

# Review of Operations (By Segment)

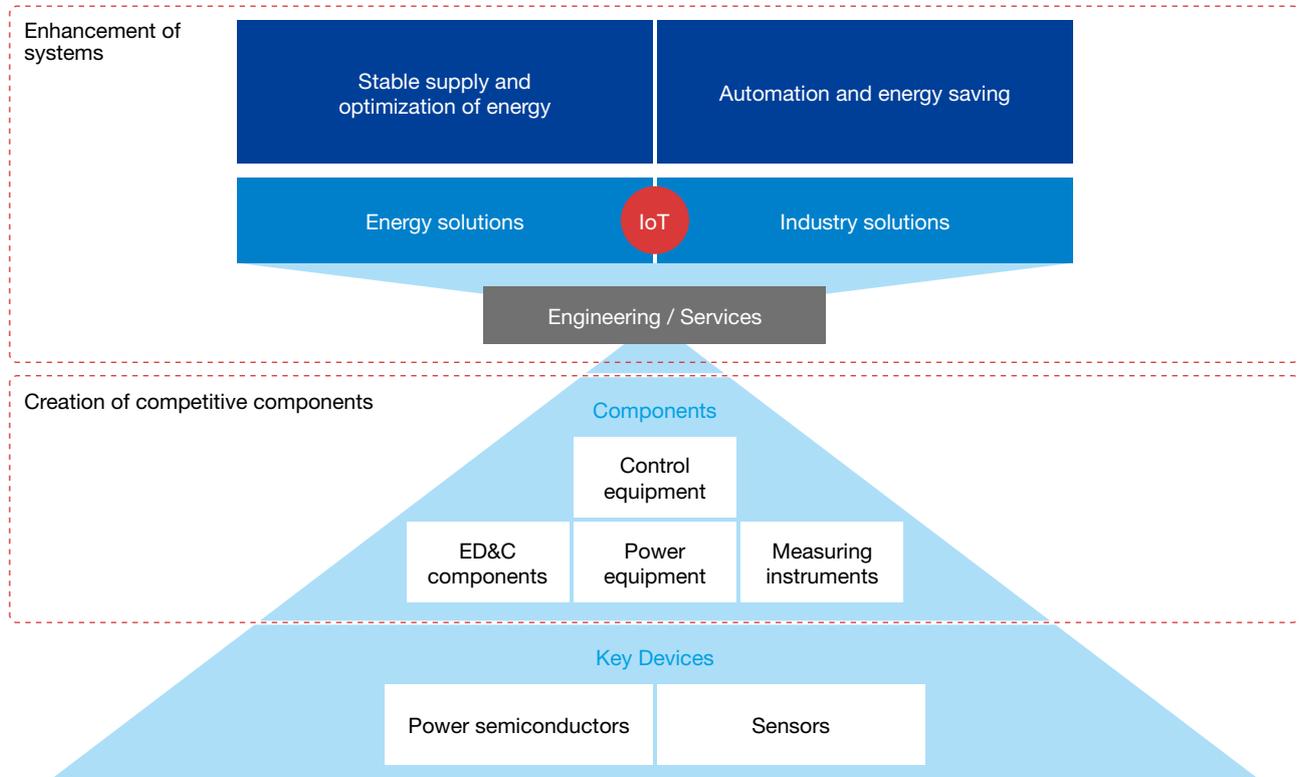
## Power Electronics Systems (Energy Solutions / Industry Solutions)

In the Energy Solutions segment, Fuji Electric supports power infrastructure with its proven technologies to contribute to the stable supply, optimization, and stabilization of energy for customers. In the Industry Solutions segment, we combine power electronics with measuring instruments and IoT technologies to contribute to improved productivity and energy savings with factory automation and monitoring.

### Power Electronics Systems Business Policy

**Strengthen systems operations using competitive components, expand overseas businesses by leveraging systems**

- Priority Measures for Fiscal 2018**
- Develop and introduce global products
  - Promote standardization and bundling of system solutions
  - Strengthen systems operations by utilizing overseas engineering companies partnered with or acquired through M&A activities
  - Pursue local production and consumption in Asia



### Creation of Competitive Components

The systems that support the optimal operation of customers' production facilities and plants require unique, competitive, and differentiated components. Fuji Electric's factory automation business is focused on the development of servos, which need the most precise control technologies among FA components; sensors for monitoring temperature, vibration, and electricity; and programmable logic controllers (PLCs), a type of control device that regulates the operations of production lines and material plants to guarantee safety. In addition, we are accelerating the creation of global products based on international specifications to expand overseas operations.

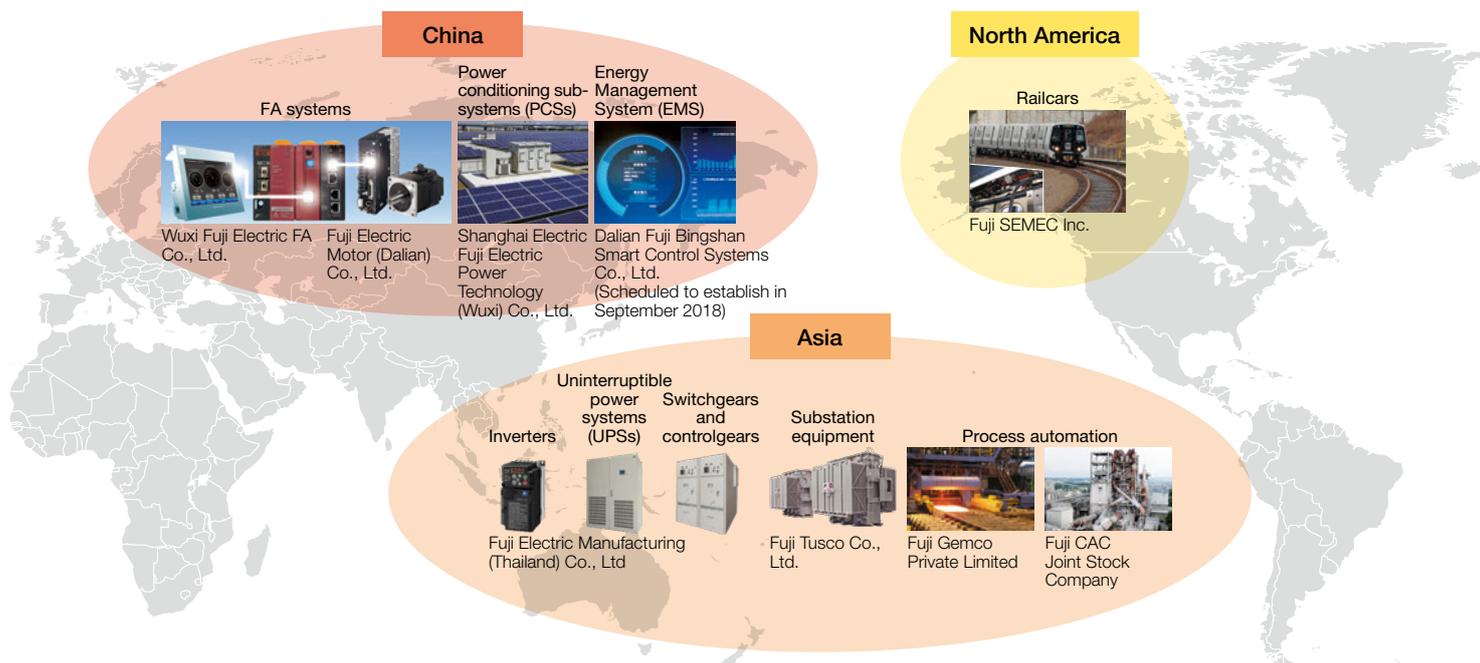
### Enhancement of Systems Using Competitive Components

The systems project track record, technologies, and expertise Fuji Electric has cultivated to date are being utilized to promote the standardization and bundling of hardware and software in an effort to step up development of high-value-added systems. Furthermore, we are backing these systems with engineering and other services.

### Expansion of Overseas Businesses by Leveraging Systems

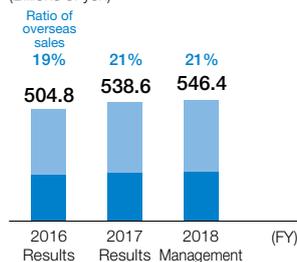
Fuji Electric is focusing on developing its transmission and distribution systems, process automation, and FA systems primarily in China and other parts of Asia. In these operations, we take advantage of overseas engineering companies acquired through M&A activities, namely Fuji Tusco Co., Ltd.; Fuji Gemco Private Limited; Fuji CAC Joint Stock Company; and Fuji SEMEC Inc. At Fuji Electric Manufacturing (Thailand) Co., Ltd., meanwhile, we have begun constructing switchgear and controlgear system factories (third factory scheduled to

commence operation in 2019). These facilities are anticipated to help us cater to demand for the switchboards that control power at factories; this demand is rising in Asia, where factories and buildings are being constructed at a rapid pace. In addition to these undertakings, we are applying standardized and bundled systems to focus areas, such as steel, cement, and chemicals, to increase orders overseas, where systems often must be delivered on tight schedules.



#### Net Sales

(Billions of yen)



■ Energy Solutions ■ Industry Solutions

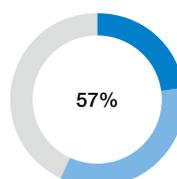
Note: Figures for FY2016 and FY2017 reflect the organizational restructuring conducted in FY2018

#### Operating Income

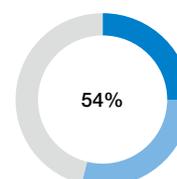
(Billions of yen)



#### Net Sales Composition Ratio (Management Plan in FY2018)



#### Operating Income Composition Ratio (Management Plan in FY2018)



## Energy Solutions

### Operating Environment

In Japan, demand is rising for solutions to stabilize power supplies and optimize the energy supply and demand in order to maintain reliable operations of equipment at factories and facilities. At the same time, the shortage in facility management personnel is stimulating demand for IoT to be utilized in all service areas, including after-sales services, in order to monitor and optimize operations while saving energy.

In rapidly growing Southeast Asia and other emerging countries, the acceleration of investment in social infrastructure and in production facilities is creating issues related to the stability and efficiency of power supplies that need to be addressed.

#### Business Areas

- Energy Management**  
 Power distribution, Smart meters, Industrial substation, Railway substation, Industrial power supplies
- Power Supply and Facility Systems**  
 Data centers, UPS, Electrical facilities, Switchgears and Controlgears
- ED&C Components**  
 Power distribution and control equipment

### Review of Operations in Fiscal 2017

In the Energy Solutions segment, net sales were up year on year. Sales benefited from large-scale orders for substation equipment for the power and industrial fields overseas. In addition, this segment enjoyed increased demand from machine tool and other equipment manufacturers and from overseas in the ED&C components business.

Operating income in this segment increased due to higher sales in the ED&C components business as well as due to cost reductions.

#### Major Initiatives in Fiscal 2017

##### Expansion of Orders Amid Substation Equipment Replacement Demand

In Japan, replacement demand is rising as existing facility and plants age. In fiscal 2017, Fuji Electric increased in orders for substation equipment centered on steel, chemical, and other material industries. This feat was accomplished by proposing renovations and replacements of customers' aged facilities.



Substation equipment

##### Plant System Order Acquisition with a Focus on Energy Management Systems

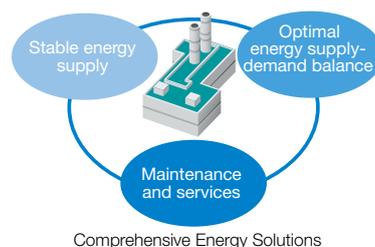
In fiscal 2017, Fuji Electric bundled energy management systems, which optimize electricity and heat usage within factories, and combined heat and power supply equipment, such as cogeneration systems that up self-sufficiency in terms of energy, to provide comprehensive energy optimization packages. We also developed control software that was ideally suited to specific industries.

With focused on energy management systems, we sought to capture plant system orders by proposing combinations of substation and power supply equipment to customers.

### Priority Measures for Fiscal 2018

#### Grow Comprehensive Factory and Facility Electrical Equipment Orders

In fiscal 2018, Fuji Electric will pursue growth in comprehensive electrical equipment orders. Focused on the five target fields of steel, semiconductors, buildings and facilities, assembly, and food, we will propose bundles that combine the substation, power supply, and air-conditioning equipment that underpin the stable supply and optimization of power at factories and facilities with energy management systems customized for specific industries. Furthermore, we will seek to expand our business through the provision of comprehensive energy solutions that encompass everything up to and including maintenance and other services.



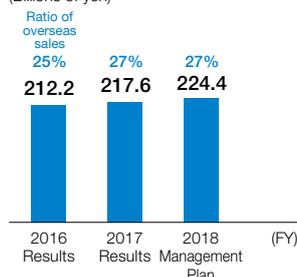
Comprehensive Energy Solutions

#### Expand Transmission and Distribution Systems Business in Asia

We will reinforce our engineering systems and increase orders of engineering, procurement, and construction (EPC) projects in order to expand our transmission and distribution systems business in Asia. At the same time, the strengths of Fuji Tusco, which manufactures transformers, will be utilized to boost the competitiveness of our product lineup through the promotion of global products and to thereby facilitate the growth of completely local businesses. For replacement projects, we will coordinate with local distributors and trading companies to step up service proposal activities.

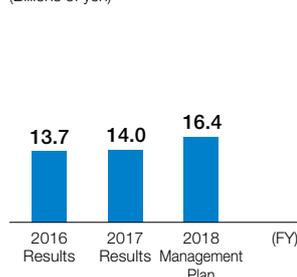
#### Net Sales

(Billions of yen)



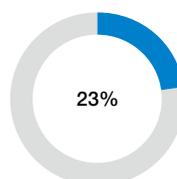
#### Operating Income

(Billions of yen)

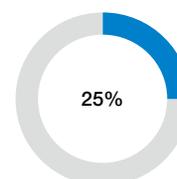


Note: Figures for FY2016 and FY2017 reflect the organizational restructuring conducted in FY2018

#### Net Sales Composition Ratio (Management Plan in FY2018)



#### Operating Income Composition Ratio (Management Plan in FY2018)



## Industry Solutions

### Operating Environment

Labor shortfalls and aging production facilities are stimulating increased demand for automation and labor saving in the domestic industrial field.

In China and other parts of Asia, a lack of production floor staff and the need to improve productivity are creating issues amid the continually robust capital expenditure demand centered on the semiconductor and automotive fields.

### Business Areas

- **Factory Automation**  
Inverters, Motors, FA components (servo and controller), Measuring instruments and sensors, FA systems
- **Process Automation**  
Drive control systems, Measuring and control systems
- **Social Solutions**  
Electrical equipment for railcars, Radiation monitoring systems
- **Equipment Construction**
- **IT Solutions**

## Review of Operations in Fiscal 2017

In the Industry Solutions segment, net sales increased year on year. Performance was driven by the factory automation business, which benefited from robust demand for the automation of production facilities in Japan and China, and the process automation business, which enjoyed brisk replacement demand in the Japanese market. Another proponent of performance was the IT solutions business, which saw increased demand for tablets in conjunction with the trend toward utilizing IT for education in schools.

Operating income in this segment grew together with net sales.

### Major Initiatives in Fiscal 2017

#### Expansion of Factory Automation Orders

In fiscal 2017, we launched our ALPHA7 series of servo systems boasting industry-leading levels of control performance as well as



the MICREX-SX Series SPH3000D motion controller. These products are applicable in a variety of fields, ranging from factory production facility and machine tools to packaging machinery, and we were thus able to expand orders of these products as an integrated motion control system. Orders were primarily centered on China and Japan.

#### Acquisition of Steel Plant Order in India

Fuji Gemco, a company in India acquired through M&A activities, received steel plant orders in fiscal 2017. We filled these orders by delivering a system that bundled software with our PLCs, motors, and inverters for use in steel rod and rolling lines. By shortening development periods to quickly deliver highly reliable systems, Fuji Electric will endeavor to meet the needs of customers requiring quick turnaround times.

## Priority Measures for Fiscal 2018

### Expand FA Systems

In fiscal 2018, Fuji Electric will undertake the development and supply of testing apparatuses and production line conveyance systems that help resolve customer issues by combining its components, such as inverters, servos, controllers, and sensors, with its control technologies and engineering capabilities.

To support these efforts, we will approach assembly processing industry end users in the automotive and semiconductor fields with the aim of growing FA system orders. At the same time, we will utilize the track record and expertise cultivated in Japan to expand our operations overseas.

### Grow the Process Automation Business in Asia

We are stepping up engineering training at Fuji Gemco of India and Fuji CAC of Vietnam, both acquired through M&A activities, and other overseas engineering companies. We thereby aim to grow overseas operations targeting steel and cement plants and other system fields in which Fuji Electric specializes.



Steel rolling facilities

Fuji Gemco

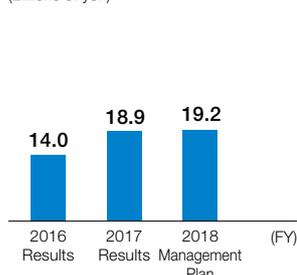
### Net Sales

(Billions of yen)

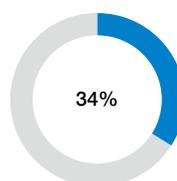


### Operating Income

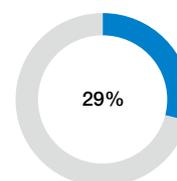
(Billions of yen)



### Net Sales Composition Ratio (Management Plan in FY2018)



### Operating Income Composition Ratio (Management Plan in FY2018)



Note: Figures for FY2016 and FY2017 reflect the organizational restructuring conducted in FY2018

**Systems Project Case Studies**

**Energy Management**

Seeking to reduce energy consumption at the Yamanashi Factory, which produces power semiconductors, Fuji Electric implemented the Smart Factory Initiative at this factory to realize stable power supplies and energy savings.

As part of this undertaking, we actively introduced our energy-saving equipment. In the clean room, conventional motors for fan and pump were replaced with the Company's high-efficiency inverter motors. Meanwhile, air-conditioning equipment, which consumes massive amounts of power, was replaced with systems that use cold water to cool only the necessary areas.

In addition, we installed our fuel cells and in-house generation equipment at the factory site and introduced a cogeneration system (combined heat and power) to make effective use of exhaust heat. Furthermore, sensors were installed on factory equipment. These sensors, which are an area of strength for the Company, allow for the monitoring and collection of data on energy usage within the factory. By analyzing this data (monitoring and comprehension) and running simulations to achieve optimal operating conditions (optimization), we succeeded in reducing the amount of energy consumed by the Yamanashi Factory and were able to secure all the power that was used through in-house generation.

**Process Automation**

Intermediate waste treatment facilities, which primarily treat household garbage, employ a variety of facilities, including incinerators as well as the cranes and conveyors used to transport waste. It is important for these facilities to be able to maintain safe and stable operation while also reducing the impact on the environment from waste incineration. Fuji Electric supplied the system currently used by the Miyanojin Clean Center of Kurume City in Fukuoka Prefecture, which is able to efficiently incinerate massive quantities of waste. This system consists of a decentralized control system equipped with PLCs that achieve optimal control of conveyance speed, air intake, and combustion temperature based on measurements taken by measuring instruments as necessitated by the types of waste being treated. This system has been effective at realizing safe and stable operation and reduced environmental impact. Moreover, the system goes further to make contributions to a low-carbon, recycling-oriented society by generating electricity using the heat energy given off during the waste incineration process. Switchboards are used to distribute the generated electricity for use within the facility, with surplus power being sold. The end result is energy savings and subsequently a smaller environmental footprint.

A major strength of Fuji Electric is its ability to propose systems that combine electrical equipment, measuring instruments, and control equipment. Capitalizing on this strength, we are moving forward with system bundle proposals and order acquisition activities to contribute to the optimization of entire production lines and even entire facilities.

**Optimization of Energy Usage**

This optimal energy control system has been dubbed the "Yamanashi Model." We are currently adapting this model into industry-specific systems packages for use at a variety of external facilities, including semiconductor, steel, assembly, and food plants and buildings and other structures.

**Energy Management System**



- 1 Monitoring  
Monitoring of energy usage
- 2 Comprehension  
Analysis of energy usage data
- 3 Optimization  
Optimization of energy usage

**34% reduction in energy usage in fiscal 2015  
(in comparison to fiscal 2010)**

**Waste Treatment Facility Control System**

**Fuji Electric System at Miyanojin Clean Center**



- 1 Decentralized control system (Capable of controlling operations throughout the facility)
- 2 PLC
- 3 Generator
- 4 Switchboard



## Factory Automation

Electric vehicles (EVs) are expected to become increasingly more mainstream going forward. In China, the drive to adopt EVs is being supercharged by plans to introduce regulation on new energy vehicles (NEVs) in 2019. Furthermore, over half of the world's lithium-ion batteries, which are indispensable to EVs, are produced in China. Fuji Electric is supplying major Chinese lithium-ion battery production equipment manufacturers with its motion control systems, which boast industry-leading control capabilities.

Lithium-ion batteries are comprised of coiled layers of film coated in materials that are able to store electricity. If these coils are not sufficiently tight, it can have a significant adverse impact on the lifespan and performance of the battery. For this reason, manufacturing these batteries requires sophisticated technological capabilities to control the strength and speed at which film is stretched.

Fuji Electric's motion control systems contribute to improved product quality and productivity for customers with their ability to realize high-precision, high-speed motion control.

When it comes to business negotiations related to systems, the competitiveness of proposals hinges on the ability to swiftly meet customers' needs. In this regard, Fuji Electric's in-house design and production of equipment is a huge advantage.

## Factory Automation

There are currently around 110,000 ships at sail around the world, and another 2,000 ships are built each year. Sulfur oxide (SOx), a pollutant contained in ship exhaust gas, is damaging to the environment and to people's health. Seeking to reduce such damages, the International Maritime Organization plans to implement regulations on SOx, as well as particulate matter, another pollutant, in 2020. These regulations will call for a 95% reduction in fuel oil SOx content. Complying with these regulations will require ship operators to switch to costly low-sulfur fuels, resulting in a massive increase in running costs. Another approved option is to use ship exhaust gas cleaning systems, of which SOx scrubbers are a key component. The market for these systems is expected to grow rapidly as they represent a SOx reduction solution that enables ship operators to continue using the same fuel.

Fuji Electric has developed SOx scrubbers that employ a proprietary cyclone technology. We offer these scrubbers to domestic ship operators and have been moving forward with verification tests, leading to the acquisition of our first order in fiscal 2017.

Conventional SOx scrubbers utilize a technology in which seawaters is sprayed on exhaust gas to remove SOx by taking advantage of a chemical reaction between SOx and the alkalis in the seawater. As such, achieving large processing capacities required massive overhauls to ships, which was a significant obstacle to introduction. Fuji Electric's cyclone SOx scrubbers have garnered attention across the industry for their compact size, which enables them to fit in the engine

## Improvement of EV Storage Battery Quality and Productivity

By merging our control technologies with mechatronic technologies, we are able to achieve timely development and proposal of systems matched to the needs of each customer.



Verification-use film coiling system



Motion control system

## Ship Exhaust Gas Cleaning Systems

rooms of most ships. Another benefit of using Fuji Electric scrubbers is that they can be supplied in system bundles that contribute to energy savings. These bundles combine gas analyzers and other measuring instruments that monitor the status of SOx scrubbers in real-time as well as inverters for controlling seawater intake and other peripheral equipment. In the future, we hope to incorporate IoT technologies into our ship exhaust gas cleaning systems to help automatically monitor the operating status of systems to prevent malfunctions or otherwise add value through after sales businesses.



Main unit of ship exhaust gas cleaning system (upper right)

## Electronic Devices

Across the industrial and automotive fields, Fuji Electric contributes to high power conversion efficiency and energy savings by supplying power semiconductors, which are key devices in power electronics.

### Business Areas

- **Semiconductors**  
Industrial and Automotive fields
- **Magnetic disks**

### Operating Environment

A trend toward automation and labor saving is currently being seen in the industrial field centered on Japan and China, stimulating growth in demand for power semiconductors for motor control applications of machine tool and robots.

In the automotive field, Germany, the United Kingdom, and France have announced future bans on the sales of conventional fossil fuel vehicles. Meanwhile, China, the world's largest automotive market, is advancing a national movement to promote EVs. These trends are accelerating the shift toward EVs, which is expected to drive rapid growth in demand for power semiconductors for automotive applications.

### Review of Operations in Fiscal 2017

In the Electronic Devices segment, net sales were up year on year. Sales of semiconductors for machine tools and other areas of the industrial field showed substantial growth on the back of increased automation and labor-saving investment in the Chinese and Japanese markets. In addition, demand for semiconductors for automotive applications was firm.

Operating income rose due to the higher net sales and the benefits of favorable foreign exchange influences.

### Major Initiatives in Fiscal 2017

#### Expansion of Domestic and Overseas Power Semiconductor Production Capacities

We bolstered our series of 7th-generation IGBT modules, which contribute to more compact equipment as well as to greater energy and space savings in comparison to previous offerings, while also expanding our 8-inch wafer production capacity and improving productivity. In addition, we boosted back-end processing capabilities overseas to address growth in inverter air conditioner unit demand in China. These efforts contributed to higher sales.

#### Development and Mass Production of Automotive Power Semiconductors

Fuji Electric developed an automotive IGBT module utilizing the Company's direct liquid cooling technology and RC-IGBT chip technology and commenced mass production. These technologies help EVs drive for longer distances while making their motor drive units smaller. Moreover, they are top in their class in terms of output electric power density.

### Priority Measures for Fiscal 2018

#### Invest in Production Capacity Increases for Expanding Power Semiconductor Operations

We plan to conduct aggressive investment in power semiconductor production equipment in preparation for the projected growth in industrial field demand and the full-fledged proliferation of EVs. In regard to front-end processes, we will invest in increasing 8-inch wafer production capacity. As for back-end processes, investment will be mainly directed toward production facilities for modules for industrial, automotive, and air conditioning applications. We will thereby seek to expand domestic and overseas production levels.

#### Accelerate Automotive Power Semiconductor Product Development

In its R&D, Fuji Electric is shifting development resources to automotive IGBT modules and investing in related development equipment with the aim of growing sales of these modules. In addition, we have commenced mass production of SiC trench gate MOSFETs\* in the form of an all-SiC module and began employing this module in our power electronics products. When incorporated into an inverter, this module can contribute to power loss reductions of 78% in comparison to prior Fuji Electric Si devices.

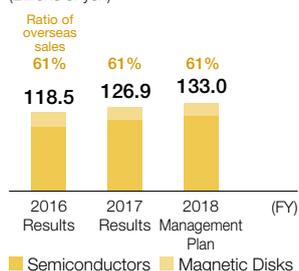
\* Metal-Oxide-Semiconductor Field-Effect Transistor



All-SiC module

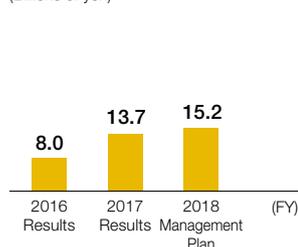
### Net Sales

(Billions of yen)

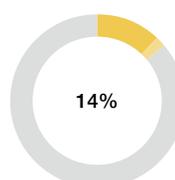


### Operating Income

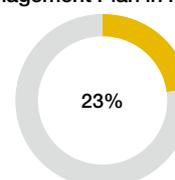
(Billions of yen)



### Net Sales Composition Ratio (Management Plan in FY2018)



### Operating Income Composition Ratio (Management Plan in FY2018)



### Fuji Electric's Power Semiconductors

Semiconductors primarily come in four varieties: micro-computers used to make calculations, memory used to record information, power semiconductors used to control electricity, and optical semiconductors are others.

Manufactured with sophisticated production and processing technologies, power semiconductors convert electricity between DC and AC power as well as the voltage and frequency of electricity to realize efficient use of power. These devices are incorporated into robots, machine tools, and other production equipment; data centers; facilities and power sources necessary to maintain stable supplies of renewable energy; railroad equipment; and EVs. In these applications, power semiconductors support industrial and social infrastructure as key devices in realizing energy savings through the control of electricity and its conversion.

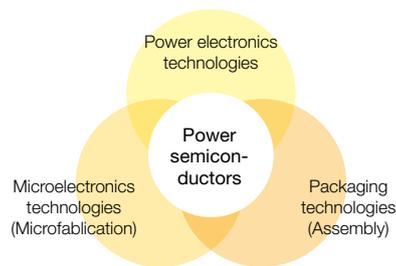
Fuji Electric employs power semiconductors in many of its mainstay power electronics products, including inverters, servo motors, UPSs, and PCs, to realize higher levels of efficiency while also making these products more compact. Moreover, it develops operations using these devices on a global scale.

One of Fuji Electric's core strengths is that the Company possesses all of the technologies necessary for the development and production of power semiconductors, specifically power electronics technologies, microelectronics

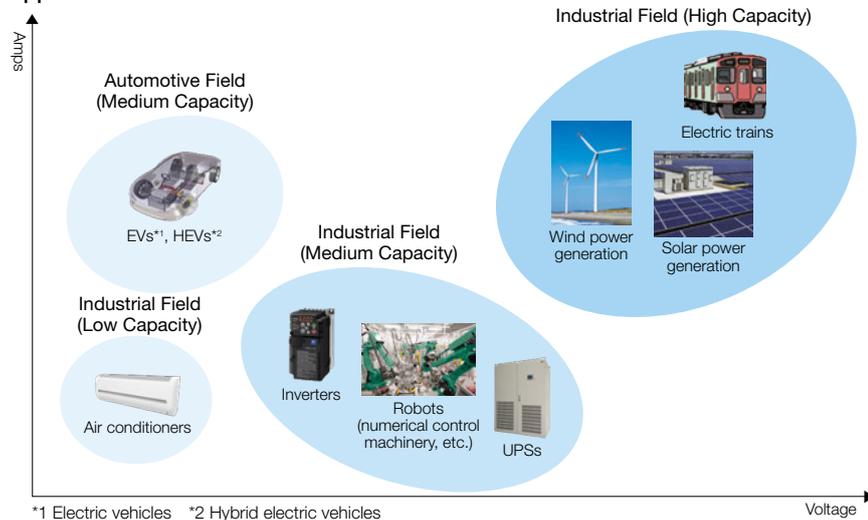
technologies, and packaging technologies. In addition, with front-end and back-end processing equipment at bases in Japan and overseas, we are able to perform all procedures related to the production of power semiconductors in-house. Furthermore, we are diversifying the locations of our production bases to promote local production and consumption while simultaneously planning for business continuity. Meanwhile, increased productivity is being pursued by bolstering 8-inch wafer production capacity. We are also developing SiC\* power semiconductors that contribute to more compact and energy efficient devices in order to further boost the competitiveness of our products.

\* SiC: Silicon Carbide

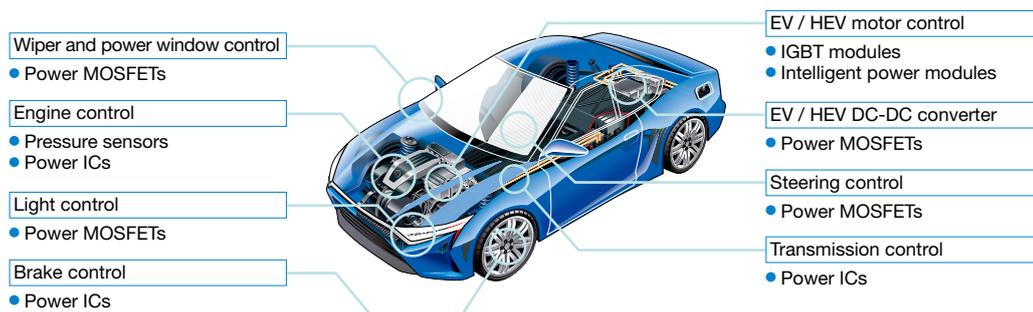
### Strengths of Fuji Electric's Power Semiconductors



### Applications of Power Semiconductors



### Applications of Automotive Semiconductors



## Power and New Energy

With its sophisticated plant engineering capabilities, Fuji Electric meets the growing demand for electricity by providing various high-efficiency power generation systems that supply eco-friendly clean power.

### Business Areas

- **Thermal power**
- **Renewable and new energy**  
Biomass power generation plants, Geothermal power generation plants, Hydro power generation facilities, Solar power generation systems, Wind power generation systems, Fuel cells
- **Nuclear power-related equipment**  
(fuel handling equipment and waste treatment equipment)

### Operating Environment

We are in the midst of a social movement to combat global warming, with efforts on this front predominantly focused on reducing and eventually eliminating carbon emissions. As power demand and the capacity of generation facilities grow in emerging countries and other parts of the world, the shift from large-scale power sources to distributed power sources is gaining speed. In Japan, which is highly dependent on fossil fuels procured from overseas, there is also a need to establish an ideal energy mix\*1 for ensuring reliable supplies of electricity. In light of these trends, Fuji Electric anticipates growth in after-sales businesses in the thermal power field that entail encouraging customers to upgrade to more efficient systems and products along with increased introduction of geothermal power, hydro power, solar power, wind power, and other eco-friendly forms of renewable energy.

\*1 Mix of power sources allowing for the balanced use of various power types for maximum benefits

### Review of Operations in Fiscal 2017

In the Power and New Energy segment, net sales were up year on year because the benefits of large-scale orders for thermal power generation systems counteracted the impacts of the decline in large-scale orders for hydro power generation systems and solar power generation systems.

However, operating income declined as a result of lower revenues from hydro power generation systems and solar power generation systems and a less favorable sales mix.

### Major Initiatives in Fiscal 2017

#### Expansion of Renewable Energy Orders

In the field of small- to medium-capacity generation systems, an area of expertise for Fuji Electric, we increased in sales for woody biomass power generation facilities and also delivered steam turbines and generators to customers such as Nakayama Nagoya Joint Power Generation of Aichi Prefecture.

In regard to geothermal power generation plants, we delivered Japan's largest binary geothermal power generation plants to the Yamagawa Binary Power Station of Kyuden Mirai Energy Company, Incorporated, located in Ibusuki City, Kagoshima Prefecture. It is able to generate power from low-temperature heated water that previously could not be used for generation.



Nagoya Power Plant 2 (Biomass)



Steam turbine and generator

### Priority Measures for Fiscal 2018

#### Pursue Further Growth in Renewable Energy Orders

Fuji Electric will pursue further growth in orders for geothermal power generation plants by utilizing its anti-corrosion and turbine production technologies and it seeks to explore new markets such as Africa, where increases in energy demand are anticipated.

We also look forward to increases in the introduction of wind power generation systems given the fact that the systems currently operating in Japan only account for a low 12%\*2 of the approved generation capacity under the country's feed-in-tariff system. Furthermore, we aim to acquire EPC contracts by addressing issues related to unreliable generation outputs with the strength of our electricity storage systems, which are equipped with Fuji Electric's power semiconductor power conversion technologies.

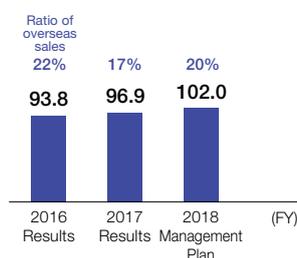
\*2 Based on figures released by the Agency for Natural Resources and Energy as of September 30, 2017

#### Expansion of After-Sales Businesses

We are expanding after-sales businesses in which we provide regular inspections as well as services for boosting generation efficiency and preventing malfunctions. In regard to thermal and geothermal power generation plants, specifically, we will construct networks for providing services that are custom-tailored to the needs of customers in priority regions such as Asia, the Americas, and the Middle East under the guidance of mother factories in Japan. At the same time, we will bolster our lineup of lifespan diagnosis services, IoT-powered remote technical services, and other services.

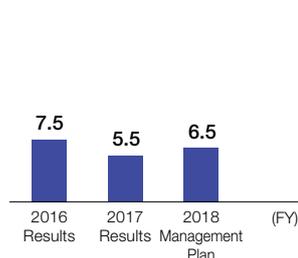
### Net Sales

(Billions of yen)

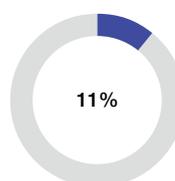


### Operating Income

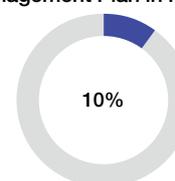
(Billions of yen)



### Net Sales Composition Ratio (Management Plan in FY2018)



### Operating Income Composition Ratio (Management Plan in FY2018)



## Food and Beverage Distribution

In the food and beverage distribution segment, Fuji Electric helps to ensure the safety and security of food and beverage products by combining its core heating and cooling technologies with mechatronic and IoT technologies to provide ideal products and solutions.

### Business Areas

- **Vending machines**  
Beverage vending machines, Vending machines for food and other goods
- **Store distribution**  
Showcases, Automatic change dispensers, Eco-friendly stores

### Operating Environment

In China and other parts of Asia, the rise in labor costs are driving a rapid trend toward the automation of beverage and other retail sales, which is contributing to the growth of the vending machine market. As a result, the Chinese market features demand for a wide range of vending machines, including can, PET bottle, cup, and food vending machines.

Turning to the domestic convenience store market, we anticipate increased investment in existing stores for the purposes of boosting sales, reducing labor requirements, and conserving energy. At the same time, the increasingly severe shortage of employees to operate stores is stimulating a rise in demand for operating solutions that can be used with fewer employees.

### Review of Operations in Fiscal 2017

Net sales in the Food and Beverage Distribution segment increased year on year. Although the revision of customers' plans caused performance in the Chinese market to remain around the same level as in the previous fiscal year in the vending machine business, this business was still able to prosper due to higher demand from customers in the Japanese market. The store distribution business enjoyed increased demand for products for convenience stores.

Operating income was up as the growth in domestic vending machine demand was able to counteract the downward pressure placed on income by a less favorable sales mix in the store distribution business.

### Major Initiatives in Fiscal 2017

#### Overseas Expansion of Vending Machine Business

We bolstered our vending machine production system in China with the completion of our second factory in Dalian City, and we also undertook reinforcements to sales, service, and development systems. Moreover, we succeeded in strengthening overall business systems by supporting local beverage manufacturers in deploying vending machines and by providing operational assistance to local operator companies, which use vending machines as a venue to sell the items contained therein. In addition, a vending machine production and sales company in Indonesia was acquired with an eye to the further enhancement of operating foundations in Southeast Asia.

### Priority Measures for Fiscal 2018

#### Grow Vending Machine Business in China

We will continue to form relationships with new customers in China, including beverage manufacturers and operator companies, while introducing cup, food, and other vending machines into the Chinese market to respond to the diverse needs therein. We thereby aim to grow vending machine sales.



Manufacturing floor of second Dalian factory

#### Creation of Southeast Asian Vending Machine Market

With the aim of creating a Southeast Asian vending machine market, we plan to step up efforts to research the needs of customers in Thailand and other countries while promoting proposals for replacing old vending machines with new models. We will also commence full-fledged operation of our Indonesia Factory, a new production base in Southeast Asia, to quickly cement operating foundations in this region.



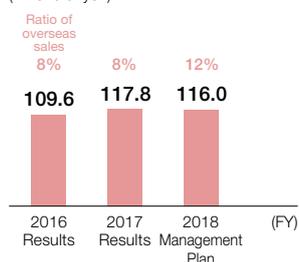
Food and goods vending machine for Southeast Asia

#### Development of Labor-Saving Products for Next Generation Stores

Fuji Electric is committed to developing and proposing new products that address the labor-saving needs of convenience stores.

### Net Sales

(Billions of yen)

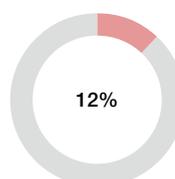


### Operating Income

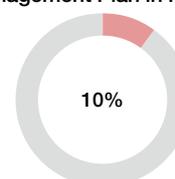
(Billions of yen)



### Net Sales Composition Ratio (Management Plan in FY2018)



### Operating Income Composition Ratio (Management Plan in FY2018)



# Review of Operations (Overseas Operations)

Fuji Electric is applying its policy of local design, local production, and local consumption to building overseas operating foundations. As part of this undertaking, we are establishing and strengthening sales, engineering, and production bases in China, other parts of Asia, the Americas, and Europe. We have also conducted a total of nine overseas M&A activities over the period spanning from fiscal 2013 to fiscal 2017 for the purpose of acquiring human resources and sales channels. Leveraging these bases, we have been successful in approaching customers and strengthening engineering capabilities overseas, and these efforts have led to the acquisition of steel, cement, and other plant orders, primarily in Asia.

Going forward, we will promote enhanced coordination between manufacturing and engineering bases in Japan and other areas in the pursuit of higher sales in China, India, and other growing Asian markets.

## Overseas Sales

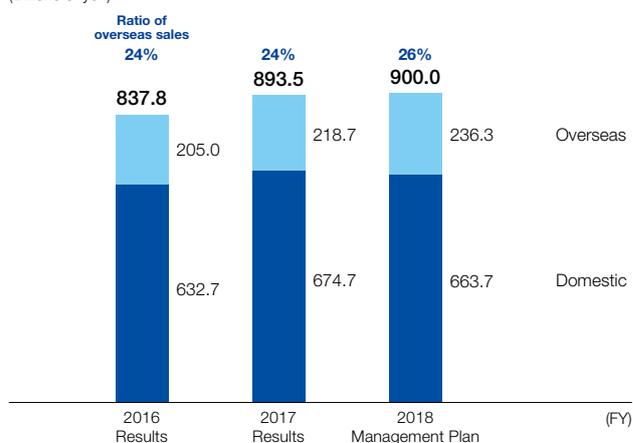
In fiscal 2017, overseas sales increased ¥13.7 billion year on year, to ¥218.7 billion. This growth was driven by performance in China and other parts of Asia, which accounted for more than 80% of these sales.

The Energy Solutions segment benefited from large-scale orders for substation equipment in Asia. Meanwhile, the Industry Solutions segment and the Electronic Devices segment enjoyed increased demand for FA components, inverters, and power semiconductors due to the rising production facility automation and energy saving needs in the Chinese market.

In fiscal 2018, we will target overseas sales of ¥236.3 billion, an increase of ¥17.6 billion year on year, by further expanding operations in Asia and China.

### Domestic and Overseas Sales

(Billions of yen)



## Priority Measures for Fiscal 2018

### Asia

- Acquire large-scale thermal and geothermal power generation system orders and grow after sales businesses (Power and New Energy)
- Step up efforts to acquire steel and cement plant orders by utilizing Fuji Gemco and Fuji CAC (Industry Solutions)
- Commence operation at the Indonesia Factory to strengthen operating foundations in the Southeast Asian vending machine market in order to create a new model vending machine market (Food and Beverage Distribution)

### China

- Boost FA component and system sales by catering to production facility automation needs (Industry Solutions)
- Introduce new solar power generation PCSs and accelerate solar power generation system order acquisition activities with joint ventures with Shanghai Electric Group to address rising renewable energy demand (Industry Solutions)
- Increase orders for air conditioner power semiconductors by growing inverter-equipped air conditioner sales (Electronic Devices)
- Expand sales of new products for automobiles amid national movement to promote EVs (Electronic Devices)
- Bolster vending machine lineup in response to diversifying market needs (Food and Beverage Distribution)

### Americas

- Strengthen systems for local production and consumption by transferring development and engineering functions to railcars

operations bases acquired through M&A activities in order to expand overseas systems operations (Industry Solutions)

- Expand thermal power and geothermal power after-sales businesses to address rising aged power plants after-sales service demand (Power and New Energy)

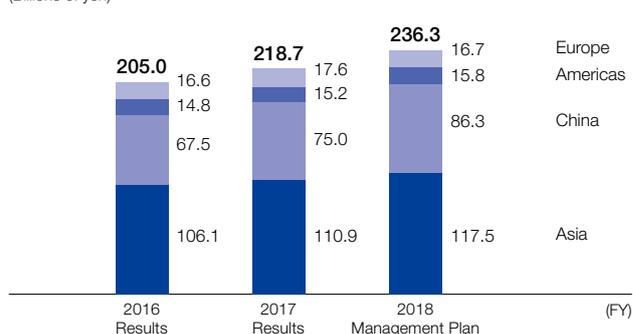
### Europe

- Reinforce European production systems through commencement of knockdown production\* of inverters (Industry Solutions)

\* A manufacturing technique in which the main parts of a product are procured from another country or another company and then assembled for sale in the local market

### Overseas Sales (by Region)

(Billions of yen)



# Review of Operations (Capital Expenditures and R&D Expenditures)

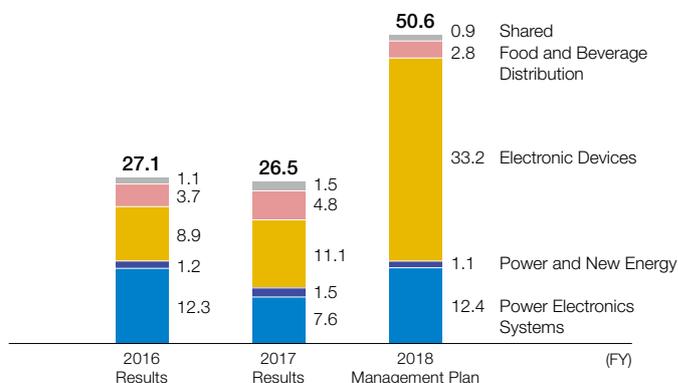
## Capital Expenditures

Fuji Electric enacts a basic capital expenditure policy of concentrating investments on facilitating local design, local production, and local consumption and on focus areas.

In fiscal 2017, expenditures were conducted in the Electronic Devices segment to install production equipment compatible with SiC power semiconductors and other newly developed products. Meanwhile, the Food and Beverage Distribution segment saw expenditures for the completion of the second Dalian factory in China, which was built to augment vending machine production capacity in this country.

In fiscal 2018, we are planning expenditures in the Electronic Devices segment for bolstering production capacity to expand power semiconductor operations and for investing in production equipment for manufacturing newly developed products, such as power semiconductors for automotive and industrial applications and SiC power semiconductors. In the Power Electronics Systems segment, we will start construction of switchgear and controlgear system factories at our production base in Thailand (Fuji Electric Manufacturing (Thailand)).

**Capital Expenditures**  
(Billions of yen)



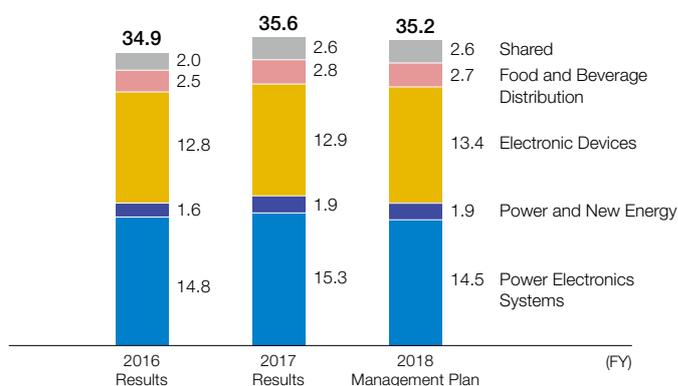
## R&D Expenditures

Fuji Electric's basic policy for R&D expenditures is to invest in research and development for accelerating the development of competitive, value-added products.

In fiscal 2017, our focus was the creation of competitive components and systems. We invested in SiC power semiconductors that contribute to substantial energy savings in the equipment in which they are used in the Electronic Devices segment. Expenditures in the Power Electronics Systems segment were made to develop an automobile tire testing machines that employs Fuji Electric's FA systems. Another R&D focus was the development of an IoT platform that helps customers optimize their energy usage and operations through the diagnosis, analysis, and prediction of facility operating conditions.

In fiscal 2018, we once again plan to devote 40% of R&D expenditures to the Electronic Devices segment, where we will move ahead with the development of SiC power semiconductors and automotive power semiconductors. In the Power Electronics Systems segment, which will also be the target of 40% of R&D expenditures, we will conduct research and development on power electronics products equipped with SiC modules. As for corporate research and development, we develop IoT-compatible equipment and systems.

**R&D Expenditures\***  
(Billions of yen)



\* Figures for R&D expenditure above have been divided by segment based on theme and may therefore differ from the figures contained in the consolidated financial report for the fiscal year ended March 31, 2018.

# Research and Development / Intellectual Property

## Research and Development

Fuji Electric is focused on research and development activities for creating competitive components and systems centered on power semiconductor technologies and power electronics technologies as well as activities for developing solutions that produce value for customers by combining fundamental technologies. The Company has designed its R&D system to accelerate R&D activities by delegating product development functions to the respective business groups while the corporate R&D group handles technology marketing, advanced research, and basic research.

### R&D Policies

- Create competitive components and systems utilizing cutting-edge technologies
- Develop competitive product technologies utilizing technology marketing
- Realize new innovation by combining Fuji Electric's fundamental technologies with open innovations



### Initiatives in Fiscal 2017

#### Creation of Competitive Components and Systems

##### ● Power Conditioning Sub-Systems for Large-Scale Solar Power Generation Systems

Fuji Electric has succeeded in the development of a compact, lightweight, and affordable independent power conditioning sub-system (PCS) for outdoor use. This PCS reduces current value by approximately 30% through conversion to higher voltages and thereby contributes to a massive reduction in the costs associated with power supplies for solar power generation systems. By revising the parts and designs used in this PCS, we were able to realize a 20% reduction in size and a 25% reduction in weight compared to our previous models.

Fuji Electric will leverage the increased competitiveness of this product to expand its operations in Southeast Asia and other overseas regions.



New PCS: PVI1000BJ-3/1000

##### ● All-SiC Module

Fuji Electric has developed and commercialized an all-SiC module equipped with SiC trench gate MOSFET. This device boasts a resistance level that is among the lowest in the world (1200 V, 3.5 mΩ cm<sup>2</sup>).

When incorporated into an inverter, this device can contribute to loss reductions of 78% in comparison to Fuji Electric's Si devices and can thereby realize significant energy savings.

Looking ahead, we intend to expand the range of products that employ all-SiC modules in order to bolster the competitiveness of Fuji Electric's power electronics products.

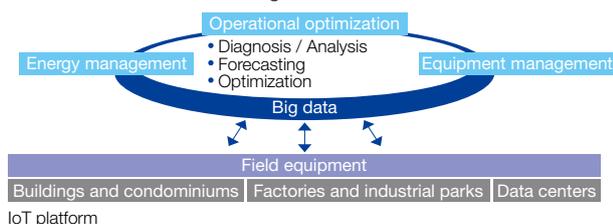


All-SiC module

#### Development of Product Technologies Utilizing Technology Marketing

##### ● IoT Platform

Fuji Electric has developed an IoT platform that tracks and optimizes plant and factory operations and energy usage. This platform utilizes sensing technologies and network connection technologies to conduct analyses of the big data collected from customers' field equipment. In this manner, the platform is able to function as a solution service that is capable of predicting facility abnormalities, improving productivity, reducing energy costs, and otherwise creating value for customers.



##### ● Automobile Tire Testing Machine Compatible with International Standards

The Company has developed an automobile tire testing machine that is compatible with the Worldwide harmonized Light vehicles Test Procedure (WLTP), an international standard for exhaust gas and fuel efficiency tests for automobile tires. Fuji Electric's electrical inertia control and other sophisticated control techniques enable this system to test tires for a wide variety of vehicles, ranging from lightweight passenger cars to four-ton trucks.

We hope to grow sales in new fields by providing offerings that combine this testing machine with FA systems.



Tire testing machine compatible with WLTP

#### Realization of New Innovation

Fuji Electric is advancing joint research with Japanese universities and research institutions based on comprehensive partnership agreements. In addition, we have endowed laboratories to the University of Tsukuba and the University of Yamanashi and

helped establish a collaboration center at Zhejiang University. Through these venues, we are advancing efforts in research and the development of human resources in the fields of power devices, power electronics, and IoT.

## Future Initiatives

Focuses of Fuji Electric's R&D activities going forward will include SiC power semiconductors, automotive power semiconductors, and SiC-equipped power electronics products as well as automotive and railroad power electronics products and other competitive components. We will also develop factory automation and process automation systems and IoT solutions that are synergetic with these components while fostering human resources through the process of tackling new challenges. Through these undertakings, we will seek to create new value for our customers.

## Intellectual Property

Positioning intellectual property (IP) rights as one of the most important management resources, Fuji Electric is working to implement IP strategies that are aligned with its business and R&D strategies to contribute to the strengthening and expansion of its globalization-compatible business.

### IP Policies

- Strengthen IP activities that extend back into the stages of business planning and R&D
- Investigate and respond to overseas IP systems and their current statuses and reinforce IP activities at overseas bases
- Promote international standardization activities

## Initiatives in Fiscal 2017

### IP Activities in the Initial Stages of Business

We endeavored to formulate IP strategies from the business and R&D theme planning stage. After confirming business and R&D directives, these strategies were drafted based on patent analysis and surveys. We also took steps to develop patent portfolios that ensure a strong advantage in business activities.

### Main Fields for Patent Applications

- Patents relating to increasing the efficiency and energy savings of power electronics products
- Patents pertaining to power semiconductors, such as those for SiC-related technologies
- Patents relating to vending machines and other areas of the food and beverage distribution field

### Global IP Activities

Fuji Electric continues to address overseas IP issues and implement measures against counterfeit products to minimize business risks related to IP.

In fiscal 2017, the patent survey and application functions in China that were enhanced during fiscal 2016 were used in advancing survey and application activities spearheaded by our local Chinese IP division. At the same time, we implemented measures for countering risks associated with counterfeit products and IP.

As part of its contributions to international standardization movements, we collaborated with the International Electrotechnical Commission (IEC), an international institution aimed at developing standards for electric and electronic technologies. Specifically, Fuji Electric contributed as a member

of the international committees responsible for establishing the IEC System for Certification to Standards Relating to Equipment for Use in Renewable Energy Applications (IECRE System). Most notably, Fuji Electric was chosen to represent Japan on the committee on solar power generation system operation and management.

As a result of these efforts, Fuji Electric was chosen, for the first time, to be included in the 2017 Top 100 Global Innovators by Clarivate Analytics, a global information service company located in Philadelphia in the United States.



Shiro Kondo (right), Corporate General Manager of the Corporate R&D Headquarters, receiving trophy from Clarivate Analytics

## Future Initiatives

Against a backdrop of increasing globalization, Fuji Electric will move ahead with initiatives linked to its business and R&D strategies as well as IP activities aimed at addressing IP issues faced overseas. We will also seek to contribute to business through proposal activities based on global standards in light of the trend toward IoT.

# Manufacturing / Procurement

## Manufacturing

Based on its policies of promoting local design, local production, and local consumption, Fuji Electric is developing a framework for optimizing global operations of mother factories in Japan and overseas bases in China and other Asian countries in order to respond to diverse needs around the world. We also strive to transmit the manufacturing DNA that we have continued to pass down since Fuji Electric's inception while promoting and expanding use of new manufacturing techniques utilizing IoT, improving productivity, and seeking to provide products and services of the highest caliber in order to leave customers thoroughly satisfied.

### Manufacturing Policies

- Innovate production with IoT and M2M\*
- Promote global supply chain reform
- Enhance on-site production capabilities, production technology capabilities, and human resource development
- Improve product quality

\* Machine to Machine: System for realizing automated and optimal control by having machines exchange information without human involvement

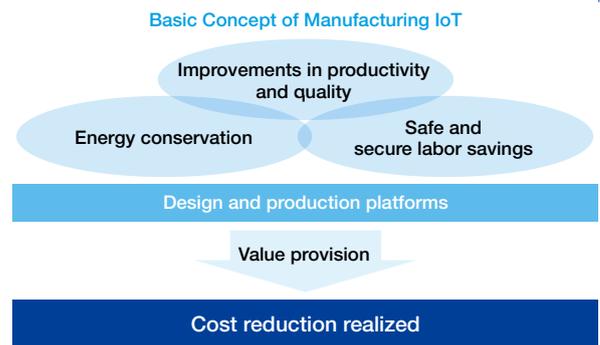


### Initiatives in Fiscal 2017

#### Cost Reductions through Manufacturing IoT

The basic concept of manufacturing IoT has been recognized to be cost reductions. The Otawara Factory, which mainly produces molded-case circuit breakers, and the Mie Factory, which produces vending machines, freezers and refrigerated showcases, have been designated as model factories at which we will advance manufacturing IoT initiatives. At these factories, we have installed dashboard systems that monitor production, equipment operation, and energy statistics in real-time. We also implemented predictive maintenance and quality improvement initiatives utilizing big data analysis technologies.

Successful manufacturing IoT initiatives will be introduced at other Fuji Electric factories.



#### Strengthening of Production Technology Capabilities

In the pursuit of stronger manufacturing capabilities, Fuji Electric is promoting development of products with an emphasis on ease of production through standardization and modular design. At the same time, we have expanded the scope of in-house production in order to improve value. Meanwhile, productivity was improved through the automation of conventional assembly procedures, and we expanded the scope of inspection procedure automation, contributing to higher product quality and reliability.



Sheet metal processing line (Kobe Factory)



Printed wiring board mounting line (Suzuka Factory)

#### TOPICS

A second factory was constructed at Dalian Fuji Bingshan Vending Machine Co., Ltd. (DFB), in order to improve our vending machine production capacity in China. We introduced the integrated production line technologies at use in Mie Factory into the second Dalian factory and also installed cutting-edge automation and IoT equipment to improve productivity.



Second DFB factory



Automated vending machine welding line

## Enhancement of Human Resource Development

Global mother factories in Japan are working to accumulate technologies and expertise. Moreover, by encouraging our employees to participate in the National Skills Competition and the Skill Grand Prix,\* we are eager to nurture ambitious employees with superior abilities that can take on high-level challenges. Overseas, Fuji Electric Manufacturing (Thailand) Co., Ltd., has been positioned as an overseas regional mother factory responsible for supporting production bases in India, Europe, and the surrounding regions in enhancing their quality and manufacturing capabilities. One focus overseas is

establishing systems for training local engineers and educating production floor leaders. At the same time, we will continue to actively transmit the manufacturing DNA cultivated in Japan to overseas operating bases in order to ensure that we can provide the same levels of quality and service anywhere in the world.

\* Held jointly by the Ministry of Health, Labour and Welfare, the Japan Vocational Ability Development Association, and ZENGIREN, this competition lets seasoned engineers put their skills to the test to determine who is the best in Japan. With no age restriction, the level of competition in this event is higher than in the National Skills Competition, which is generally only open to people ages 23 and under.

## Future Initiatives

In the future, Fuji Electric will pursue production innovations based on the concept of completely localized production along with cost reductions utilizing IoT in order to boost product competitiveness. Also, measures for automating testing and inspection processes, utilizing AI for autonomous production, and reducing costs with IoT will be implemented under the guidance of global mother factories in Japan with the aim of creating factories linked through these technologies.

## Procurement

To increase profitability and reduce risks, Fuji Electric is strengthening its global-scale procurement system while also striving to keep down all costs of materials and indirect materials used in products as well as promoting CSR-oriented procurement activities.

### Procurement Policies

- Secure necessary materials and limit cost increases through responses to procurement environment changes
- Promote strategic procurement through coordination between design and development departments and suppliers
- Enhance global procurement capabilities through global estimate management system
- Promote thorough compliance



Global estimate management system explanatory forum for business partners

## Initiatives in Fiscal 2017

### Strengthening of Global Procurement Capabilities to Reduce Costs of Direct and Indirect Materials

In response to changes in the procurement environment, such as soaring material prices and tight supply-demand balances, Fuji Electric expanded the scope of strategic procurement through coordination between design and development departments and suppliers with the aim of realizing further cost reductions. At the same time, we sought to limit cost increases

by standardizing parts and switching to easier to obtain materials. Furthermore, the Company implemented a global estimate management system that allows for the sharing of information on estimates received at all bases. This system enables us to more efficiently form relationships with competitive suppliers.

### Reinforcement of Procurement Business Community Management

Acting in accordance with Fuji Electric's procurement business community management regulations, we sought to establish frameworks for quick confirmation of the impacts on the supply chain of any natural disasters that may occur. We also worked

to entrench information management practices that will facilitate the identification of risks associated with material procurement and thereby help ensure business continuity.

## Future Initiatives

The current procurement environment is characterized by a tight supply-demand situation for electronic components, wafers, and other items. Amid these conditions, Fuji Electric will implement its global estimate management system, monitor component related information from all bases, and collect a broad range of other information to move forward with the standardization of materials procured and with the establishment of multiple sources for these materials. Going forward, we will strive to contribute to the expansion of Fuji Electric's business while simultaneously securing the necessary materials, limiting cost increases, and pursuing cost reductions.