy management systems)

Current status: Introducing electric power monitoring system, taking measurements and conducting survey of waste from operational aspect

Measures: Monitoring of PC operations during lunch breaks, reduction to standby power at night

Measures firmly entrenched: E-mail sent out asking for reasons why PCs were used at lunchtime, responses collated and corrective action taken

Effect: CO₂ emissions reduced 8.1%, lunchtime PC users reduced by half, nighttime standby power reduced by two-thirds



Vending Machines

Fuji Electric's vending machines employ innovative hybrid heat pump technologies that utilized external air heat when heating for beverages in vending machines, non-

Vending Machines

fluorocarbon refrigerants, and state-of-the-art vacuum insulation panels. By combining these features with LED displays, we have created ultra-energy-efficient vending machines that realize substantial reductions in electricity consumption.

CO₂ emissions reduction: approx. 342 kg / year (78.2% reduction)

(Comparison between models released in fiscal 2002 and those released in fiscal 2014)

Effect calculated under typical operating conditions (when product in use)

Operating conditions: In accordance with vending machine test method JIS B 8561:2007

CO₂ emission factor 0.476kg-CO₂/kWh



Energy Conservation Initiatives in Logistics

To reduce CO₂ emissions in logistics, specified consigner whose annual tonnages exceed 30 million ton-kilometers have been required to measure and improve their energy consumption since April 2006.

Fuji Electric has established the Guidelines for Consigner's Obligations to enable each business site to comply with these laws and regulations smoothly and appropriately. The guidelines centrally manage data using FeSMART* to ascertain the environmental burden due to logistics activities. In fiscal 2015, we reviewed regular transport routes between factories to reduce distances to a minimum, which made it possible to reduce energy used and CO₂ emissions from logistics.

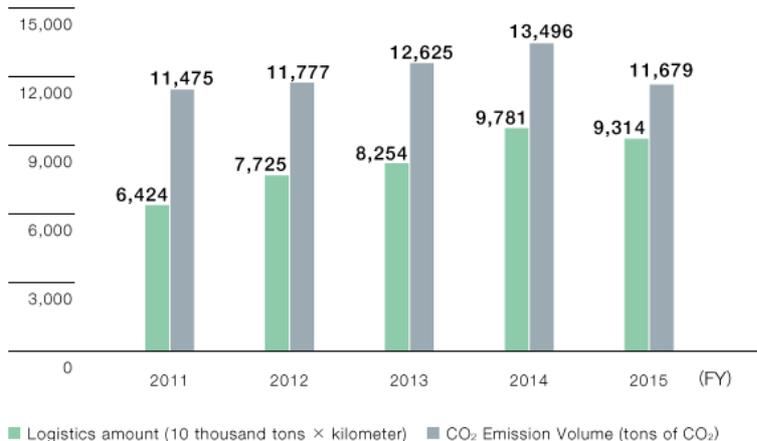
Going forward, Fuji Electric will continue to reinforce its energy conservation activities in its logistics operations and work to reduce its environmental footprint, including reducing transportation weight by minimizing product size and changing the mode of line-haul transportation.

* FeSMART: (Fuji electric Sustainable MAnagement suppoRT system)

Enables registration of and access to all environmental data relating to the Company's factories and operating sites using a web browser on the Company's Intranet.

Environmental Impact of Logistics (In Japan)

(10 thousand tons × kilometer/tons of CO₂)



Example of initiatives to reduce the environmental impact of logistics

Fuji Electric's total logistics load in fiscal 2015 was 5% less than in the previous year, while CO₂ emissions were 13% lower, meaning that the reduction in CO₂ emissions outpaced the reduction in logistics load.

One of these initiatives was to review regular transport routes at Chichibu Fuji. As a result, despite the fact that Chichibu Fuji's energy load increased (25%) from the previous year, energy used was reduced by half (54%).

Chichibu Fuji's logistics load accounts for 26% of the Group's total, meaning that this made a major contribution to reducing the Group's overall environmental impact from logistics.

Scope 3 Emissions

Greenhouse gases emitted indirectly upstream to downstream on Fuji Electric's supply chain (Scope 3) have been calculated since fiscal 2012 based on guidelines*1 issued by the Ministry of the Environment. As a result, we found that emissions from use of products sold were highest and confirmed this as an important item to address. It was affirmed that raising the energy efficiency of products and contributing to more efficient electricity use within society is an important activity*2 for Fuji Electric tied to preventing global warming.

*1: Basic Guidelines on Accounting for Greenhouse Gas Emissions Throughout the Supply Chain Ver. 2.0 issued by the Ministry of the Environment.

*2: For 2020 activity targets, refer to the section "Reducing Society's CO₂ 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

(unit:tons of CO₂)

segment		category	fiscal 2014	fiscal 2015	coverage
upstream	1	Products and services purchased	164,333	158,532	Emissions related to production of raw materials purchased by domestic factories
	2	Capital goods	83,230	79,499	Emissions related to construction/manufacture of capital facilities domestically and oversea
	3	Fuel and energy purchases (outside Scope 1/2)	30,555	30,788	Emissions related to fuel procured domestically and to production of fuel necessary for generation of electrical energy
	4	Transport and delivery (upstream)	13,496	11,679	Emissions related to company transport (domestic) (same as reported for environmental impact from logistics activities)
	5	Waste discharged from business operations	5,050	5,035	Emissions related to processing waste discharged from domestic factories
	6	Business travel	1,956	1,922	Emissions related to business travel by domestic employees
	7	Commuting	8,137	8,396	Emissions related to commuting to domestic business sites
	8	Use of lease assets (upstream)	0	0	Transport from product delivery (Category 4) sites is marginal, so excluded from scope of calculations.
downstream	9	Transport/delivery (downstream)	-	-	Transport from product delivery (Category 4) sites is marginal, so excluded from scope of calculations.
	10	Processing of sold products	-	-	Intermediate products requiring downstream processing are not sold, so excluded from the scope of calculations.
	11	Use of products sold	2,781,797	2,898,124	Emissions assuming that products for the consumer sector* shipped domestically and overseas during the fiscal year are used until the end of their service lives.
	12	Waste processing of products sold	-	-	Fuji Electric products have high metal ratios and emissions at recycling are assumed to be low, so this is excluded from the scope of calculations.
	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
total			3,088,554	3,193,975	

*Products for industries are not worked out so as to be counted among emission in our customers.

Initiatives for Utilizing Renewable Energies

Fuji Electric promotes use of renewable energies through development and supply of geothermal and hydropower facilities and solar and wind power systems, all of which have low environmental impact, to contribute solutions to increasingly diverse global energy issues.

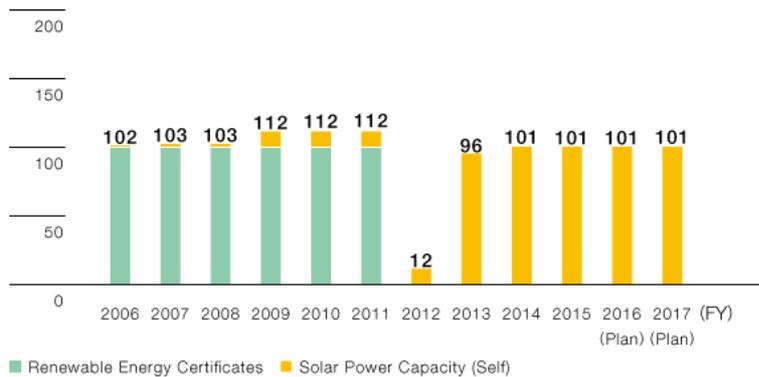
Fiscal 2015 shipments included two geothermal power generators (80MW total) to Indonesia, and repairs for a hydroelectric power station and a biomass generator in Japan.

■Utilization of Renewable Energies in Production Activities

With respect to power consumed at the Company, we purchased renewable energy certificates of 1 million kilowatts each year for seven years from 2005 to 2011. We are currently promoting power generation using our own products, and installed large-capacity power systems at the Mie Factory and a new factory in Thailand in fiscal 2013 and a 50-kW solar power system at the Fukiage Factory in fiscal 2014. As a result, self-generated power capacity as of the end of fiscal 2014 totaled 957 kilowatts.

Renewable Energy Utilization in Production Activities

(10,000 kWh/year)



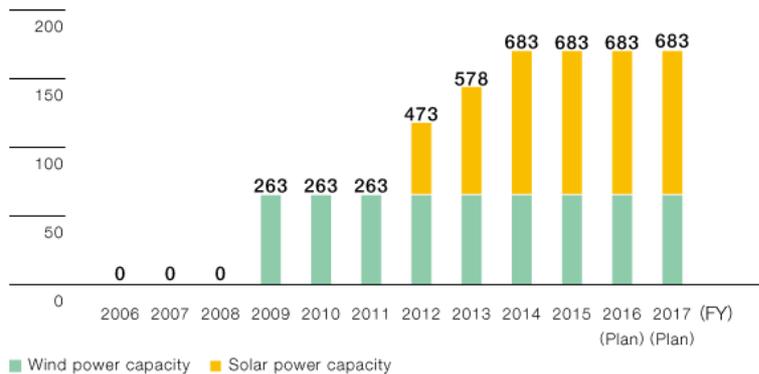
Note: Solar power capacity is average capacity utilization multiplied by total capacity installed as of the end of the fiscal year. (12%)

Renewable Energy Supply Initiatives

Fuji Electric contributes to the prevention of global warming by participating in power projects and supplying renewable energies. Subsidiary Fuji Green Power Co., Ltd. built the Nishime wind power plant, which went online in fiscal 2009, and a mega solar power facility (2 megawatts) on the premises of our Yamanashi Factory. In fiscal 2012, it began selling the total amount of power produced by these systems.

Supply Capacity of Fuji Electric's Renewable Energy Business

(10,000 kWh/year)



Note: Wind power and solar power capacity is average capacity utilization multiplied by total capacity installed as of the end of the fiscal year. (Wind power 20%; Solar power 12%)