

# **Power Electronics Business Strategies**

**May 29, 2015**  
**Fuji Electric Co., Ltd.**  
**Power Electronics Business Group**

- Business Overview
- Market Trends
- Business Targets
- Priority Measures

# Business Overview

## Major products

## Market position

### Drive

- Inverters
- Motors
- Servo systems
- Transportation power electronics



Inverters



Motors



Servo systems



Automotive electronics



Electric equipment for railcars

- **Low-voltage inverters**  
Share in Japan: 25% (No.2)  
Global share: 4% (No.7)
- **Medium-voltage inverters**  
Share in Japan: 14% (No.3)

### Power supply

- UPS
- PCS
- Switching power supplies
- Switchgear and controlgear



Uninterruptible power systems (UPS)



Power conditioner(PCS) for mega solar



Switching power supplies



Switchgear and controlgear

- **Medium- and large-capacity UPS**  
Share in Japan: 27% (No.2)  
Share of units sold
- **Large-capacity PCS**  
Share in Japan: 25% (No.3)  
-capacity over 500 kW:  
Share in Japan: 57% (No.1)

### ED&C components

- Power distribution and control equipment



Magnetic starters



Molded case circuit breakers

- **Magnetic starters**  
Share in Japan: 50% (No.1)
- **Molded case circuit breakers**  
Share in Japan: 16% (No.2)

## Supply core components for plants and systems



# Market Trends

# Inverters Market Trends

- Strong growth expected in Japan
- Flat growth in China, modest recovery in Europe
- Recovery trend in Asia and the Americas despite certain risks

Region/country	Market growth rate (YOY)	High-growth fields	Forecasts of market conditions
World	104%	—	—
Japan	104%	Fans, pumps	<ul style="list-style-type: none"> <li>▪ Strong growth expected</li> </ul>
Overseas	104%	—	<ul style="list-style-type: none"> <li>▪ Flat growth in China, modest recovery in Europe</li> <li>▪ Recovery trend in Asia and the Americas despite certain risks</li> </ul>
China	100%	—	<ul style="list-style-type: none"> <li>▪ Delayed recovery of air conditioner market due to sluggish real estate market</li> <li>▪ Flat growth expected</li> </ul>
Asia	104%	Air conditioners, elevators, infrastructure	<ul style="list-style-type: none"> <li>▪ Strong conditions in air conditioner market (Southeast Asia) and elevator market (India)</li> </ul>
Europe	102%	Air conditioners, elevators	<ul style="list-style-type: none"> <li>▪ Low growth despite signs of departure from stagnancy seen in manufacturing industry during beginning of year</li> </ul>
Americas	103%	Air conditioners	<ul style="list-style-type: none"> <li>▪ Overall recovery trend despite risks associated with oil and gas projects due to low crude oil prices</li> </ul>

\* Fuji Electric's estimates

# UPS Market Trends

- Slight negative growth in Japan
- Flat growth in China
- Ongoing favorable conditions in Asian and American IDC markets
- Recovery trend in Europe

Region/ country	Market growth rate (YOY)	High-growth fields	Forecasts of market conditions
World	102%	—	—
Japan	99%	IDC	• Slight negative growth due to delays in IDC construction
Overseas	102%	—	• Market conditions continue to be favorable in the Americas • IDC market conditions continue to be favorable
China	100%	IDC	• Flat growth
Asia	101%	IDC, public infrastructure	• IDC market conditions continue to be favorable in Southeast Asia
Europe	105%	IDC	• Recovery from previous year's substantial negative growth
Americas	106%	IDC	• IDC market conditions continue to be favorable • The 3 largest players account for more than 70% of the market

\* Fuji Electric's estimates



# PCS Market Trends

- Slight negative growth in Japanese mega solar market, favorable conditions for PCS (capacity over 500 kW)
- Flat growth in China
- Continued favorable conditions in Asia

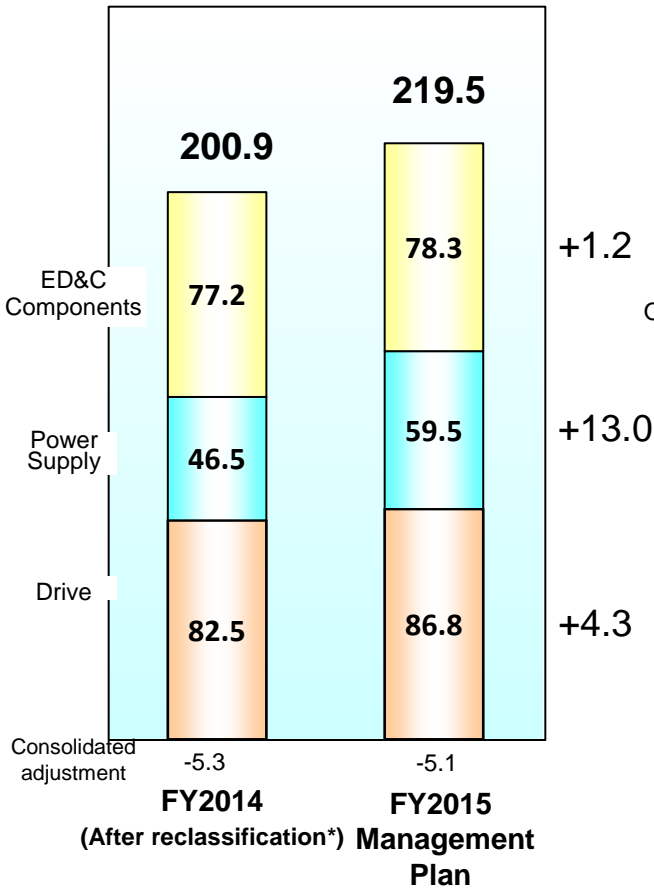
Region/country	Market growth rate (YOY)	High-growth fields	Forecasts of market conditions
World	107%	—	—
Japan	116% (PCS with capacity over 500 kW)	Mega solar	<ul style="list-style-type: none"> <li>• Slight negative growth in Japanese mega solar market</li> <li>• Favorable conditions for PCS (capacity over 500 kW)</li> </ul>
Overseas	110%	—	<ul style="list-style-type: none"> <li>• Continuation of overall favorable conditions</li> </ul>
China	101%	Mega solar Medium-sized commercial-use	<ul style="list-style-type: none"> <li>• Conditions generally favorable despite slowdown</li> <li>• Expansion of shares of local manufacturers</li> </ul>
Asia	117%	Mega solar Medium-sized commercial-use	<ul style="list-style-type: none"> <li>• Market conditions favorable in Thailand, Malaysia, and South Korea</li> <li>• Large-scale projects continue</li> </ul>
Europe	109%	Medium-sized commercial-use	<ul style="list-style-type: none"> <li>• Significant country-specific changes in government policies and economic conditions</li> </ul>
Americas	113%	Mega solar Medium-sized commercial-use	<ul style="list-style-type: none"> <li>• Market conditions favorable for small- and medium-capacity PCS</li> </ul>

\* Fuji Electric's estimates

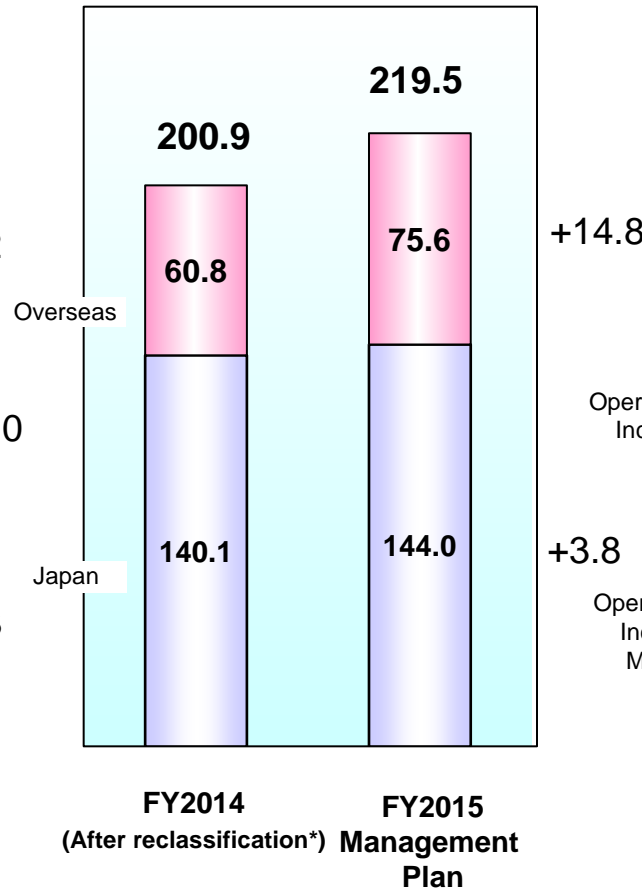
# Business Targets

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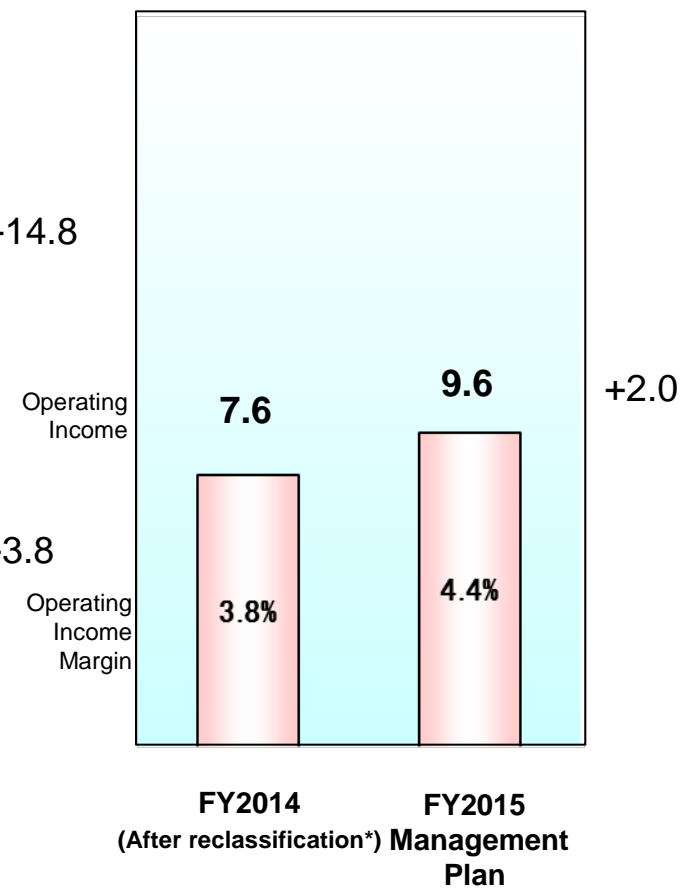
Net Sales by Subsegment  
(Billion yen)



Net Sales in Japan / Overseas  
(Billion yen)



Operating Income / Operating Income Margin  
(Billion yen)



\* FY2014 figures have been restated to reflect the change in business divisions instituted in FY2015.

Business division change: Transference of switchgear and controlgear operations (Social engineering systems / industrial and instrumentation equipment → Power supply)

Change of control of HMI subsidiary (Industrial and instrumentation equipment → Drive)

# Priority Measures

## ● Transition to strong earnings structure

Convert Suzuka Factory into global mother production base for power electronics components

- Consolidate component manufacturing within Suzuka Factory  
(Expand domestic production of industrial motors, transfer Kobe Factory's railcar production operations to the Suzuka Factory)
- Expand local production and local consumption

## ● Expand overseas orders and sales

- Utilize acquired companies and step up collaboration (Asia, Americas)

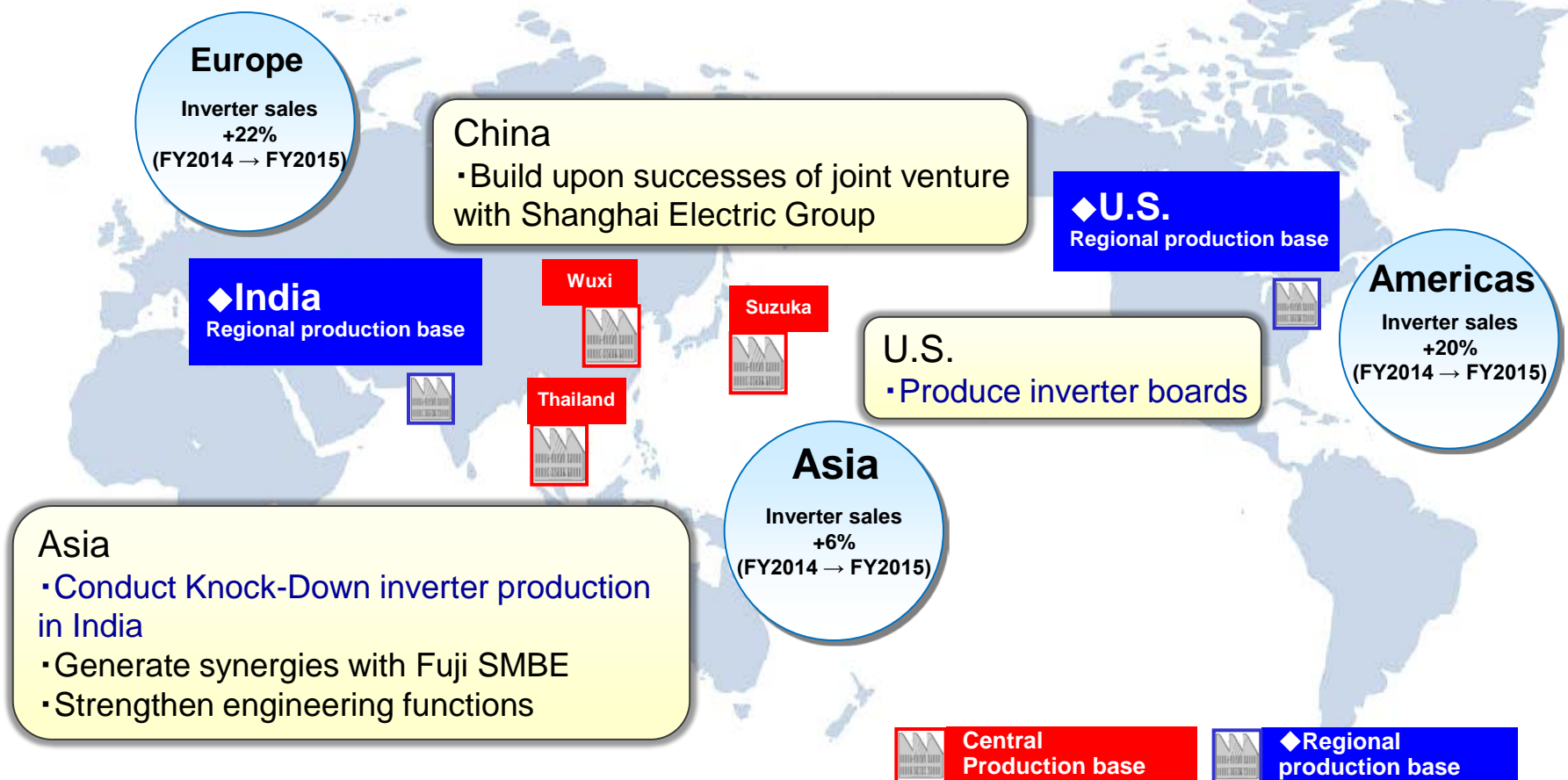
## ● Accelerate new product launches

Consolidate development systems through establishment of Power Electronics Technical Center

- Develop platform employing power semiconductors in order to accelerate market introductions
- Advance development of differentiated products through application of SiC power semiconductors










# Inverters & Servo systems Priority Measures

- Improve competitiveness by establishing regional production bases in the United States and India
- Utilize Fuji SMBE's sales channels and step up collaboration with companies in Asia and the Americas to expand overseas orders
- Build upon successes of FY2014, such as collaboration with Shanghai Electric Group and introduction of new products



# Inverters & Servo systems Priority Measures

- Utilize platform to realize short-period development of models for specific industries and regions and then launch these products

Application / Industries	Models	FY2014	FY2015			
			1Q	2Q	3Q	4Q
Industrial Plants, Electric power and Social Infrastructure	Medium-voltage inverters 		Global models			
Cranes, Molding machines, Automotive testing equipment	Stack-type FRENIC-VG high-performance vector-controlled inverter		SiC-equipped Expand 690V series			
Elevators	FRENIC-Lift for elevators		★ Slim type			
Air conditioners (HVAC)	FRENIC-HVAC FRENIC-VP, FRENIC-eHVAC, for air conditioning applications	 <b>Utilize platform</b> 	For U.S. (575V Series)			
			★ For China / SE Asia			
General industrial machinery	FRENIC-Ace, a global standard model 		Higher voltage, capacity			
			EMC filter built-in			
Semiconductor fabrication equipment, Metal processing machines, Packaging machines, Printing machines	Servo systems ALPHA5 Next Smart for overseas markets ALPHA5 Ether-CAT type for motion systems					

**[Development of SiC-equipped products]**

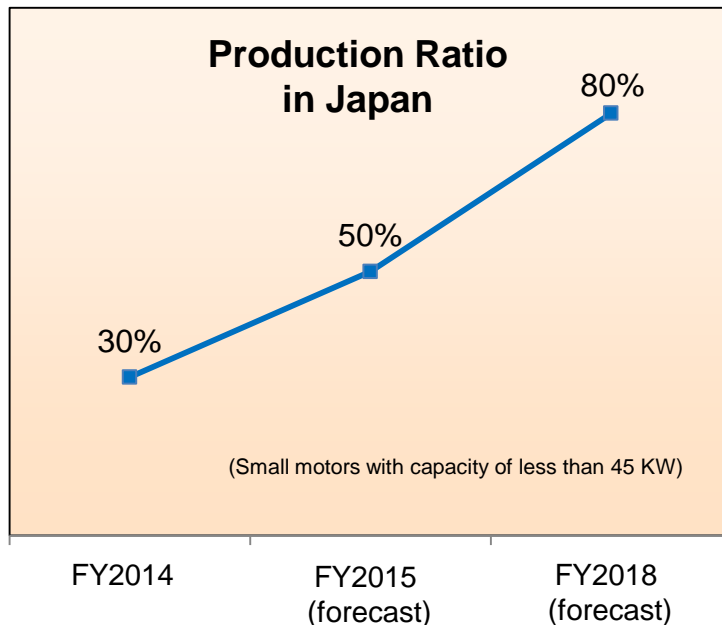
Low-voltage inverters  
Servo systems (multi-axis servo amplifiers)

Small- to large-capacity platform → Apply models to VG, HVAC, etc.

# Motors Priority Measures

## ● Expand domestic production to increase local production and consumption (China → Suzuka Factory)

- Develop advanced automated production line
- Revise manufacturing procedures (technologies/techniques) in domestic factories
- Conduct high-mix, low-volume production of industrial motors and shorten lead times



IE3 motor



Ultrahigh-speed motor



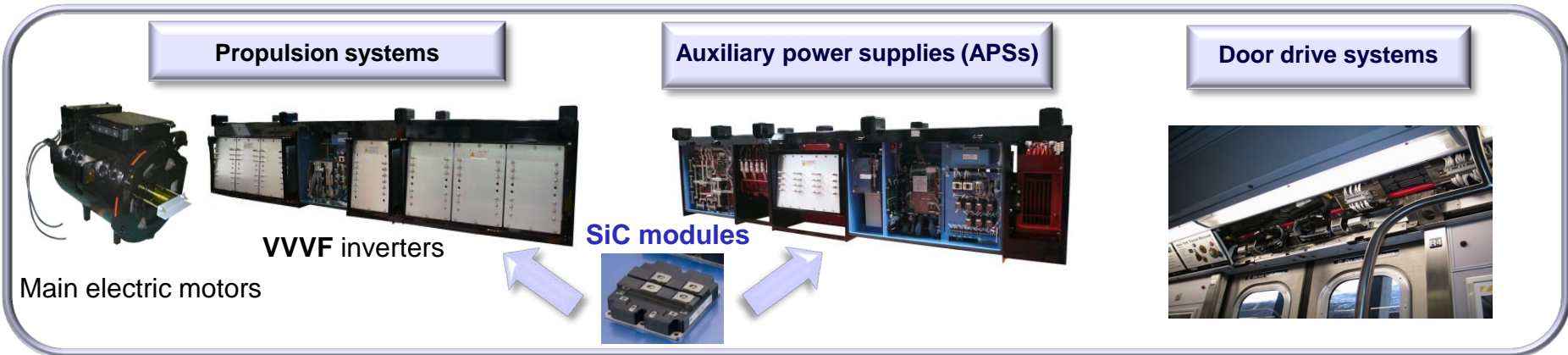
# Railcar systems Priority Measures

- **Promote local production and consumption to strengthen and expand business operations**

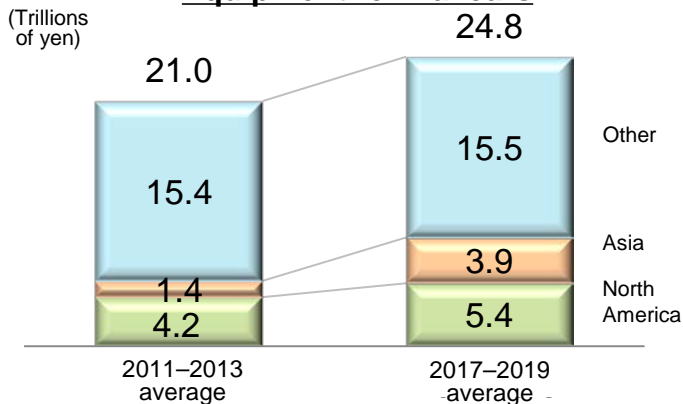
Construct production systems in the United States

- **Expand lineup of new products**

Develop new differentiated products through application of SiC power semiconductors (propulsion systems, APSs)



**Scale of Market for Electrical Equipment for Railcars**



**Production bases**



\* Company's estimates based on UNIFE World Rail Market Study 2014

# Automotive power electronics Priority Measures

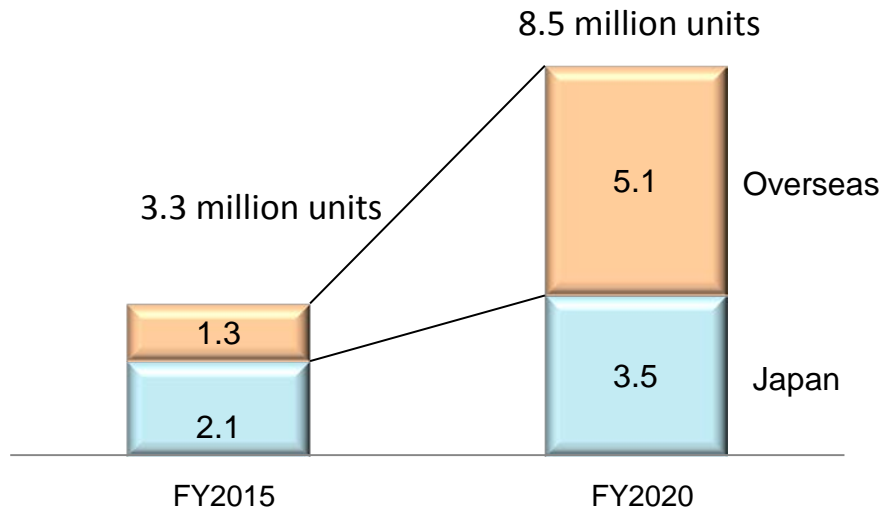
- **Accelerate development of automotive power electronics**

Develop new products by merging advanced power semiconductors with power electronics technologies

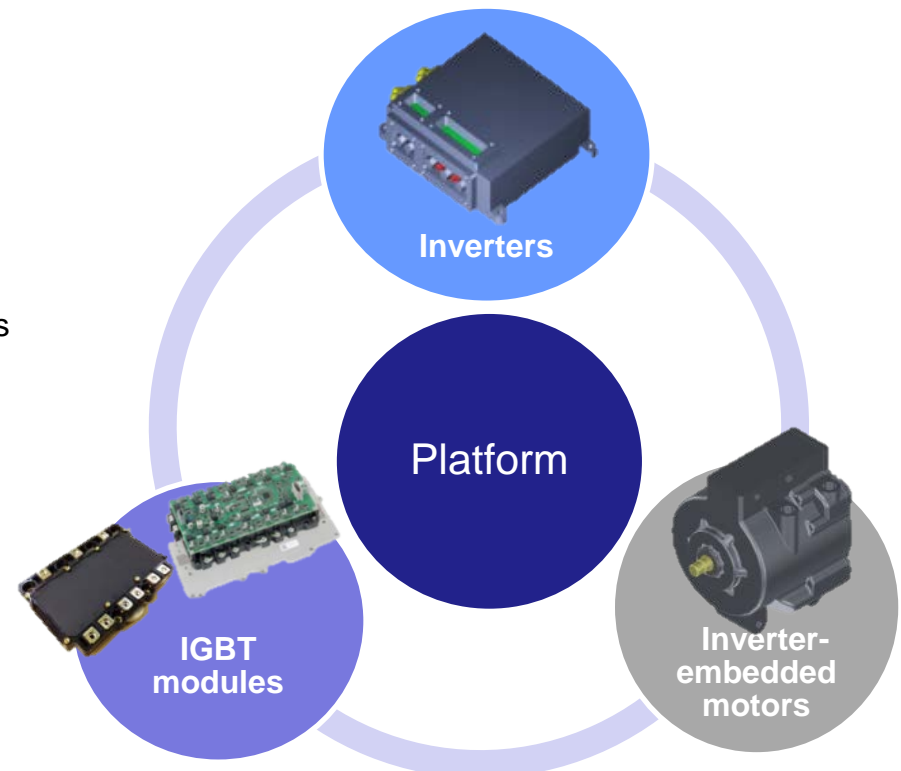
- **Strengthen efforts to have our specifications accepted by the growing eco-friendly automobile market**

Develop platform to quickly spread usage of our products

**EV/HEV Market Forecasts**  
(Production volumes)



\* Company's estimates based on data released by IHS Automotive in February 2015



## ● Transition to strong earnings structure

Convert Kobe Factory into global mother production base for power electronics systems

- Pursue exhaustive cost reductions through manufacturing reforms (standardization, unit development, in-house production)

## ● Expand overseas orders and sales

- Promote sales of medium- and large-capacity UPS overseas (Asia, U.S.)
- Strengthen switchgear and controlgear business by leveraging Fuji SMBE

## ● Accelerate new product launches

Consolidate development systems through establishment of Power Electronics Technical Center

- Rapidly introduce new products into the global market
- Accelerate development of differentiated products through application of SiC power semiconductors

# UPS Priority Measures

- Enhance lineup of products for overseas markets
- Strengthen efforts to provide solutions proposals for major IDC operators

## New Product Launch Schedule

Product	Model	FY2014		FY2015				
		3Q	4Q	1Q	2Q	3Q	4Q	
Medium- and large-capacity UPS	UPS7000HX-T4 for Chinese / Southeast Asia market	500kVA						300kVA, 400kVA
	UPS7700 for Chinese / Southeast Asia market	100kVA, 200kVA, 300kVA						
	UPS7000HX-T3U for North America market	300kVA, 400kVA, 500kVA						
	UPS6000DX-T3 for Japan market / large-capacity	100kVA, 200kVA, 300kVA						150kVA, 250kVA


**[Development of SiC-equipped products]**

Large-capacity/industrial-use power supply platform

→ Products for North America, Asia, and Japan

- Strengthen competitiveness by enhancing lineup of products with world-leading levels of efficiency

## New Product Launch Schedule

Product	Model	FY2014		FY2015			
		3Q	4Q	1Q	2Q	3Q	4Q
Solar PCS	Outdoor mega solar-use	750kW、1000kW					
		1000kW (usable overseas)					
Solar PCS	Indoor mega solar-use 	500kW、660kW					
		SiC-equipped 1000kW					
PCS for electricity load equalization	Indoor electricity load equalization-use	500kW、630kW					
		750kW					

**[Development of SiC-equipped products]**

Large-capacity/industrial-use power supply platform → Outdoor-use PCS

# Switchgear and Controlgear Priority Measures

- **Expand overseas operations**

Leverage Fuji SMBE's Asian sales channels and production bases to expand operations

- **Pursue exhaustive cost reductions through manufacturing reforms**

Reduce costs by conducting semi-order-made production realized through standardization and development of units

Develop complete, in-house production system encompassing design, sheet metal processing, manufacturing, and testing to shorten lead times and reduce costs

**FMT**

**Tokyo**

Kobe Factory (site of production consolidation)  
Global mother production base for power electronics systems

**Fuji SMBE**

Switchgear and controlgear

## ● **Actively develop operations targeting growth markets (renewable energy, replacement, IDC, etc.)**

- Leverage new products and distinctive Schneider products to augment product range
- Introduce products that match needs differing by market (specifications, price) overseas (in Asia)

## ● **Accelerate development of next-generation, differentiated products**

- Advance joint-development with Schneider
- Make use of new development wing, Techno Lab, and realize massive increase in development efficiency



## ● Proactively introduce new products for use in growth fields

### Renewable Energy

#### Solar power generation



DC MCCB, strings monitoring units, high-voltage equipment

#### Wind power generation



High- and ultrahigh-voltage equipment, ACB, large-frame contactors, etc.

### Replacement

VCB, LBS, and other high-voltage equipment  
MCCB, MS, and other low-voltage equipment



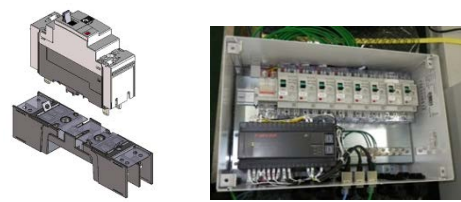
### Shipping

Busway system, ultrahigh-voltage equipment, components for cabin controllers



### IDC

Busway system, plug-in MCCB



### Elevators

Silent contactors

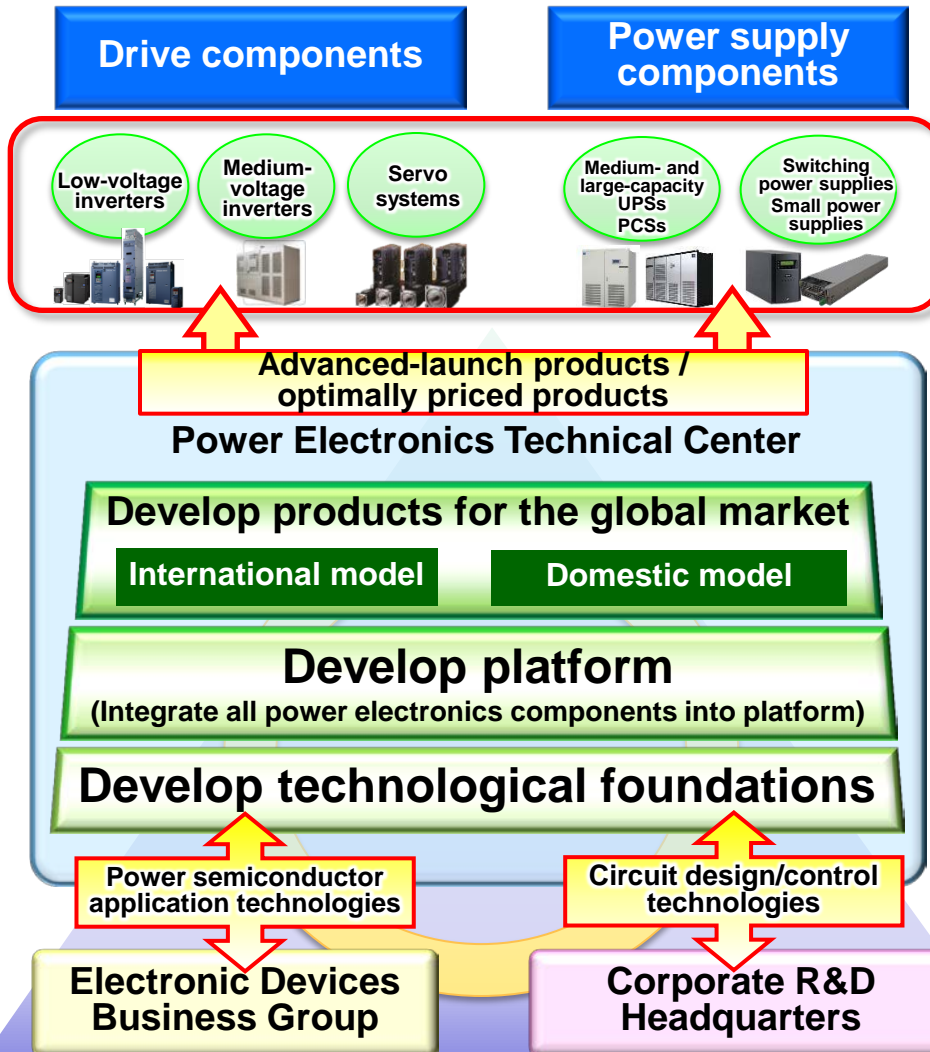


ACB: Air circuit breaker VCB: Vacuum circuit breaker LBS: Load-break switch  
MCCB: Molded case circuit breaker MS: Magnetic starter



# Accelerate development of new products

- Accelerate introduction of products onto global market through establishment of Power Electronics Technical Center



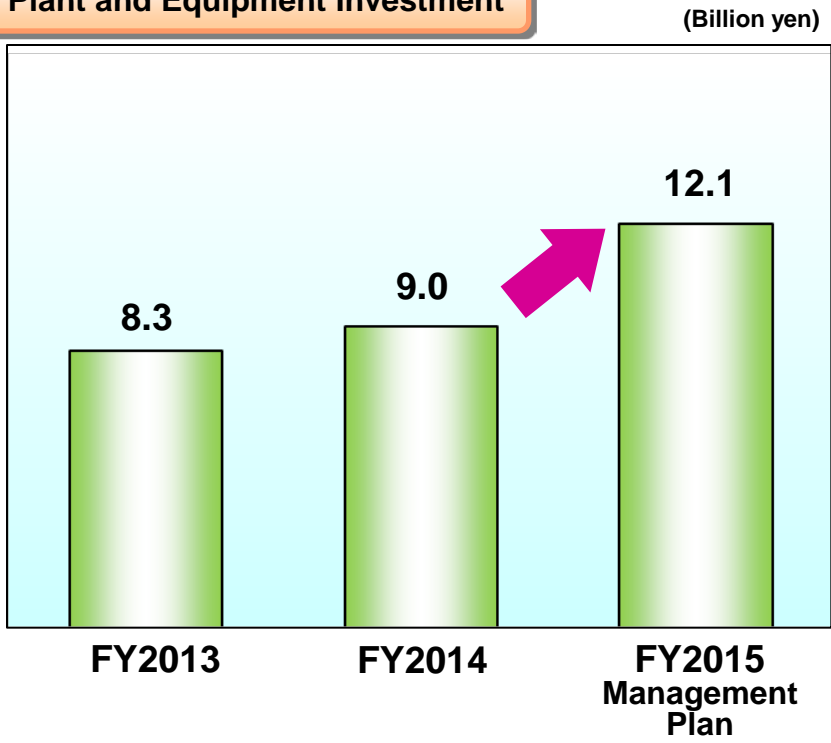
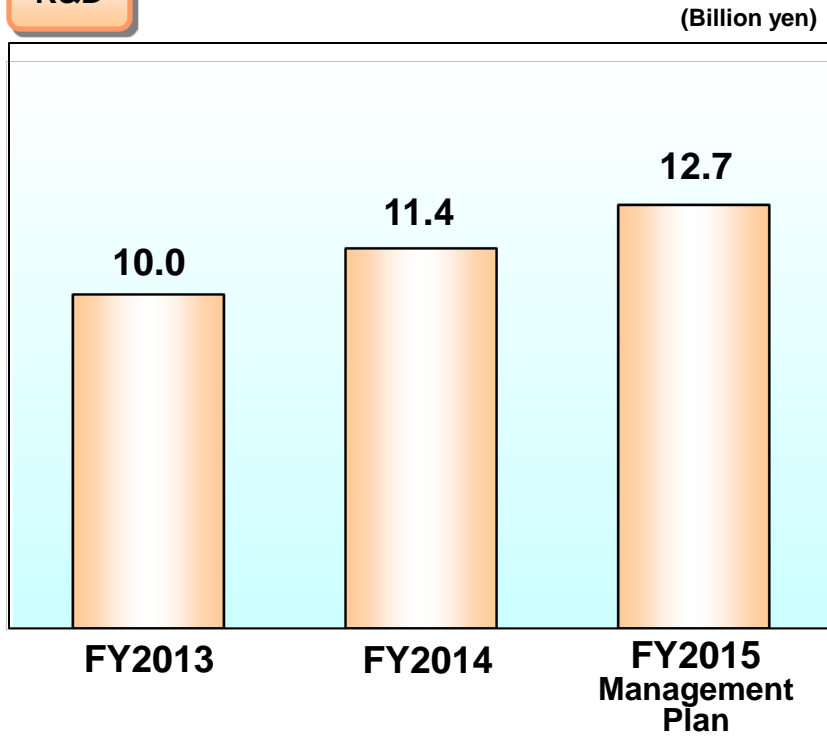
## Power Electronics Technical Center

- Total floor space: Approx. 20,000 m<sup>2</sup>
- Completion: August 2016 (tentative)



# Plant and Equipment Investment / R&D

- Plant and Equipment investment: Centralize development and testing staff to shorten development lead times, generate technological synergies, and strengthen coordination with customers
- R&D: Develop and launch SiC-equipped products and products for the global market

**Plant and Equipment Investment**

**R&D**


- [Major themes]
- Construction of Power Electronics Technical Center (Suzuka)
  - Strengthening of mother production bases in Japan (Suzuka/Kobe)

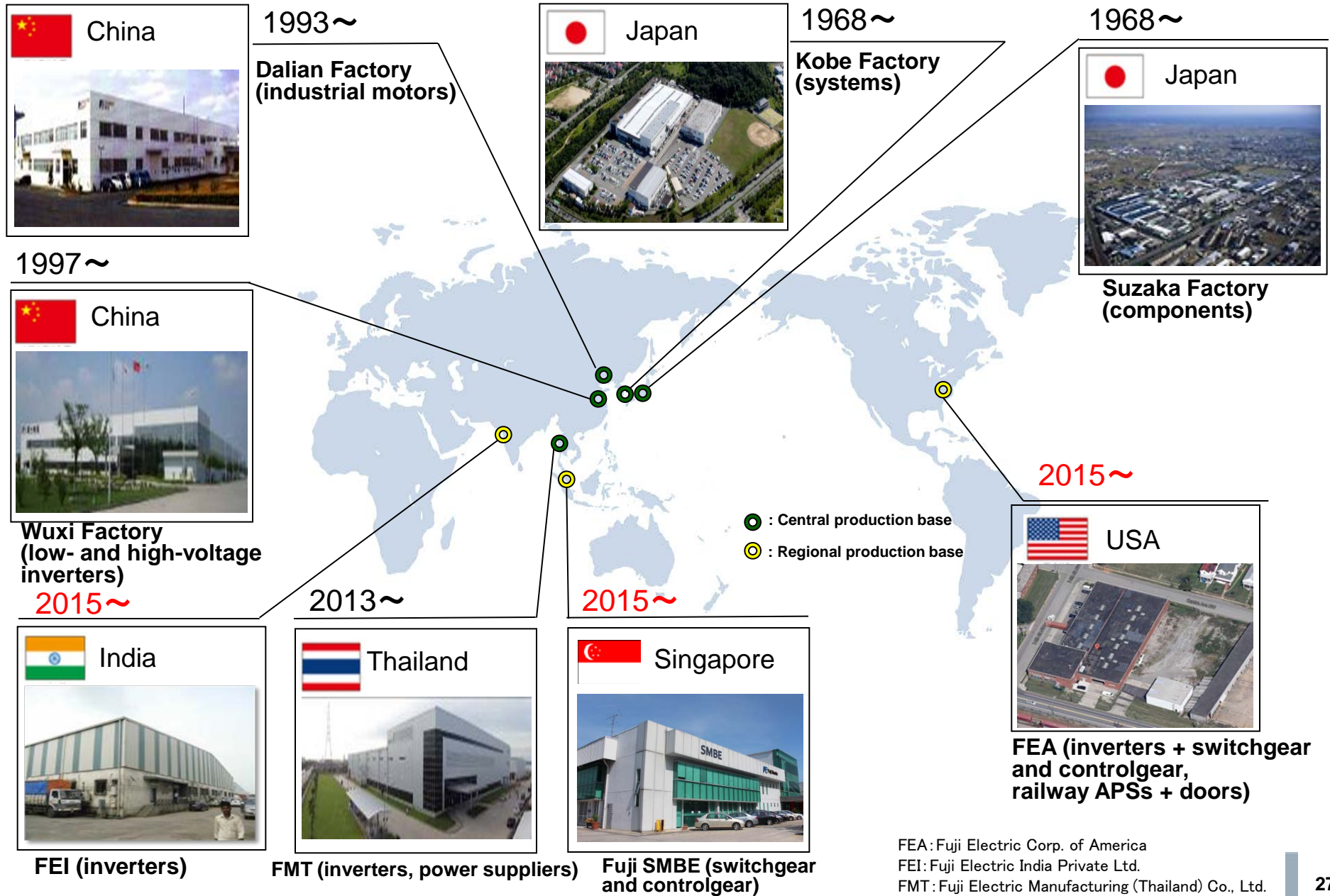
- [Major themes]
- Development of new SiC-equipped products
  - Development of automotive platform products

\* R&D expenditures are attributed to segments based on theme. Accordingly, figures above differ from these described in Consolidated Financial Report for the fiscal year ended March 31, 2015.

\* The R&D expenditure figure for FY2013 has been restated to reflect business division changes conducted in FY2014.

# Plans for Production Bases

## Initiatives for expanding local production and consumption



FEA: Fuji Electric Corp. of America  
FEI: Fuji Electric India Private Ltd.  
FMT: Fuji Electric Manufacturing (Thailand) Co., Ltd.

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