

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.

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Action Plan to Reduce CO₂ Emissions

From 2013 through to 2020, the Kyoto Protocol international treaty aimed at preventing global warming is in its second commitment period. The electrical and electronics industry has instituted its own autonomous Action Plan for Commitment to a Low-Carbon Society for this period and is moving ahead on preventing global warming through improvement of energy efficiency and emission reductions of production processes and contributing to emission reductions through products and services.

Fuji Electric has been involved in the action plan since March 2012 and we continue to move ahead with our activities to realize its goals through our Environmental Vision 2020.

(1) We added improving energy efficiency as a target together with reducing production emissions of CO₂ in 2020 to 20% less than the 381,000 tons they had been in fiscal 2006 and now seek also to improve our energy consumption per base unit by 10% compared with fiscal 2012.

(2) Providing products with the aim of contributing to reducing society's CO₂ emissions by 17 million tons* by 2020.

*Conventionally, calculation of emission reductions would be done by working out how much a product delivered this year would contribute after one year of operation. However, according to the calculation methods under the action plan, the calculation methods have been changed so that the figure is taken from use for one year of products that were shipped since collation started in 2009 and are not reaching its lifetime. As a result, the target was altered from 2.4 million tons.

Reducing Greenhouse Gas Emissions During Production

Fiscal 2013 CO₂ Emission Reduction Targets and Achievements

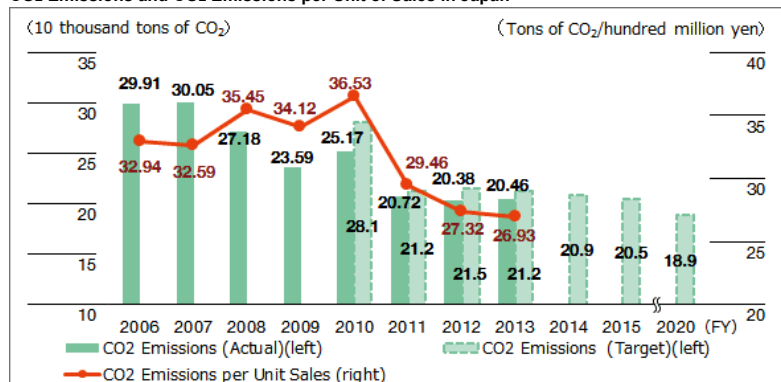
In Japan, we have been moving ahead with activities to reduce CO₂ emissions to conserve energy and curb energy costs since fiscal 2012.

Apart from cutting power consumption by reviewing clean room air conditioner controls and reducing standby power for production equipment, Fuji Electric has upgraded to highly efficient machinery and introduced a solar power generation system among other measures to control peak power. The effective reduction in energy expenses in fiscal 2013 working out to be equivalent to a saving of 11.0% compared with fiscal 2011. As a result, in fiscal 2013 we aimed to reduce CO₂ emissions from production to 212,000 tons (a 29.0% reduction from the fiscal 2006 level), and achieved this goal by cutting down to 204,600 tons, a 31.4% reduction compared to fiscal 2006. Emissions increased slightly from the previous year, owing to higher production volumes; however the increase was offset by energy-conservation efforts that enabled us to cut CO₂ emissions by around 7,500 tons.

Overseas, we pushed ahead with such energy-saving activities as deploying 500kW solar power generation systems and advanced energy monitoring systems at our new factory in Thailand, retirement of emission credits* at our plant in Shenzhen, China, and other energy-saving activities. As a result, our fiscal 2013 CO₂ emissions were 119,500 tons, an 8.6% reduction compared to fiscal 2010, surpassing the targeted 125,000 tons for fiscal 2013, which in turn would have been a 4.1% reduction on fiscal 2010.

* China's emissions trading: This is a 3-year trial being carried out from 2013 in 5 cities in 2 provinces including Shenzhen, Beijing and Shanghai. 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 fiscal 2010, and set emission allowances. At Fuji Electric's Shenzhen Factory, we purchased 8,400 tons of credit through the China Emissions Exchange, of which we retired 7,282 tons.

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.

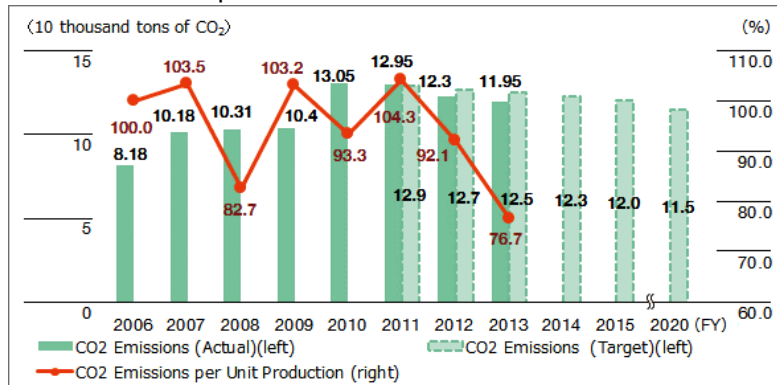
Notes:

- Collation of figures from the production bases and offices of all domestic consolidated subsidiaries, including Fuji Electric's offices.
- 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.

3. Data has been corrected retroactively for the addition of a semiconductor factory in fiscal 2013.

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:

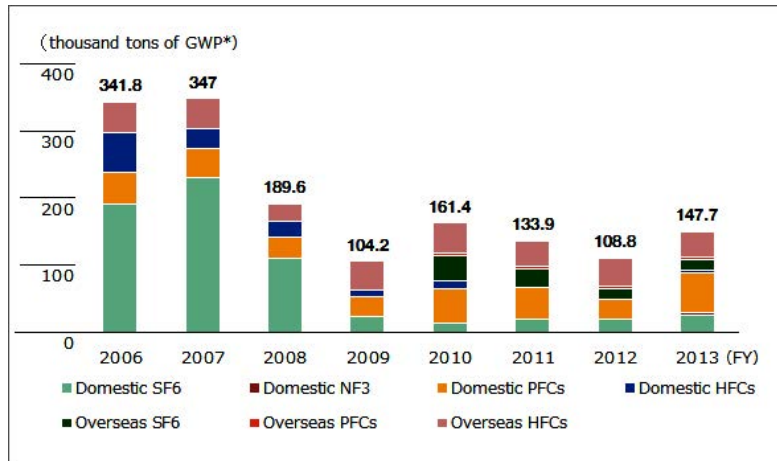
1. Collation of figures from production bases of overseas consolidated subsidiaries.
2. Overseas energy and electric power conversion coefficients obtained from the JEMA website (Ver. 3, March 2006).
3. Data has been corrected retroactively for the addition of two new factories in fiscal 2013 (Fuji Electric France S.A.S and Dalian Fuji Bingshan Vending Machine Co., Ltd.).
4. Fiscal 2013 figure adjusted to reflect credits traded from the China Emissions Exchange.

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 we have switched our objective to maintenance of the status, and we continue our emission reduction activities with all newly established production lines equipped with abatement apparatus. From fiscal 2013, the Kyoto Protocol enters its second commitment period, and Fuji Electric changed the emission collation methods in conjunction. Based on the decisions made at the United Nations Framework Convention on Climate Change (COP 17, 18) as well as the amendment of the Act on the Promotion of Global Warming Countermeasures, we added NF₃ (nitrogen trifluoride) as a designated gas and changed global warming potential values.

Fiscal 2013 emissions increased by 38,700 tons (35%) compared with fiscal 2012 due to an increase of about 13,500 tons caused by a change in calculation method, an increase of approximately 18,000 tons due to adding new production bases such as a semiconductor factory, and another increase of about 7,200 tons accompanying production expansion.

Emissions Other than CO₂



* 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.
2. The global warming coefficient has been changed from fiscal 2013 to the IPCC Fourth Assessment Report in accordance with a COP17 decision.
3. Based on a COP18 decision, NF₃ has been added as a designated gas from fiscal 2013 (Overseas has no NF₃ emissions).
4. A new semiconductor factory was added to Japan in fiscal 2013. Overseas, a production base (for vending machines in China) was added.

Promoting Smart Factory Initiatives

Fuji Electric has started to introduce Smart Factories at its production bases to optimize energy use through the coordination of electric and thermal energy technologies and production planning.

In fiscal 2013, we moved ahead with visualization of energy use through sensor placement and energy control software

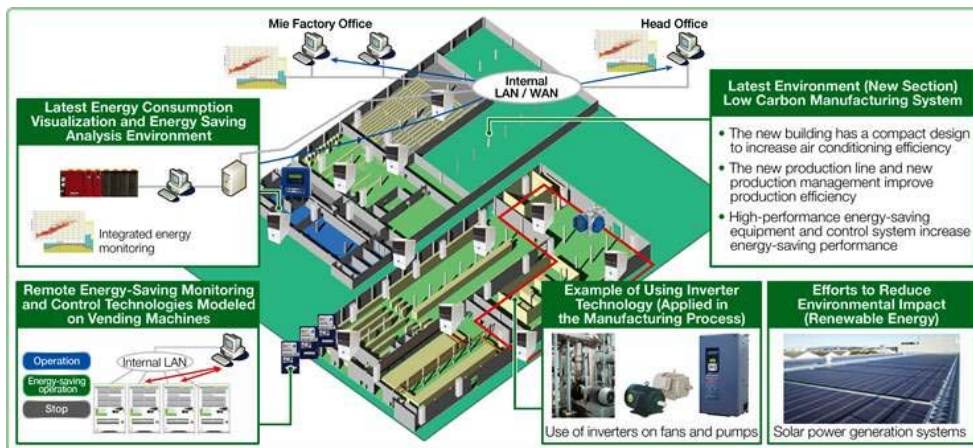
development for use at our four Smart Factory model sites in Kawasaki, Tokyo, Yamanashi and Mie. Furthermore, with energy management for energy conservation designated factories under the Energy Saving Law apart from these four sites, we have moved ahead with smart concepts based on the characteristics of the electrical and thermal energy and production methods used at each factory. Going forward, we will verify the effects of the Smart Factory Initiatives at the four model sites and use the results to propose new business models to society.

Case Example from Smart Factory Initiatives

TOPICS

■Conserving Energy through the Smart Factory Initiative

We are undertaking a Smart Factory Initiative at the Mie Factory, which is our core production site for vending machines. As well as attaining high efficiency in our equipment through the application of inverters, in fiscal 2013 we established the foundations of a smart factory by installing solar power generation systems, fuel cells, and systems to monitor overall plant energy usage. The energy monitoring systems integrate production management systems with information and control the supply of energy to facilities according to changes in production conditions to minimize energy consumption. We built a system to monitor the power consumption and operating statuses of around 30 vending machines within the plant and optimized energy-saving settings for the differing usage environments of each workplace as part of efforts to minimize electricity consumption.



Main measures of the Smart Factory Initiative at the Mie Factory (Example of the new building)

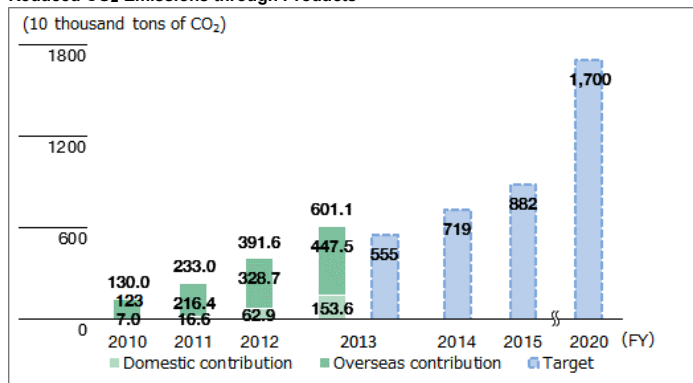
Reducing Society's CO2 Emissions through Products

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

Fiscal 2013 CO2 Emission Control Targets and Achievements through Products

In fiscal 2013, the contribution to CO2 emission reductions from products was up 2,095,000 tons from fiscal 2012, to 6,011,000 tons, and we achieved our fiscal 2013 target of 5,550,000 tons. This reflected expanded sales of power conditioners for mega solar power generation and solar power generation systems.

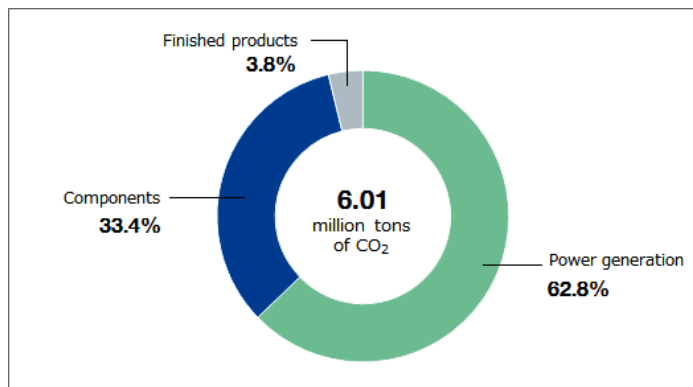
Reduced CO2 Emissions through Products



* 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 2013 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, power conditioners and various types of power supply systems

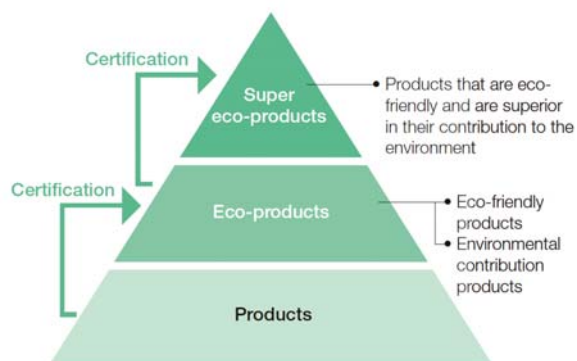
Eco-Product Certification System

Fuji Electric is developing eco-friendly products, which enhance energy efficiency and reduce the use of chemical substances, and environmental contribution products, which help reduce society's overall impact on the environment. We are continuing to promote the spread of these products.

In this initiative, Fuji Electric has established a common Fuji Electric Eco-Product Certification System. We evaluate the degree of product eco-friendliness on a Company-wide platform. Products meeting fixed criteria are certified as "eco-products," while those that are at the top of the industry for environmental benefit and contribution, and which are recognized outside the Company at the national level for environmental superiority are labeled "super eco-products."

In fiscal 2013, 30 offerings were certified as eco-products, while another 6 received certification as super eco-products. As a result, we now have 157 eco-products and 16 super eco-products.

Eco-Product Certification System



Eco-Product Definitions	
Eco-Friendly Products	Products that have a reduced environmental impact over the entire product lifecycle. These products are superior to traditional products in at least four of six standard areas, including energy conservation, resource conservation, and recyclability.
Environmental Contribution Products	Products that contribute to environmental preservation during use. Products that contribute to the environment by utilizing natural energy or information and communication technology.

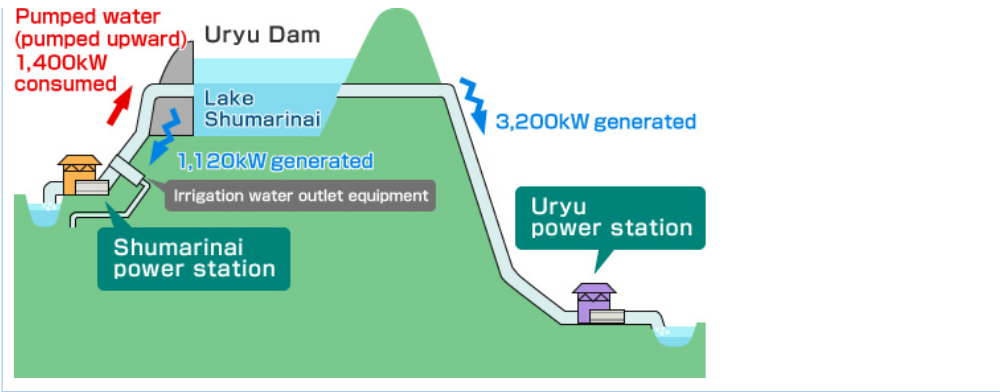
Fiscal 2013 Super Eco-Products

TOPICS

In January 2013, variable speed pumped-storage power station was awarded the New Energy Foundation chairman's prize.

The Shumarinai power station in Hokkaido capable of both pumping water and generating power was built to utilize previously unused irrigation water flowing downstream.

This facility, equipped with a reversible pump-turbine with adjustable speed control, is capable of generating power through the fluctuations between times when irrigation water flows from Lake Shumarinai's upper dam and other times. River water flowing into the lower dam is pumped into the upper dam, and that water is used to generate electricity at the Uryu power station with its high ratio of electricity to water, effectively making use of the hydration energy. This is the first case in Japan of an adjustable speed pump turbine being installed, and it is highly rated because it is expected to be applied in other regions.






Fiscal 2013 also saw the appearance of six new super eco-products, including the Dose-e, a highly functional integrating dosimeter and Good Design Award winner renowned for its simple operability and user friendliness, and the SK series of mini contactor thermal relay, electromagnetic switches, which are highly regarded for their compact size and low energy consumption, and which also helped us win an honorable mention in the Japan Electrical Manufacturer's Association award.

Ratio of Eco-Product Sales

In fiscal 2013, sales of eco-products accounted for 32% of total net sales, as compared to 29.5% in fiscal 2012, a 2.5 percentage point increase.

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.

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 rotation speed of the motors that move such equipment, inverters eliminate energy loss during operation and contribute to energy savings.</p> <p>CO2 emissions reduction: approx. 11.9 tons / year (50.0% reduction)</p> <p>(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</p>	
Data Centers	
Module Type Data Centers	
<p>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.</p> <p>CO2 emissions reduction: approx. 156 tons / year (60.0% reduction)</p> <p>(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</p>	

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

Office Buildings

UPSs

Equipped with batteries, UPSs protect computers and factory equipment from power outages. We have created UPSs that realize world-leading levels of power conversion efficiency at 98.5%, thus contributing to energy savings.

CO2 emissions reduction: approx. 62.4 tons / year (71.1% reduction)

(Comparison between models released in fiscal 2006 and those released in fiscal 2011)
 Effect calculated under typical operating conditions (when product in use)
 Operating conditions: Hours of operation/year 8,760 hours, 500kVA, power factor 0.9, load factor 80%
 Conventional product: FY2006 7000D standard inverter power supply, efficiency 95%
 Current product: FY2011 dual-processing 8000ND Series, efficiency 98.5%
 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-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. 383 kg / year (57.0% reduction)

(Comparison between models released in fiscal 2006 and those released in fiscal 2013)
 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 provide an understanding of matters including the scope of CO₂ emissions measurements, the method for calculating CO₂ emissions, reporting procedures, and the role of people in charge. In addition, Fuji Electric is centrally managing data using FeSMART* in order to ascertain the environmental burden due to logistics activities.

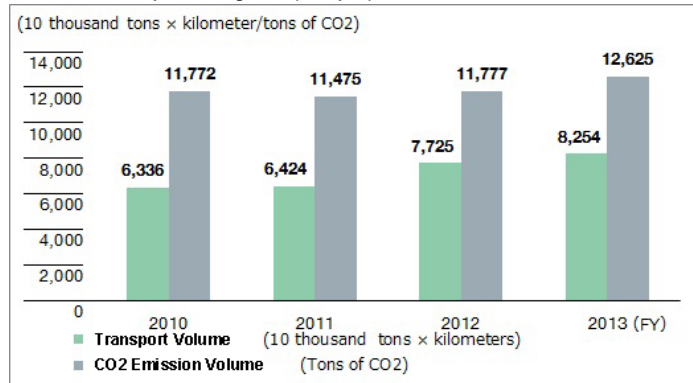
In fiscal 2013, there was an increase in the transport of parts and products accompanying an increase in net sales. As a result, there was a year-on-year rise in CO₂ emissions from logistics.

Going forward, Fuji Electric will continue to enhance 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)



Reduction of CO₂ Emissions on “Milk Run”

At the Suzuka Factory in Japan, we are focusing on reducing CO₂ emissions during parts transportation.

The so-called “milk run” is one of the initiatives. First introduced in fiscal 2010, we started collecting parts from several suppliers using one large truck.

Previously deliveries along this route entailed several trucks making round trips between the Company's factory and the six component manufacturers. Now, one large truck is driven around all six companies to collect parts. This has resulted in an annual CO₂ emission reduction of 4.5 tons.

Looking ahead, we plan to introduce the milk run system to other factories to further reduce the environmental impact of transporting parts.