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# Power and New Energy Business Strategies

**May 31, 2018**
**Fuji Electric Co., Ltd.**
**Power and New Energy Business Group**

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# Business Overview

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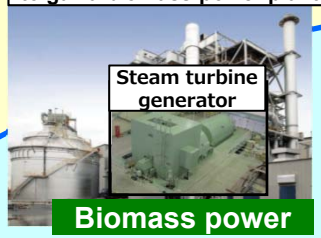
Contribute to the realization of a sustainable society by stably creating safe and secure energy

***~Develop businesses with maximized environmental performance, efficiency, economic benefits, value, and innovation~***

## Renewable Energy and New Energy

**Compatibility with high efficiency**

Itoigawa biomass power plant




Biomass power

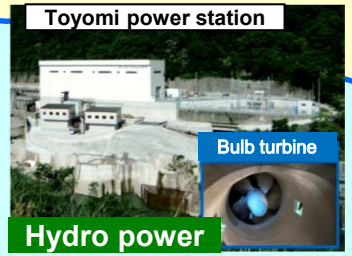
**Expanded lineup**

Nga Awa Purua Geothermal Power Station

Geothermal Power

**Response to S&B demand**

Toyomi power station




Hydro power

**EPC and grid stabilization services**

Minami Alps Energy Park

Solar power

Ogimi Wind Power Generation Demonstration Research Facility

Wind power

**Expansion of product lineup from phosphoric acid models to SOFC models**

Fuel Cells

**Expansion of after sales businesses**

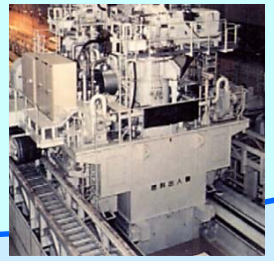
## Thermal power

**Compatibility with high temperatures and efficiency and expanded service lineup**

Yoshinoura Thermal Power Station

## Nuclear Power-Related Equipment

**Expanded lineup of decommissioning systems and service offerings**



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# Review of FY2017

# Review of FY2017

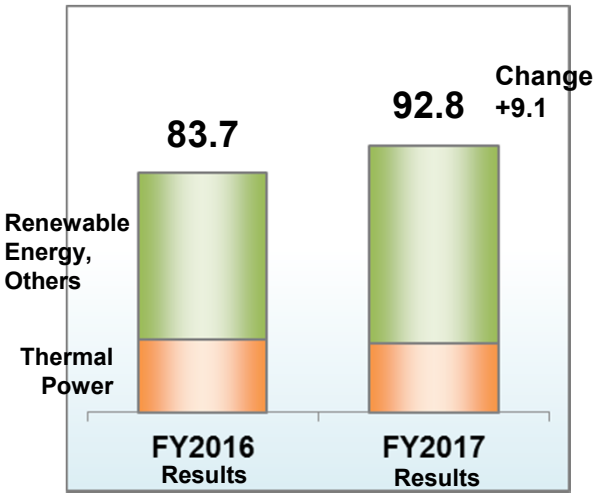
## Initiative Results in FY2017

- Continually acquired official biomass power plant orders and unofficial agreements in Japan (total of five)
- Received orders for large-scale solar power plants (received orders for plants with attached storage cells)
- Increased orders for nuclear power-related equipment

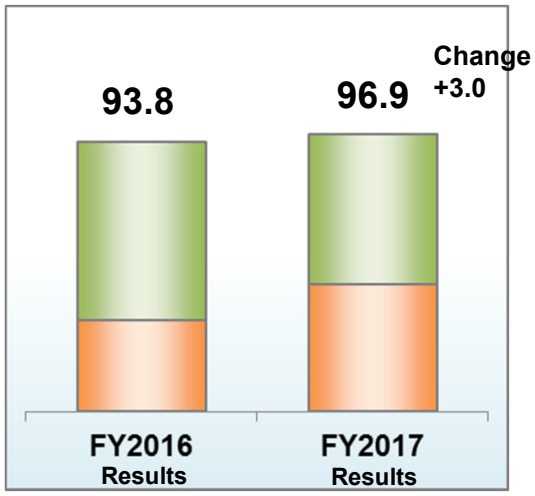
## Challenges to Be Tackled in FY2018

- Expansion of orders (orders ≧ sales)
- Redoubling of cost reduction activities to increase profits

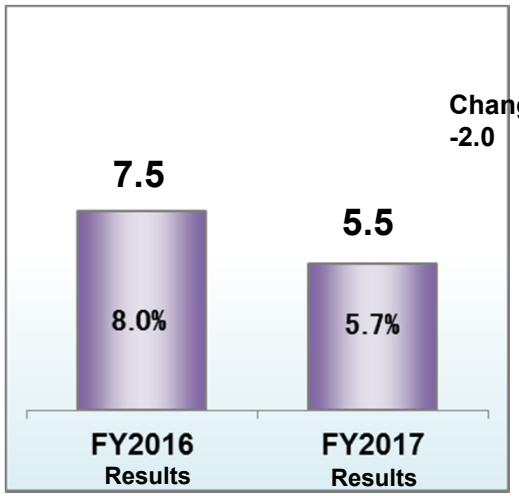
**Amount of Orders Received**
(Billion yen)




**Net Sales** (Billion yen)




**Operating Income / Operating Margin** (Billion yen)



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# FY2018 Management Plan

# Business Policies

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## Address substantial changes in market structures to achieve stable and ongoing business growth

- Shift from large-scale power sources to distributed power sources
- Growing presence of renewable energy

## Business Policies

- Increase orders for renewable energy projects
- Expand after sales businesses
- Redouble cost reduction activities to increase profits

# Business Plan

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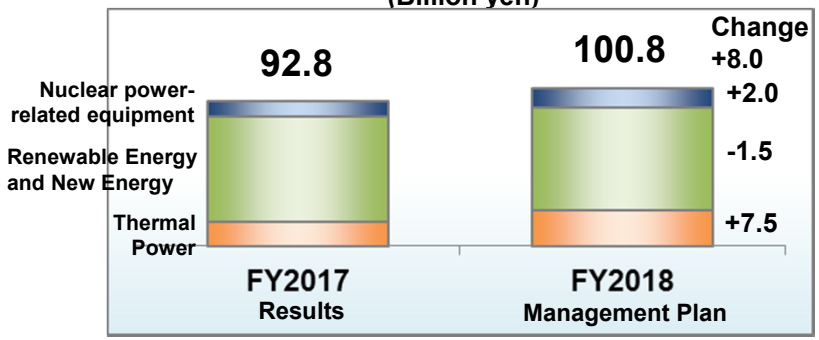
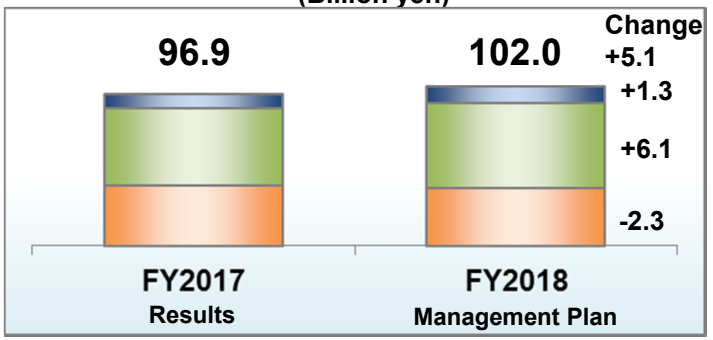
## Amount of Orders Received by model

(Billion yen)

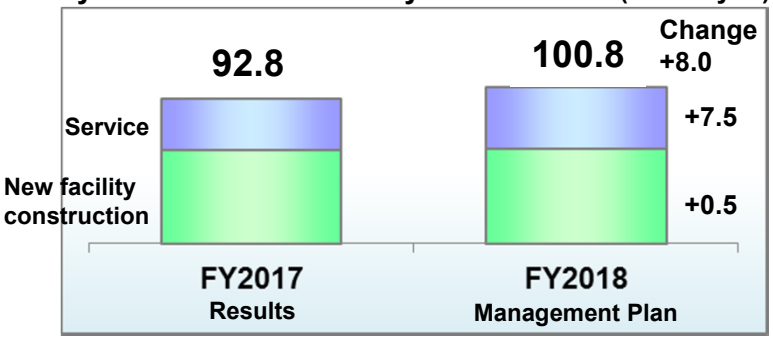



## Net Sales by model

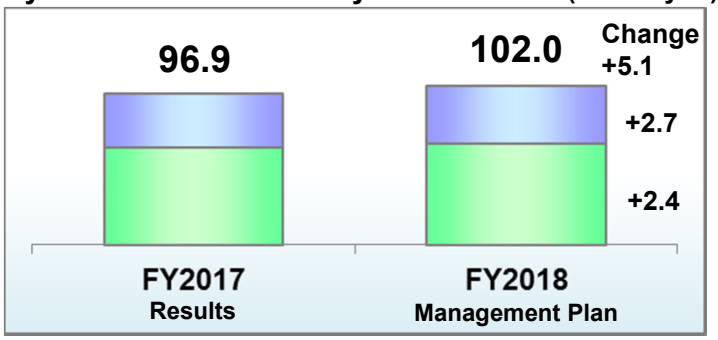
(Billion yen)



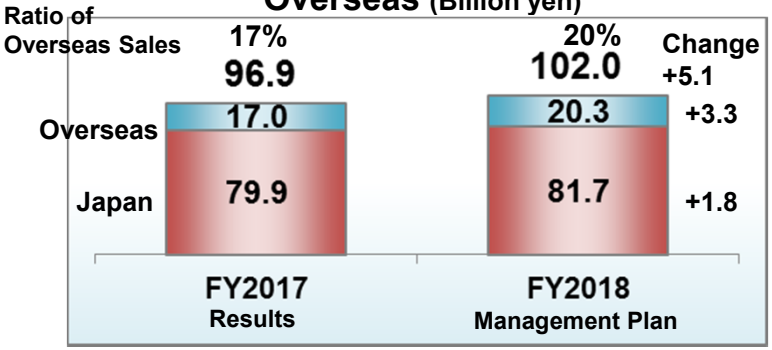

## Amount of Orders Received by Service or New Facility Construction (Billion yen)



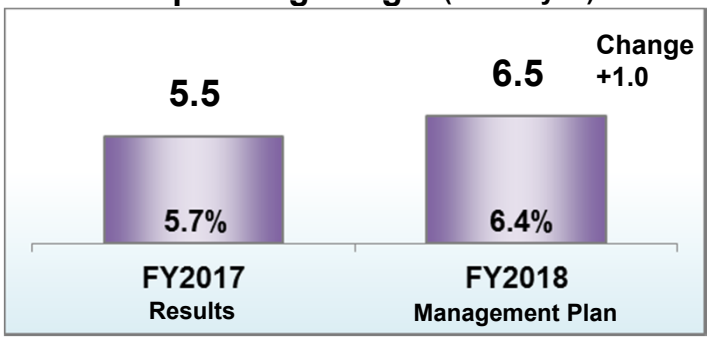

## Net Sales by Service or New Facility Construction (Billion yen)




## Net Sales in Japan / Overseas (Billion yen)




## Operating Income / Operating Margin (Billion yen)



# Power Generation Facilities—Market Trends (Global)

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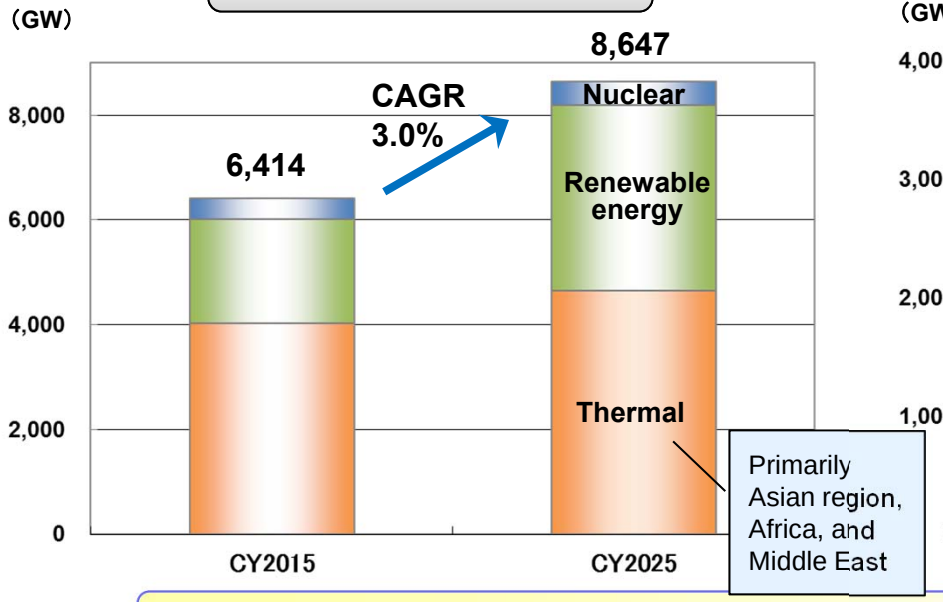
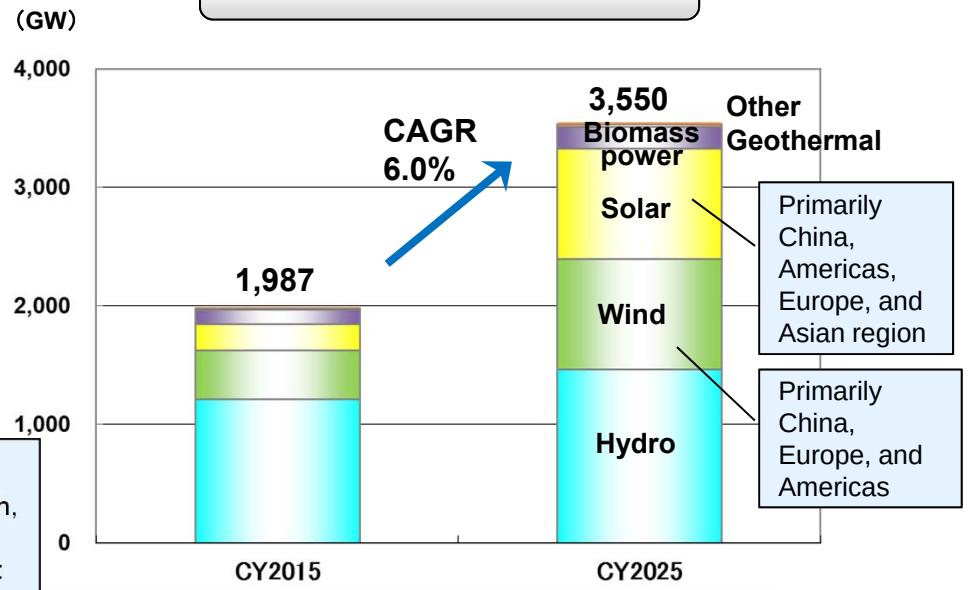
**Continuing global growth in electricity demand and increasing installation of generation facilities**

**Global Power Generation Capacity***




**Of Which, Renewable Energy***




- **Annual growth rate (CY2016–CY2025) of 2.1% for global energy demand***
  - **—North America, Europe, and Japan: 0.7% annual growth**
  - **—Other regions: 3.2% annual growth**
- **Thermal: Decline in large-scale coal-fired thermal projects, increase in gas combined cycle projects**
- **Geothermal: Promotion of geothermal power generation plant introduction by government measures and subsidies (Indonesia and Africa)**
- **Solar and wind: Driving force behind growth of renewable energy**

* Source: IEA World Energy Outlook 2017

# Power Generation Facilities—Market Trends (Japan)

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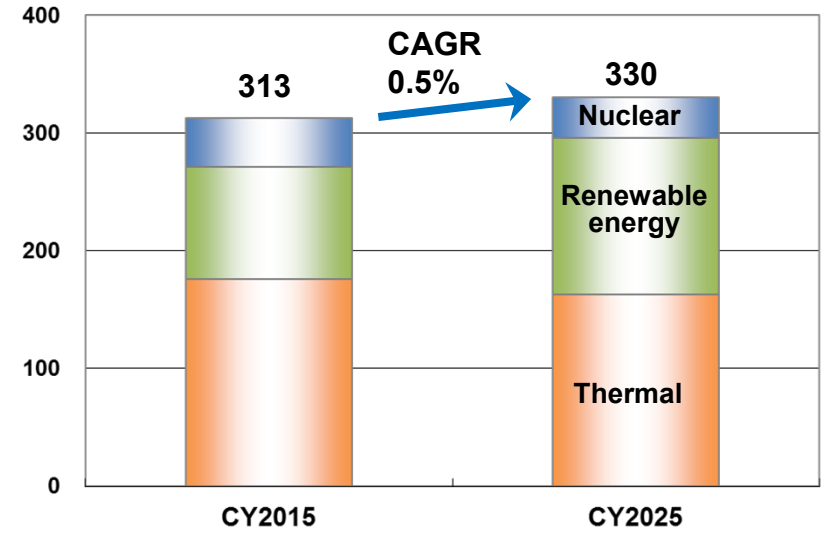
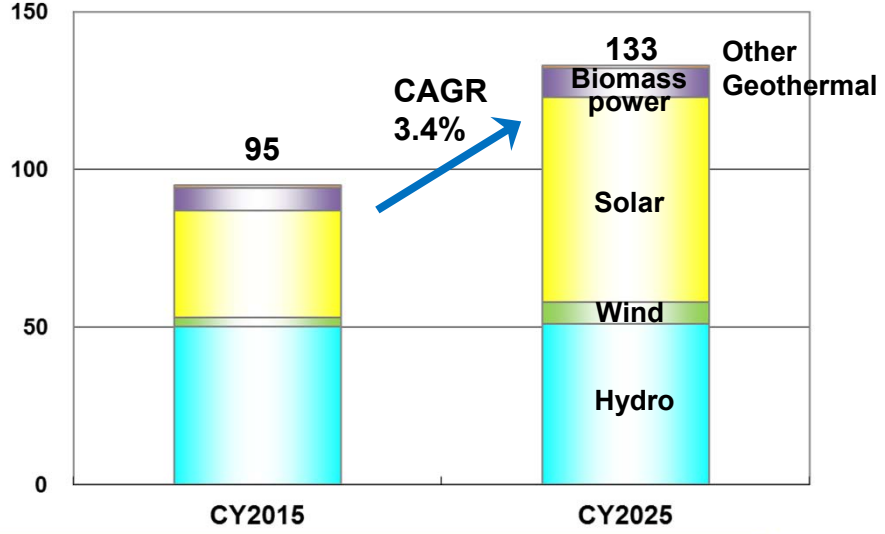
**Decline in thermal and nuclear power, growth in renewable energy going forward**

Japanese Power Generation Capacity*




Of Which, Renewable Energy*




- Electricity demand in Japan projected to around the same level as 2016 in 2025*
- Thermal: Overall market contraction due to decline of coal-fired thermal and oil-fired thermal
- Hydro: Ongoing demand centered around S&B projects for improving efficiency
- Wind: Rapid growth driven by projects applicable under FIT scheme
- Solar: Shift of focus from projects applicable under FIT scheme to in-house generation and rooftop generation projects
- Biomass: Growth driven by projects applicable under FIT scheme
- Nuclear: Market contraction due to decommissioning of nuclear power plants

* Source: IEA World Energy Outlook 2017

# Thermal Power and Biomass Thermal Power —Priority Measures

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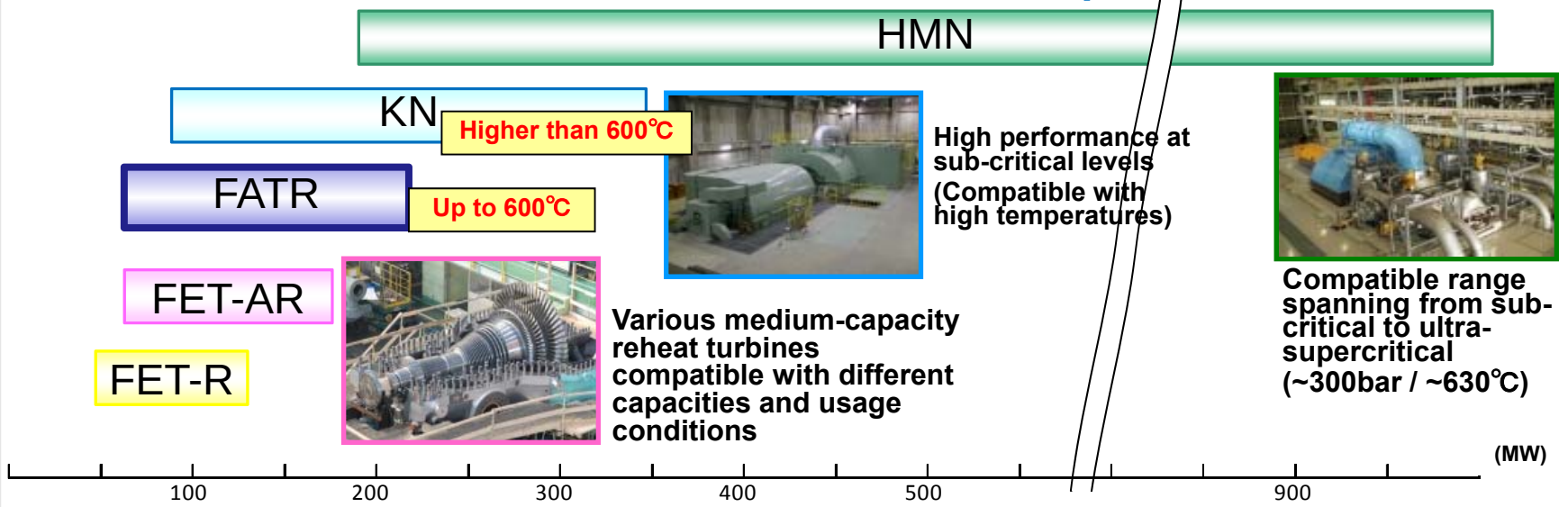
■**Continue to acquire orders for biomass and combined cycle projects primarily in Japan, Asia, and the Middle East**

■**Launch high-temperature, high-efficiency products**

・**Realize compatibility with high temperatures (600℃~) and improve efficiency of main units**

■**Increase profits through project management and accelerated cost reductions**

## ＜Reheat Turbine Product Lineup＞




* IPP: Independent power producer, PPS: Power producer and supplier

# Geothermal Power—Priority Measures

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■Continue acquiring orders in Asia and Africa and work to acquire orders in Central and South American markets
- ・Step up coordination with existing partners (Asia) and new partners (Africa and Central and South America)
- ・Increase profits through project management and accelerated cost reductions

■Expand orders for flash and binary geothermal power generation plants in Japan
- ・Promote sales to new flash geothermal power generation plants to be developed in Japan
- ・Leverage existing track record to promote sales of binary geothermal power generation plants

## ＜Binary Geothermal Power Generation＞

**Robust product lineup covering capacities up to and exceeding 10 MW**
**Delivered one of Japan's largest binary geothermal power generation plants, continuing trend for FY2016**

**Yamagawa Binary Power Station of Kyuden Mirai Energy Company, Incorporated**

- ・Start of commercial operation: February 23, 2018
- ・Location: Yamagawa-Ogawa , Ibusuki City, Kagoshima Prefecture
- ・Generation capacity: 4,990 kW
- ・Generation method: Air-cooled binary generation
- ・Generation conducted by effectively utilizing energy that cannot be used with the generation method employed by the Yamagawa Power Station of Kyushu Electric Power Company, Incorporated

# Hydro Power—Priority Measures

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■**Steadily advance initiatives in relation to after sales services for existing power plants (including output increases)**

・**Promote output increases at existing power plants by upgrading runners and generators while also performing periodic maintenance**

■**Expand orders for S&B projects and new power plants taking advantage of FIT scheme**

・**Proactively seek to acquire projects from power companies, enterprise bureaus, and private-sector companies**

■**Differentiate operations by utilizing new, eco-friendly technologies**

・**Use water servomotors and water lubricated bearings, minimize use of pressure oil equipment, etc.**

【Turbine and Generator Upgrades】

Akiha No. 1 Power Station of Electric Power Development Co., Ltd.
・Turbine type: Vertical Francis turbine (2 units, 22.6 MW capacity)
・Start of operation: May 2017 for No. 2
May 2018 for No. 1

【Turbine Runner Upgrade】

Nakanosawa Power Station of Tokyo Electric Power Company Holdings, Incorporated
・Turbine type: Vertical Francis turbine (1 unit, 43.5 MW capacity)
・Start of operation: May 2018

- S&B: Scrap & build FIT: Feed-in Tariff

# Solar and Wind—Market Trends (Japan)

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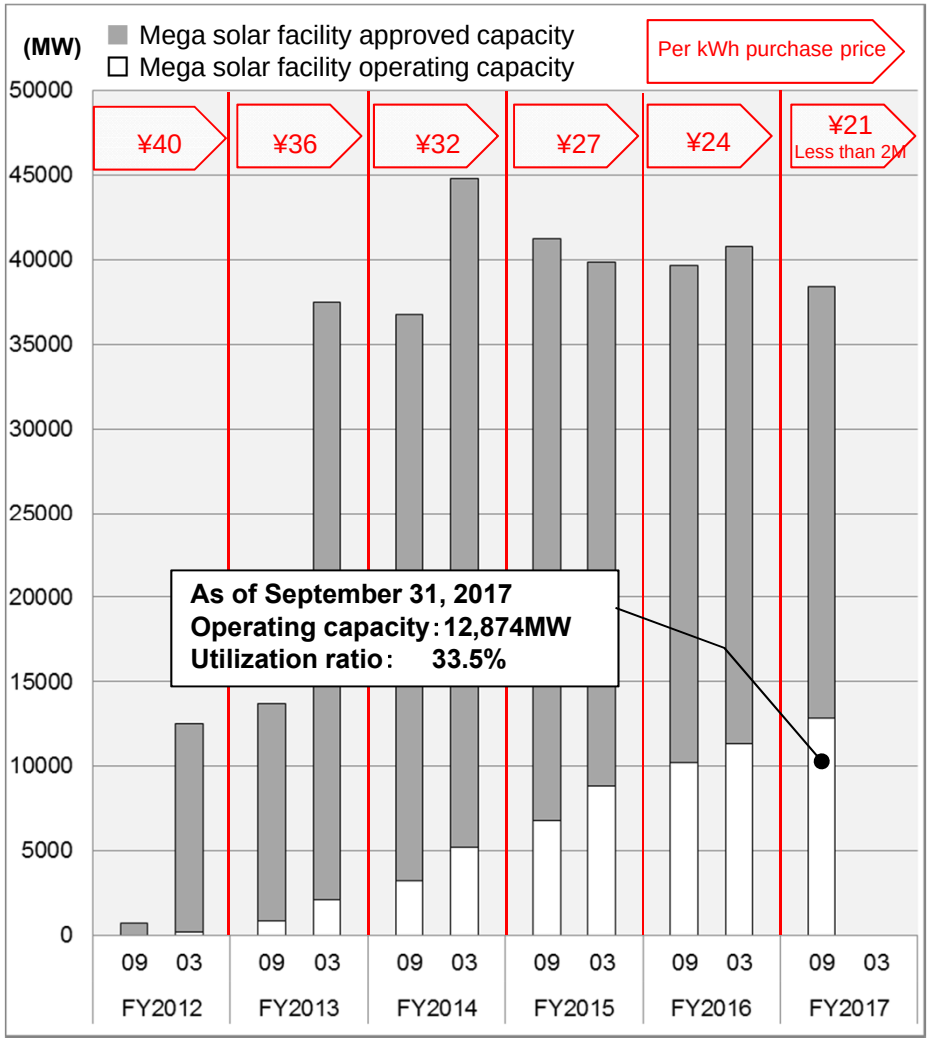
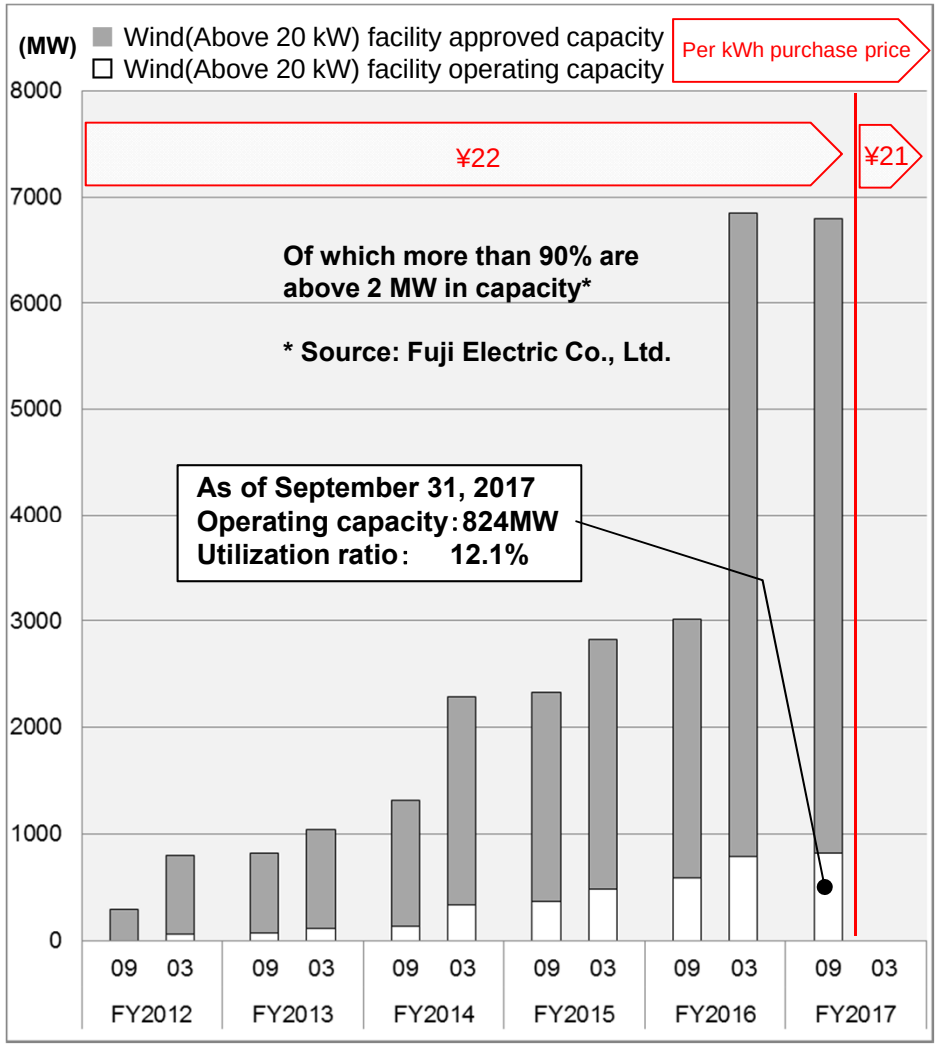
## Solar Power (Mega Solar) Facility Approval and Operation Trends




## Wind Power (Above 20 kW) Facility Approval and Operation Trends




Source: Agency for Natural Resources and Energy

# Solar Power and Wind Power—Priority Measures

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■**Solar Power**

- **Identify potential EPC projects yet to be started and boost orders through negotiations that incorporate attached storage cells, grid stabilization systems, etc.**
- **Expand orders for maintenance services**
- **Increase profits through large-scale EPC project management and accelerated cost reductions**

■**Wind Power**

- **Increase EPC project orders**
- **Boost orders through negotiations that incorporate attached storage cells, grid stabilization systems, etc.**

Tomakomai Mega Solar Power Station
No. 1 of GPD Sakura Solar
(EPC project with generation capacity of 38 MW of DC power and 25 MW of AC power)

Scheduled to commence operation in August 2018

# Nuclear Power-Related Equipment, Fuel Cells —Priority Measures

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## ■Nuclear Power-Related Equipment

- **Begin utilizing Europe's cutting-edge solidification technology (SIAL®)* in the plant decommissioning field and for treating waste at plants under operation, which are on the rise as nuclear power plant operations resume**
- **Steadily produce MOX fuel manufacturing equipment compatible with new regulatory standards**

* SIAL® is a registered trademark of Wood (UK).

SIAL® solidified body

SIAL® solidified sample

wood.

## ■Fuel Cells

- **Take advantage of South Korea's systems encouraging fuel cell introduction (RPS system,*1 mandatory installation) to promote sales**
- **Utilize patents of Fuji $N_2$telligence to promote sales in German fire prevention market through collaboration with fire prevention equipment manufacturers**
- **Quickly launch SOFCs*2 that will serve as high-efficiency distributed power sources (FY2018)**

*1 RPS system: Renewable Portfolio Standard system
System for promoting the spread of new energy by requiring power companies to generate a certain portion of their power from new energy sources

*2 SOFCs: Solid oxide fuel cells

【Fuel Cell Introduction】

Five 100 kW fuel cells introduced Yuil Industry facility in South Korea (completed in 2017)

# After Sales Businesses—Priority Measures

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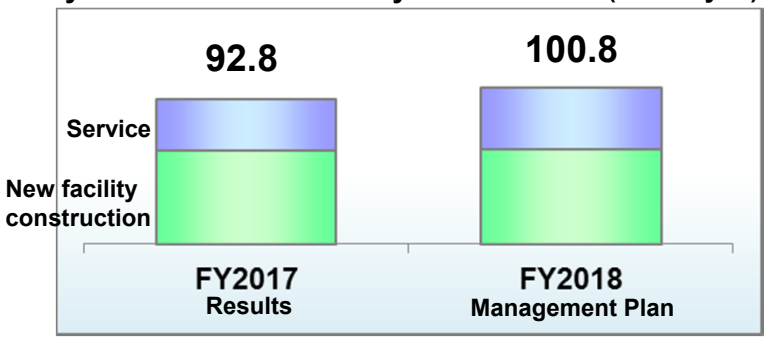
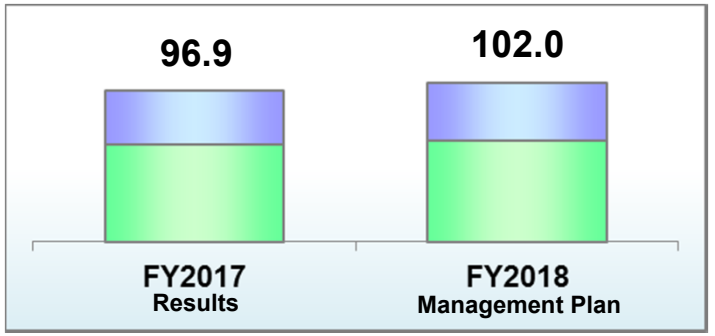
**Amount of Orders Received**
**by Service or New Facility Construction (Billion yen)**




**Net Sales**
**by Service or New Facility Construction (Billion yen)**




**After Sales Business Orders and Net Sales**

**【Orders】**

**FY2017: ¥32.5 billion (35% of total)**

**FY2018 (Target): ¥40.0 billion (40% of total)**

**Change: +¥7.5 billion (+5 ppts.)**

**【Net Sales】**

**FY2017: ¥34.8 billion (36% of total)**

**FY2018 (Target): ¥37.5 billion (37% of total)**

**Change: +¥2.7 billion (+1 ppt.)**

Secure stable earnings by expanding after sales businesses

■ Thermal and geothermal
- Enhance services that are custom-tailored to customers
- Bolster service lineup

■ Hydro
- Increase orders for S&B projects
- Expand scope of duties handled in after sales businesses

■ Nuclear
- Enter into nuclear waste treatment field and expand sales therein

■ Solar and wind
- Reinforce maintenance service systems

# Thermal and Geothermal Power
# Expansion of After Sales Businesses

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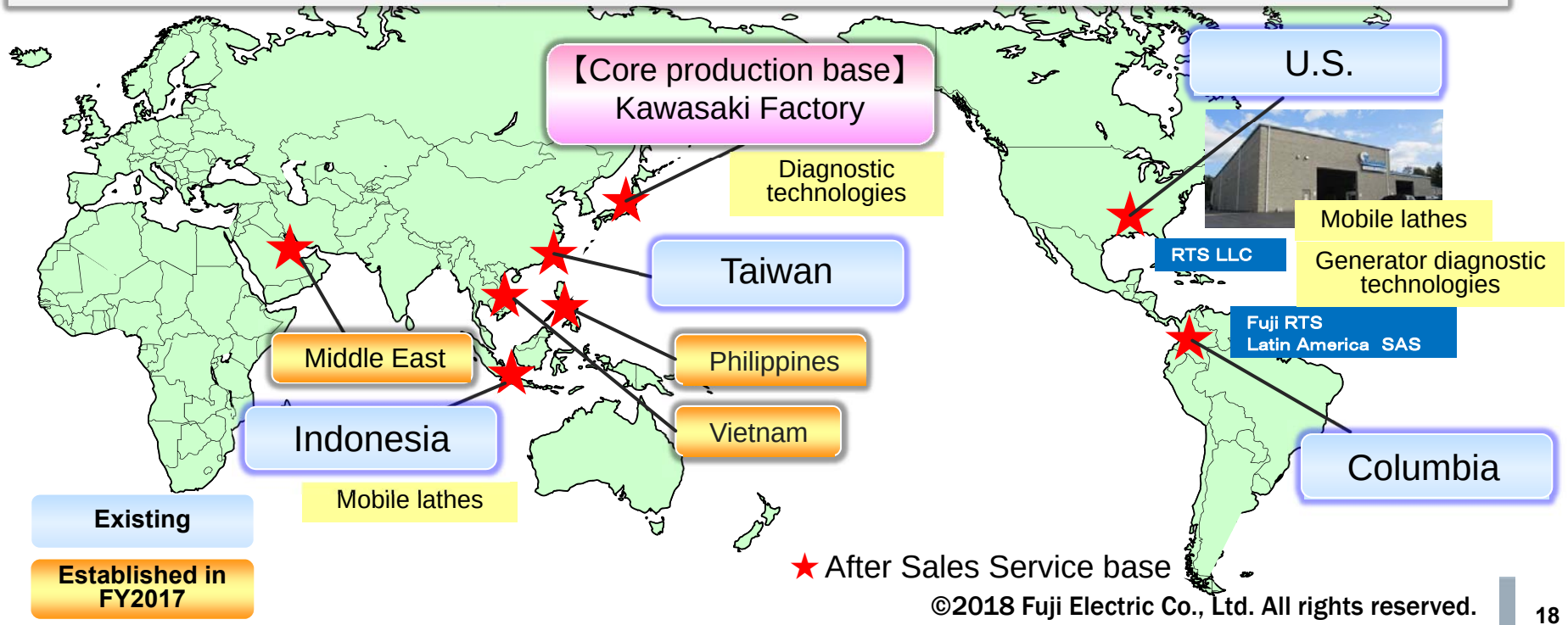
■Enhance services that are custom-tailored to customers
- ・Bolster functions at overseas bases (established additional bases in the Philippines, Vietnam, and the Middle East in FY2017)
- ・Increase customer coverage by strengthening area strategies (sales + engineering teams)

■Bolster service lineup
- ・Enhance lifespan diagnosis proposals
- ・Expand lineup of plant lifecycle optimization services (efficiency improvement, lifespan extension)
- ・Provide remote technical services by utilizing IoT

**Portion of total sales attributable to after sales businesses (thermal and geothermal power):**

**Approx. 30% on average over past 3 years → 40% in FY2018**



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# Capital Investment / Research and Development

# Capital Investment / Research and Development

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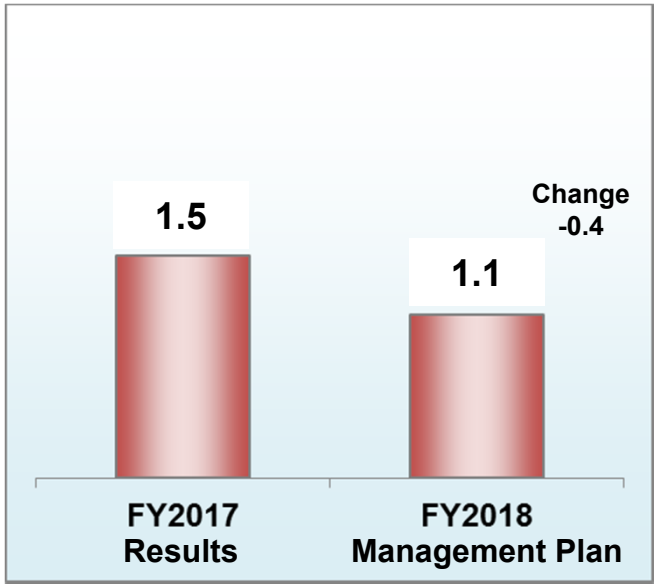
## Capital Investment

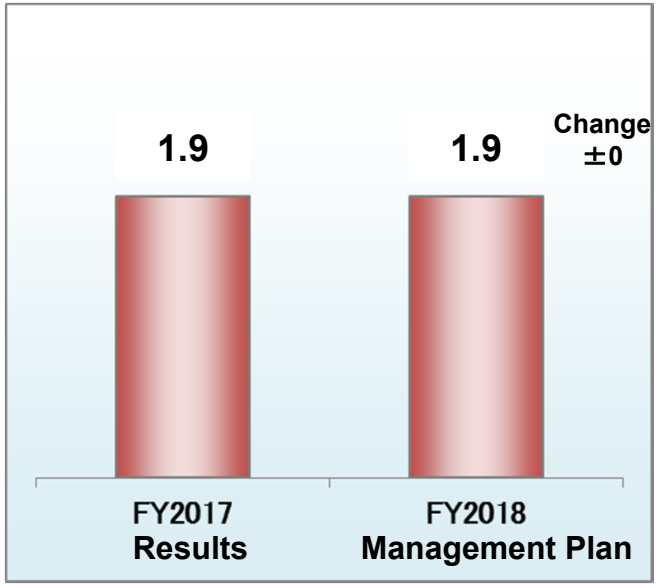
(Billion yen)




- Manufacturing equipment at Kawasaki Factory (rationalization, etc.)

## Research and Development

(Billion yen)




- Efficiency increases for thermal turbines
- Service technology development
- Next-generation fuel cell (SOFC) development

* R&D expenditure figures above represent expenditures that have been allocated to segments based on theme and may therefore differ from figures contained in consolidated financial reports.

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