Business Strategy of Energy Solutions

August 18, 2010

Fuji Electric Holdings Co., Ltd.

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1. Business Outline

2. Market Trends

3. Business Policies / Growth Strategies

4. Performance Trends / Targets

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Business Outline

- The Fuji Electric Group will focus on the field of “energy and the environment”
- The Group will develop the “Green Energy Solutions” and “Grid Solutions” subsegments in a manner that addresses the social concerns of creating a low-carbon society, achieving stable electric power supplies, and optimizing the management of energy

Markets and trends

Energy creation	Energy distribution	Energy saving
Increasing and enhancing power generation systems Creating a low-carbon society Reducing CO2 emissions	Stabilizing power systems Optimizing the balance between supply and demand of electric power Storing electric power	Energy saving Optimizing energy operation Developing “smart communities”

Energy solutions

Green Energy Solutions	Grid Solutions

Optimized systems and solutions

- Basic power generation Renewable energy
- Stabilized electric power
- Grid connection
- Smart grids
- Smart meters
- Optimal energy operation
- Smart communities

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Business Outline

Green Energy Solutions Subsegment

Thermal power generation	◻ Medium-scale thermal power turbine power generation facilities ◻ Gasification combined cycle power generation (GCC) ◻ Solar thermal power generation / Biomass power generation	● Expanded share of the medium-scale market ● GCC generation: Yoshinoura Thermal Power Station (2 units × 250 MW) under construction for The Okinawa Electric Power Company ● Focused on solar thermal / biomass power generation in the U.S.
Geothermal power generation	◻ Flash geothermal power generation facilities ◻ Binary power generation facilities ◻ Geothermal power generation business (newly entered)	● Top share of the global market (44%) ● Supplied the Nga Awa Purua Geothermal Power Station in New Zealand with a turbine boasting the world's largest power output for a single unit ● Entered into the binary power generation market
Nuclear power generation	◻ Nuclear fuel cycle field ◻ Waste material treatment facilities ◻ Next generation high-temperature gas furnaces (Development)	● Designed and is producing J-MOX fuel manufacturing facilities for Japan Nuclear Fuel Limited ● Participated in concept designing of high-temperature gas furnaces in the U.S.
Hydroelectric power generation	◻ Hydroelectric power generation facilities, pumped-storage hydroelectric power generation ◻ Low head hydro power	● Cooperation with the Foit Siemens Hydro Group of Germany

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Business Outline

Grid Solutions Subsegment

Grid Solutions	◻ Power transmission/Power distribution control systems ◻ Optimal energy control systems ◻ Smart grid systems ◻ Dam monitoring control systems	● Participated in various smart grid demonstration tests that were national projects ● Supplied smart grids for isolated islands such as those used by KYUSHU ELECTRIC POWER and The Okinawa Electric Power Company ● Developed a smart grid business based on demonstration tests
Meters	◻ Watt-hour meters ◻ Smart meters	● Established a joint venture company with GE (scheduled for October 2010) ● Developed next-generation smart meters
New energy	◻ Solar cells, modules, photovoltaic power generation systems ◻ Fuel cells ◻ Wind power generation components	● Developed photovoltaic power generation systems ● Demonstrated fuel cells for hypoxic supply systems ● Developed large-scale permanent magnet generators for wind power generation
Radiation systems	◻ Dosimeter management systems ◻ Radiation monitoring systems ◻ Medical facilities safety management systems	● Top domestic market share In particular, the market share for dosimeter management systems is 90% ● Entered into the sophisticated medical systems field

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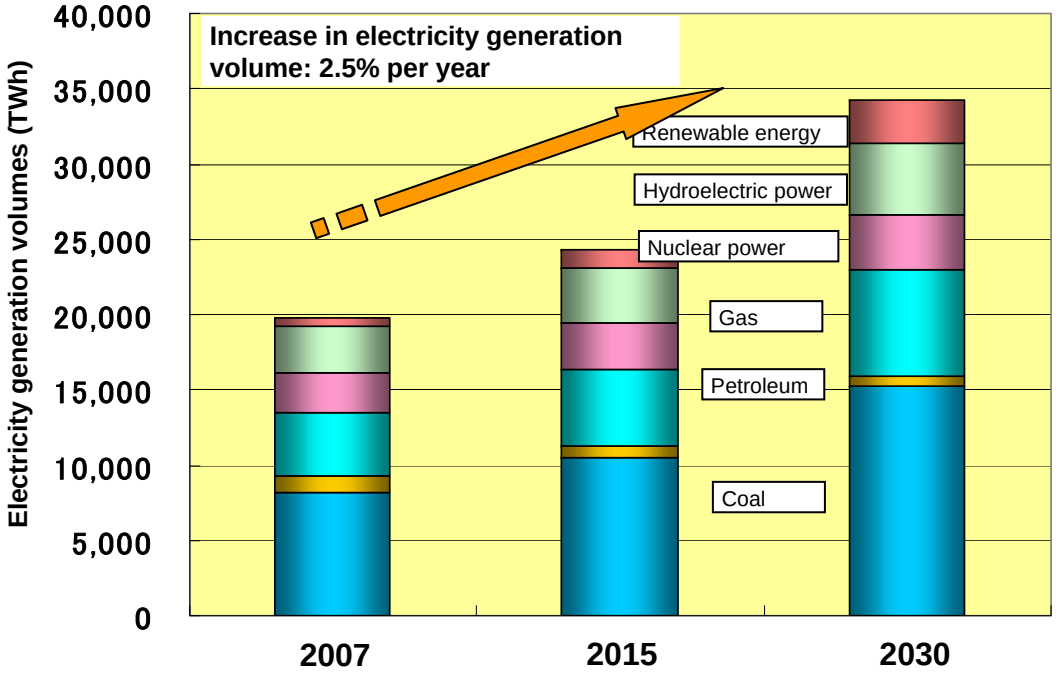
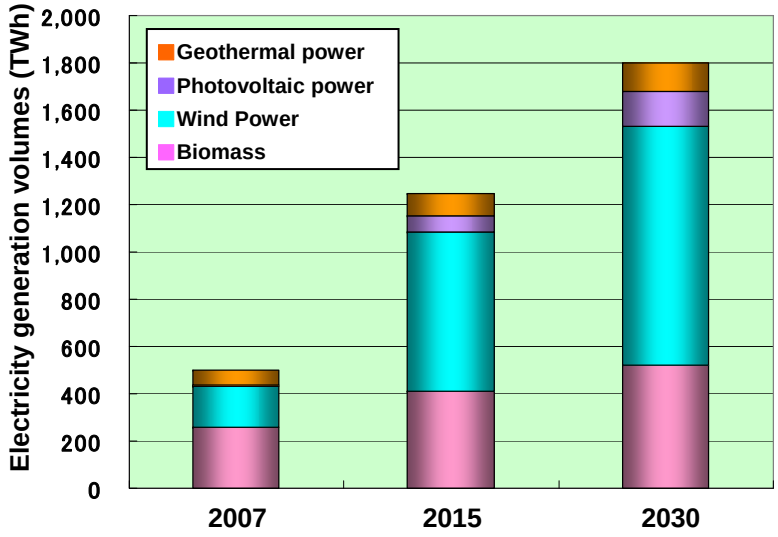
Trends in the Electric Power Market

- Volume of energy demand in the world will rise 2.5% year on year, generation facilities will continue to be expanded
- Creation of a low-carbon society and reduction of CO2 emissions will become social responsibilities
- There will be continued advances in bolstering efficiency of power generation facilities, changing fuel sources, and introducing renewable energy

Estimated global electricity generation volumes



Estimated renewable energy volumes



(Source: World Energy Outlook 2009)

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Trends in the Grid Market

Social trends

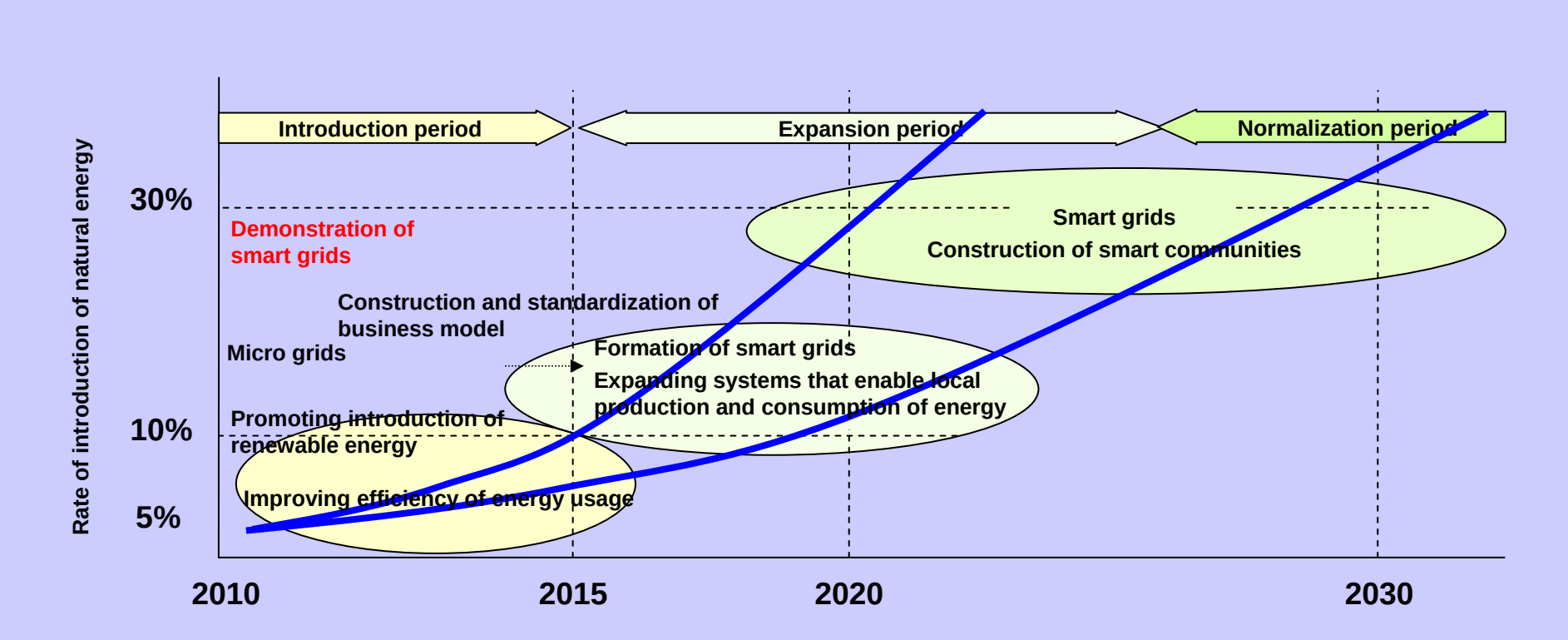
- Creation of a low-carbon society
- Introduction of renewable energy
- Energy saving

Construction of a smart grid society

- Stabilization of power systems
- Optimization of the balance between supply and demand of electric power
- Storage of electric power (Accumulators, etc.)

Advancement toward smart communities

- Optimization of the management of social infrastructure (electric power, gas, water, etc.) and establishment of a comfortable society



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Basic Energy Solution Policies

- Increasing energy and creating a low-carbon society

  Promoting green energy with a particular focus on geothermal power generation

- Creating new markets

  Create a smart grid market based on the strength of our power electronics and control technologies

- Increasing overseas sales as percentage of net sales

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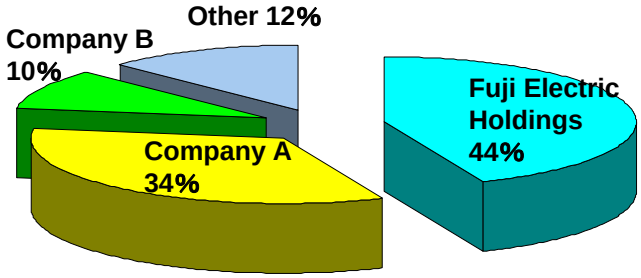
Growth Strategy: Geothermal Power Generation

Aim for a 50% Share of the Global Market (Currently 44%)

- **Focus on the US market**
  - **World's leading volume of geothermal resources**
  - **High levels of government support (Green Deal initiative)**
  - **126 geothermal power generators planned**
- **Strengthen engineering function**
  - **Strengthen peripheral equipment technology through strategic alliances and M&A transactions**
  - **Bolster orders for turnkey projects**
- **Enhance R&D**
  - **Develop reinforced corrosion-resistant turbines**
  - **Develop binary power generation facilities**
- **Participate in binary power generation**

Average market share over the past 10 years (2000-2010)



(Source: Fuji Electric Holdings Co., Ltd.)

NZ NPA Geothermal Power Station
(Commenced operation in April 2010)

World's largest power output for a single unit (140 MW)

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Growth Strategy: Geothermal Power Generation

Strengthen Efforts in Key Markets (U.S., Indonesia, NZ)
Advance the expansion of growing focus markets

Key Markets

- **U.S.**

  World's leader in geothermal energy

  Strong Green Deal support initiative

- **Indonesia, the Philippines**

  Rich geothermal resources, target figures set by the government

  Favorable tax systems, etc.

- **New Zealand**

  Government initiatives (Target: renewable energy as 90% of energy used)

- **Iceland**

  Government initiatives (Target: renewable energy as 100% of energy used)

Focus Markets

- **Central & South America: Mexico, El Salvador, Chile**

  Rich geothermal resources, measures to increase percent of natural energy used

- **Africa: Kenya, Ethiopia**

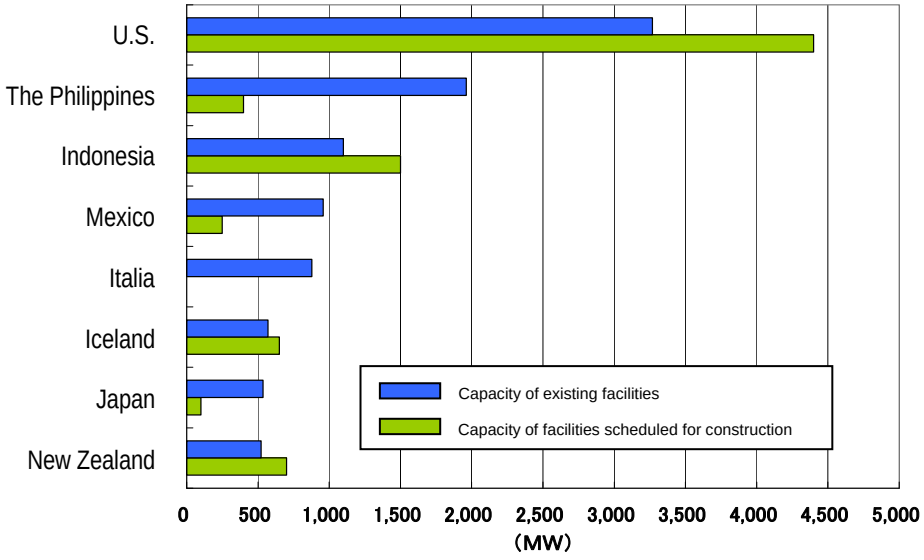
  Rich geothermal resources, promotion of development

Japanese Market

Third leading country in volume of geothermal resources

Efforts accelerating due to deregulation and the introduction of support measures

Geothermal power: Capacity of existing facilities and facilities scheduled for construction



(Source: Emerging Energy Research)

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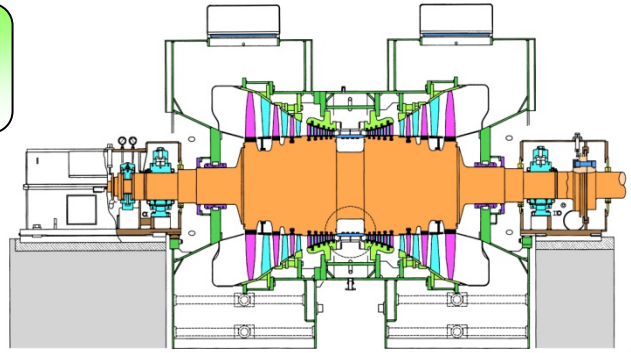
Growth Strategy: Geothermal Power Generation

Further Enhance the World's Leading Geothermal Power Generation Technologies

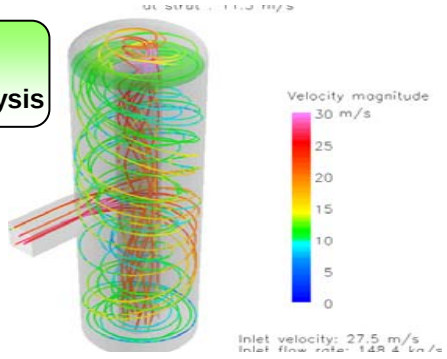
- **Reaction turbines that are highly efficient, functional, and reliable**
- **Corrosion-resistance, wear-resistance, and anti-scaling technologies to protect turbines from geothermal steam**
- **Corrosion-resistance technologies to protect generators and electrical control units against the geothermal atmosphere**
- **Use of modules to decrease design, manufacturing, and installment times**
- **Optimal plant design technologies including steam characteristic derivation equipment**
- **Optimal operation technologies through remote geothermal steam characteristic monitoring control systems**

Highly functional geothermal reaction turbine



Steam separator

Two-phase flow analysis



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Growth Strategy: Nuclear power / Radiation systems

Expand Overseas by Leveraging the Synergies between Nuclear Power and Radiation Systems

Nuclear power

- Focus on the nuclear fuel cycle field and the waste material treatment facilities field

  Received order for J-MOX nuclear fuel manufacturing facilities for Japan Nuclear Fuel Limited, measures addressing waste furnaces and treatment of radioactive waste

- Research and development of high-temperature gas furnaces

  Received order for concept designing of high-temperature gas furnaces from the U.S. Department of Energy

J-MOX Fuel Processing Plant

Radiation Systems

- Expand presence in domestic and overseas markets based on domestic performance

  Individual radiation management systems, contamination monitors, radiation monitors

  Increased usage of radiation safety management systems due wider usage of sophisticated medical systems

- Increase the high-added-value characteristic of radiation management systems based on sensor and control technologies

  Develop next generation area process monitors, etc.

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Growth Strategy: Smart meters

Expand Operations through GE Fuji Electric Meters

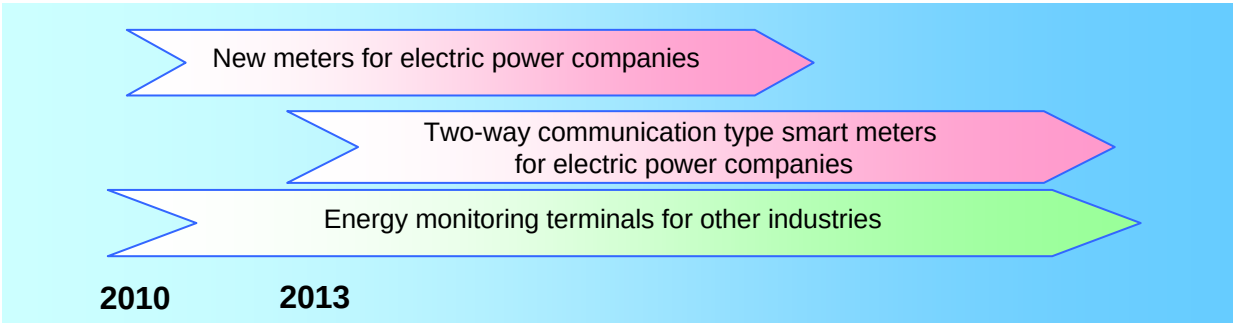
- Establish GE Fuji Electric Meters Co., Ltd. (Scheduled for October 2010)

Holding Fuji Electric: 50.01%
GE: 49.99%

- Develop next generation smart meters by combining Fuji Electric and GE's technologies
- Aim to develop a competitive business by leveraging Fuji Electric and GE's strengths

≪ Trends in the smart meter market ≫

- **Approximately 83 million electricity meters belonging to electric power companies in operation (of which 60 million are for residential housing)**
- **Currently, the majority is mechanical (penetration rate of electrical meters: 5%)**
- **In the future, the shift from mechanical to electrical will accelerate**



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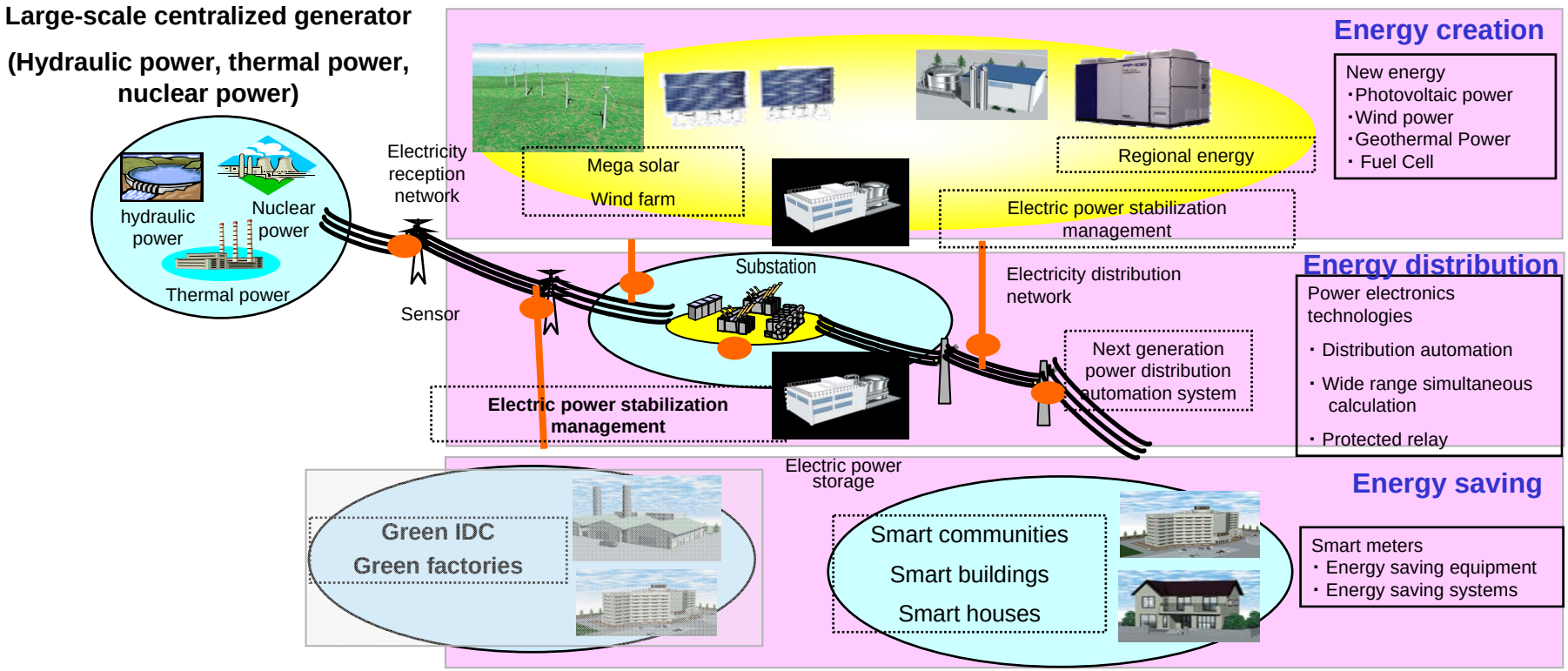
Growth Strategy: Smart grids

Create a Smart Grid Market that Combines Energy, Control, and Information Technologies

- Leverage the strengths of the power electronics and energy control technologies
- Construct a smart grid platform and provide total solutions



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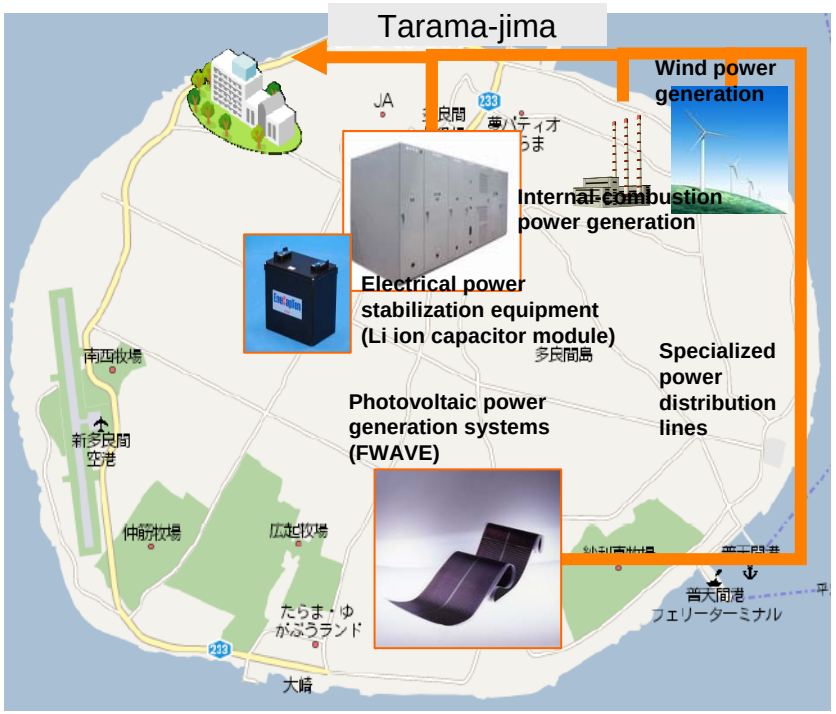
Growth Strategy: Smart grids

Expand operations overseas based on the results of smart grid demonstration tests

Participation in demonstration tests

- Isolated island micro grid system
  - KYUSHU ELECTRIC POWER: 6 islands
  - The Okinawa Electric Power Company: 3 islands
- Smart community demonstration tests
  - Kitakyushu City model smart community business
  - Kyoto, Osaka, and Nara model smart community business
- Overseas smart grid projects
  - New Mexico State, U.S.: Green Grid Initiative
  - Indonesia: Smart community preliminary investigation



The Okinawa Electric Power Company Tarama-jima

Isolated island micro grid system

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Growth Strategy: Smart grids

Kitakyushu City Smart Community

(Next generation energy / Infrastructure system demonstration)

Promoted by Kitakyushu City Smart Community Development Association (Kitakyushu City + 40 companies + 5 organizations)
Principal members: Kitakyushu City (Infrastructure system), **Fuji Electric Systems Co., Ltd. (Energy)**, NIPPON STEEL CORPORATION (Energy), IBM Japan, Ltd. (Information infrastructure)

Local community participation style energy community → **Society that can fully utilize energy** → **50% CO_2 reduction**

Introduce new energy

- Town Mega Solar

- Kitakyushu Hydrogen Town
- Binary power generation

Projects primarily managed by Fuji Electric

Introduce an energy saving system for the entire city block

- Introduce BEMS* and HEMS* that are responsive to demand

Smart offices

Smart data centers

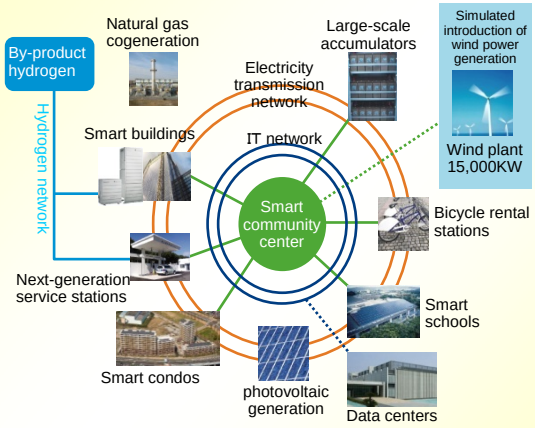
Smart factories

Develop the local community using next generation transportation systems, etc.

- Introduce large amounts of EV, etc.
- Introduce small-scale vehicles using fuel cells
- Cooperate with public transportation, community buses, etc.

Develop local energy management systems

- Local energy conservation facilities



- Introduce smart meters
- Carbon offset and eco-point systems

*BEMS: Building Energy Management System *HEMS: Home Energy Management System

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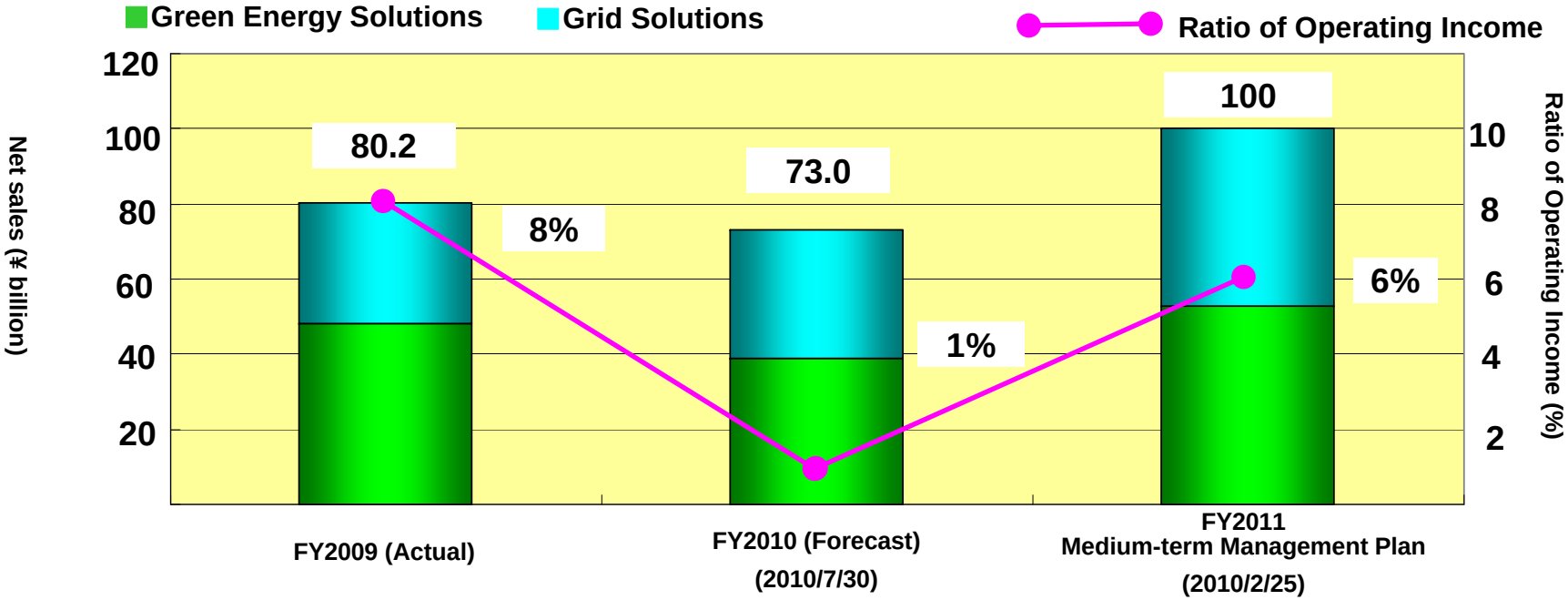
Performance Trends / Targets

FY2011 Medium-term Management Plan

Aim for net sales of ¥100.0 billion and
ratio of operating income to net sales of 6%



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