

Business Briefing on Power Systems

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Business domain	Customers/ Markets	Segment					
		Shipbuilding & Ocean Development	Power Systems	Machinery & Steel Infrastructure Systems	Aerospace Systems	General Machinery & Special Vehicles	Others (Air-Conditioning/ Machine Tool)
Energy & Environment	<ul style="list-style-type: none"> Power companies Gas companies Resource companies (oil, chemicals, steel) 		<ul style="list-style-type: none"> GTCC Large-sized thermal power plants Nuclear energy 	<ul style="list-style-type: none"> Environmental plants Chemical plants 			
Machinery, Equipment Systems	<ul style="list-style-type: none"> Core industries (steel, etc.) Automotive industry Logistics, etc. 		<ul style="list-style-type: none"> Stationary engines 	<ul style="list-style-type: none"> Compressors Metals machinery Crane & material handling systems 		<ul style="list-style-type: none"> Turbochargers Forklift trucks Engines 	<ul style="list-style-type: none"> Air-conditioning equipment Machine tools
Transportation	<ul style="list-style-type: none"> Airlines (air) Shipping companies (sea) Railways (land), etc. 	<ul style="list-style-type: none"> Commercial Ships 		<ul style="list-style-type: none"> Transportation system 	<ul style="list-style-type: none"> Commercial aircraft 		
Defense & Aerospace	<ul style="list-style-type: none"> Ministry of Defense (land, sea, air) JAXA 	<ul style="list-style-type: none"> Destroyers & submarines for the Ministry of Defense 			<ul style="list-style-type: none"> Defense aircraft Missiles Space Systems 	<ul style="list-style-type: none"> Special vehicles 	

1. Review of FY2011 (Review of 2010 Mid-Term Business Plan)
2. Business Environment
3. Business Policy for Achieving the 2012 Mid-Term Business Plan
4. Product Portfolio
5. Enhancing Competitiveness by Developing Global Network
6. Business Operation in Line with Market Needs (Thermal Power Business)
7. Future Technological Development (Offshore Wind Turbine, Lithium-Ion Rechargeable Battery, SOFC)
8. Marine Machinery and Engine Business

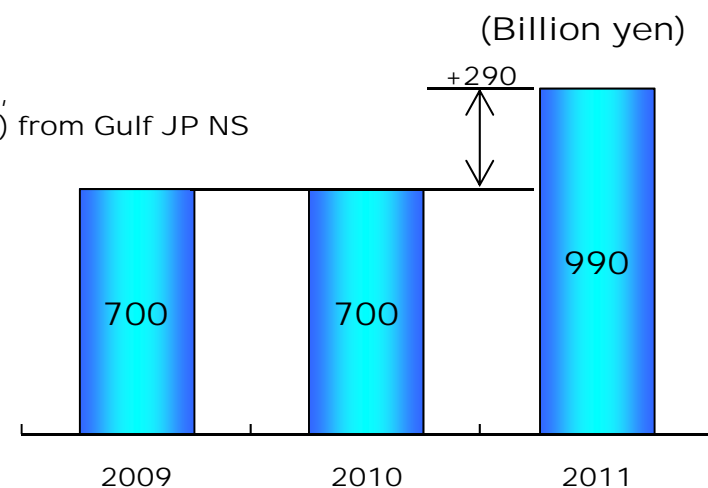
1. Review of FY2011 (Review of 2010 Mid-Term Business Plan)

2010 Business Plan Implemented Steadily

- Boosted product technologies
 - Introduced a state-of-the-art "J" series GT into the market, with order intakes for the turbines. Upgraded existing models.
 - Developed 7 MW-class hydraulic-drive, large offshore wind turbine.
- Global expansion
 - Commenced construction of rotor manufacturing facilities at GT manufacturing plant of Savannah Machinery Works in Georgia, the United States, to increase production capacity
 - Established Regional headquarters, Mitsubishi Power Systems India
- Efficient use of EPC functions
 - Established the Engineering Headquarters

Orders in FY2011

- | | |
|--|--|
| GTCC | <ul style="list-style-type: none"> ● Orders for 10 state-of-the-art "J" series GTs in South Korea, ● Turnkey order for Nong Saeng GTCC power plant (1,600MW) from Gulf JP NS Company, Ltd. in Thailand |
| Large-sized Coal-fired Thermal Power Plants | <ul style="list-style-type: none"> ● Order for 3 units of supercritical-pressure power plant for Linkou Thermal Power Plant from Taiwan Power Company |
| Others | <ul style="list-style-type: none"> ● Orders for 20 stationary engines for securing power sources in Japan |



Power Market Trend

- The outlook for the new nuclear power plants is uncertain. In the short term, environmental-friendly GTCC will grow as an alternative power source.
- In Emerging countries, Stable demand for coal-fired thermal power due to the low coal price
- Globally, renewable energy market faces excess of supply and falling prices due to the reduction of governmental support (incentives) in developed countries. Large offshore wind turbine will be the solution.



- Expand the thermal power business by strengthening the EPC network.
- Continue investments in large offshore wind turbines.

Price Trends of Natural Gas

- North America: Prices are kept low and the gas utilization has been increasing due to shale gas development.
- Asia: Prices have been rising with the energy diversification in emerging countries and moves to secure natural gas following the Great East Japan Earthquake. Highly efficient use of the gas is important.



- Strengthen GTCC business in response to needs in regional markets.

Competitive Environment

- Continuing Yen appreciation
- Intensified price competition due to new manufacturers from Asia



- Reduce currency rate fluctuation risk and cost reduction by expanding the global network.
- Secure advantage by improving efficiency and developing eco-friendly technologies.

3. Business Policy for Achieving the 2012 Mid-Term Business Plan

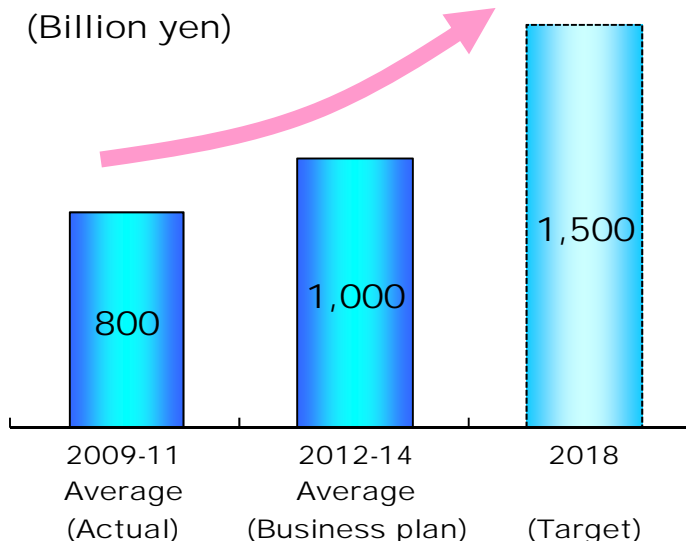
Aim to expand the business, which has remained at around 1 trillion yen, to 1.5 trillion yen by taking chance of changing business environment.

- (1) Improve the ability to win orders through globalization.
 - Strengthen EPC, procurement, services, and sales bases by establishing the “Diamond Network.”
 - Improve the competitiveness of main equipment and increase production capacity with global production.
- (2) Reform the operation of the product business.
 - GT: Accelerate development of strategic new models.
 - Boilers: Utilize LCC and shift to IGCC business in the future.
 - ST: Improve competitiveness through global procurement and production.
 - Marine Machinery and Engines: Increase market shares by MEET products.
- (3) Develop new business and domain.
 - Offshore wind turbine, lithium-ion rechargeable battery, SOFC triple combined system

Order Intake Plan




Maintain 1 trillion yen level and aim for further increase

- Increase GTCC orders, responding to demand for the replacement of aging power plant in developed countries and the diversification of power sources in emerging countries.
- Continue getting orders for coal-fired thermal power in emerging countries, mainly in India and Southeast Asia.
- Increase competitiveness by accelerating the global expansion of EPC business.



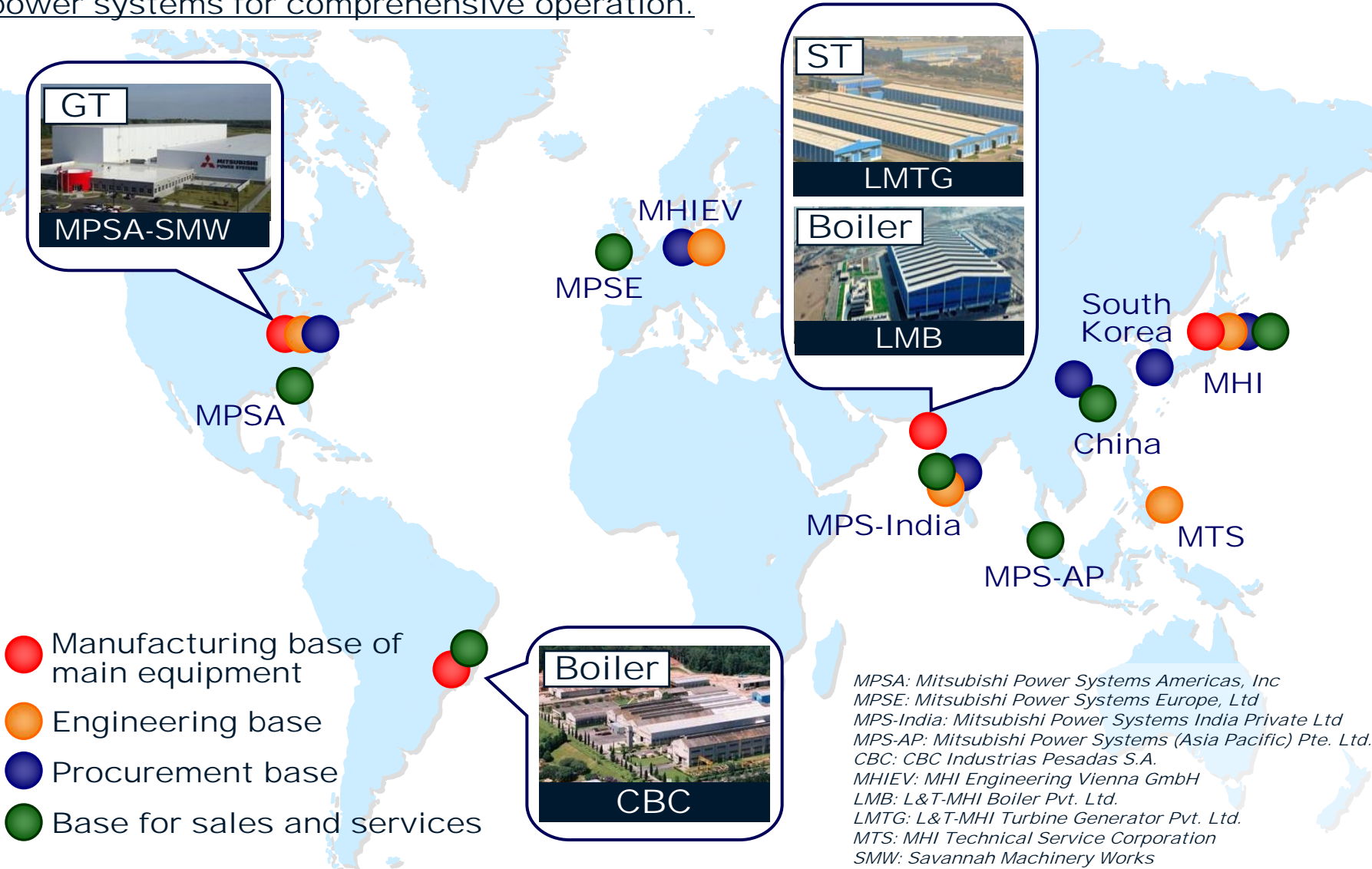
4. Product Portfolio

A product portfolio developed in anticipation of the continuation of highly efficient use of thermal power plants and environmental considerations required in the future

Energy	<p style="text-align: center;"><u>Natural Gas</u></p> 	<p style="text-align: center;"><u>Coal</u></p> 	<p style="text-align: center;"><u>Renewables</u></p> 
<p>Characteristics and Challenges</p>	<ul style="list-style-type: none"> ■ A well-balanced power source with economic efficiency and environmental-friendliness ■ The competitive edge over other power sources changes rapidly due to fluctuations in prices. 	<ul style="list-style-type: none"> ■ Coal is easy to procure and fuel is readily available at reasonable prices. ■ But coal emits more air pollutants than other power sources. Measures need to be taken to achieve zero emissions. 	<ul style="list-style-type: none"> ■ Eco-friendly and CO2-free power source ■ Costs of power generation are high. Performance improvement and cost cutting are necessary.
<p>Market Environment</p>	<ul style="list-style-type: none"> ■ North America: The environment is conducive to the introduction of GTCC because the use of gas has been increasing with the development of shale gas. ■ Asia: Pursuit of fuel efficiency reflecting rising gas prices following the earthquake 	<ul style="list-style-type: none"> ■ Developed countries: Construction of new facilities has been stagnant because they are subject to environmental regulations. ■ Emerging countries: Coal is the main power source supporting economic growth in India, Southeast Asia, and elsewhere. 	<ul style="list-style-type: none"> ■ Policies on offshore wind turbines are promoted in several countries. ■ Energy management technologies sought to achieve the low-carbon society in the future
<p>Product Development Policy</p>	<ul style="list-style-type: none"> ■ Development of high-efficiency, high-output GT 	<ul style="list-style-type: none"> ■ Development of clean coal technologies (= USC, IGCC) 	<ul style="list-style-type: none"> ■ Large offshore wind turbine ■ Lithium-ion rechargeable battery ■ Geothermal (Development of longer blades)

5. Enhancing Competitiveness by Developing Global Network

Strengthen the capacity of thermal power projects worldwide by networking bases of power systems for comprehensive operation.



Global Design Base

Mitsubishi Power Systems India Private Ltd

Established in October 2011

- Engineering base for thermal power projects worldwide
- Get orders for GTCC and implement EPC in the domestic market in India.



EPC Base of Europe

MHI Engineering Vienna GmbH

Established in June 2011

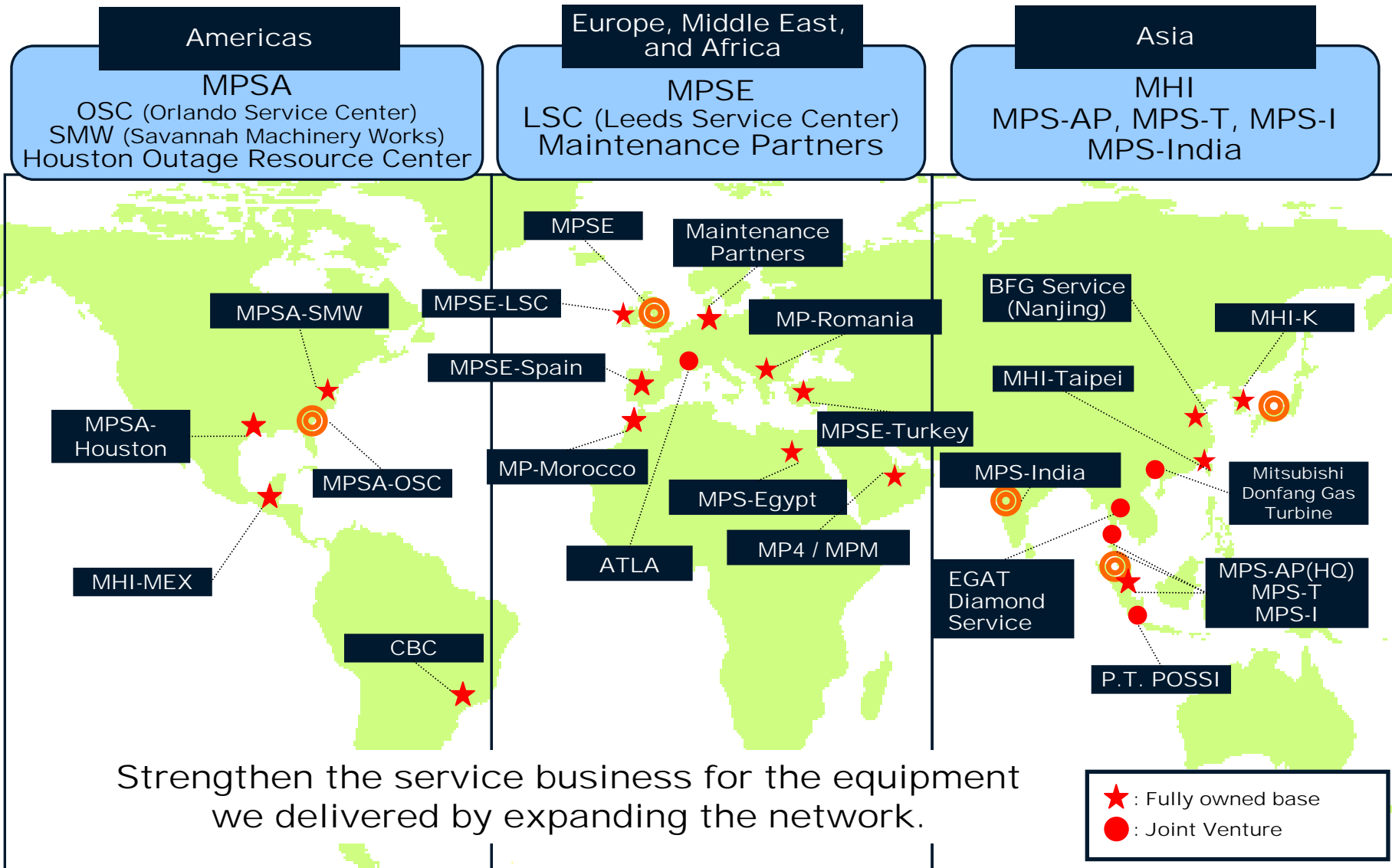
- GTCC engineering base for the European market
- Procurement base in European region ★



Strengthen the EPC business further
by securing global resources

5. Promoting Localization of Thermal Service

Improve customer services by strengthening *Diamond Service Network*.



Strengthen the service business for the equipment we delivered by expanding the network.

6. Business Operation in Line with Market Needs (Thermal Power Business: Natural Gas 1/2)

Large GTCC (Gas Turbine Combined Cycle)

Achieve over 30% of the global shares by developing cutting-edge technologies for large-sized GTs that meet the needs of regional markets.

East Asia and Southeast Asia

Highly Efficient Use

- Needs for highly-efficient GT have been growing due to the surging gas prices, which is advantageous for J-Series GT.
- World's highest thermal efficiency performance in 2011: Thanks to the introduction of M501J with thermal efficiency exceeding 61%, MHI won orders for 10 units in South Korea, where demand has increased rapidly.
- Respond to customer needs with a lineup of high-efficiency GTs.

➔ M501J / M701J / M701F5



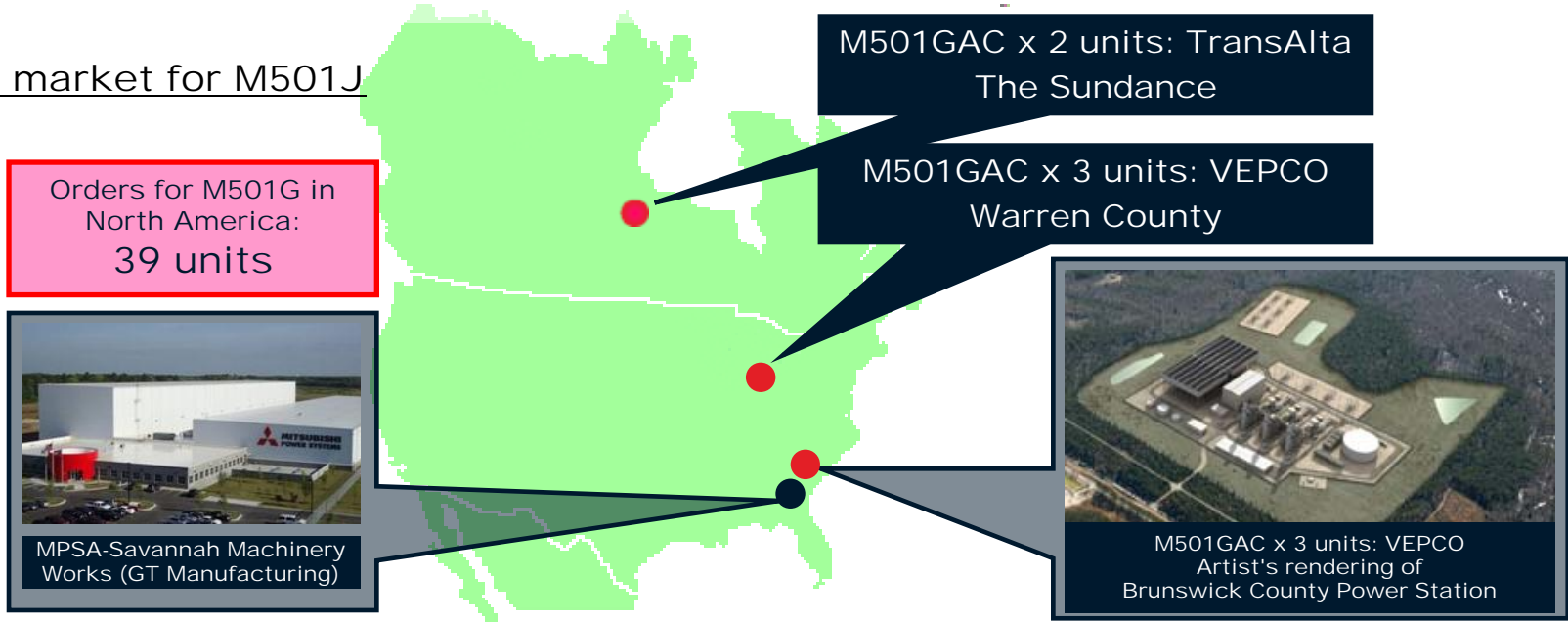
Model	CC Output	CC Efficiency
M701F5	525 MW	61.0%
M501J	470 MW	61.5%
M701J	680 MW	61.7%

Large GTCC (Gas Turbine Combined Cycle)

North America Operational Flexibility and High-Output

- GTCC has become the most economical power source given the fall in gas prices, reflecting shale gas development.
- There has been growing demand for turbines with high flexibility given the need to cope with load-fluctuations by increased renewable energy installation.
- ➔ M501GAC: Got order for 2 units from TransAlta, following orders for a total of 6 units from Dominion (VEPCO)
- Demand for large GTCC for base-load power plants, as the alternative to aging large-sized coal-fired plants, have grown due to the emission control specified by the U.S. EPA.

➔ New market for M501J



6. Business Operation in Line with Market Needs (Thermal Power Business: Clean Coal Technology)

Large-Sized Coal-Fired Power Plants

High-quality plants at competitive prices

- Increased orders, mainly in East Asia and Southeast Asia, where the economy has been growing, on the strength of high efficiency and high reliability
- Reduced costs by global design, procurement, and production network, and maintained price competitiveness against our competitors from China and South Korea.
- In India, where demand is strong, we localized our business by establishing JV with Larsen & Toubro, a leading local company.

September 2011:
Got order for 3 units of supercritical-pressure power generation for Linkou Thermal Power Plant from Taiwan Power Company (2,400MW)



700MW Coal-Fired Thermal Power Plant

Coal Gasification Technology (IGCC)

Power source that materialize needs for Coal-utilization and Eco-friendly

- Verified high reliability
More than 16,000 hours of operation (accumulated) of demonstration equipment at Nakoso IGCC of Clean Coal Power R&D Co., Ltd.
- Cost reduction toward commercialization

Accelerated order intake for commercial-use units by developing markets in coal-rich regions, including China and North America



Clean Coal Power R&D Co., Ltd.
(Nakoso IGCC)

7. Future Technology Development (Offshore Wind Turbine)

Cost reduction is essential to materialize renewable energy



Large offshore wind turbines, which permit lower unit cost of power generation (cost reduction) with improved power generation efficiency enabled by large capacity and size, are promising.

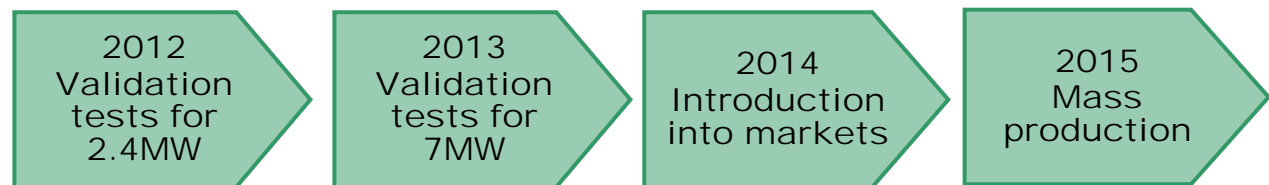


Offshore wind turbine plans are in progress, mainly in the UK and other European countries. They are also in progress in the United States, China, South Korea, and Japan.

Development Policy and Schedule



- Introduced a hydraulic power drive technology owned by a UK venture firm, Artemis Intelligent Power (acquired in 2010), to hydraulic drive trains for offshore wind turbines
- Under development of 7MW-class gearless offshore wind turbine



Development of Floating Wind Turbine

- Integrating our wind turbine technologies with our marine structure technologies
- Participation in the “Experimental Offshore Floating Wind Farm Projects” sponsored by METI of Japan, which started in FY2011



7. Future Technology Development (Lithium-ion Rechargeable Battery)

Enable diverse applications. Accelerate verification tests and commercialization efforts.

For Energy Storage Systems

- Emergency power supply
- Promotion of introduction of renewable energy
- Reduction of power demand at peak times

Rack 100kW-class Energy Storage System



- Found practical application as an emergency power supply system
- Introduced to eco-friendly condominiums of Mitsui Fudosan Residential

Container 100kW-class Energy Storage System



- Introduced as a micro grid test facility to the Shimizu Institute of Technology of Shimizu Corporation

Container-type MW-class Energy Storage System

- Japan's first large-capacity power storage system
- Internal verification test for power stabilization application is under way.



High Output, High Capacity,
High Reliability

For Vehicles

- Application to vehicles manufactured internally and ones from other manufacturers
- Verification tests under severer environmental conditions

Hybrid Forklift



- World's first 4-ton hybrid forklift

Demonstrative Driving of Electric Bus



- Demonstrative driving in the City of Manitoba in Canada, where the environmental condition is severe, following Kyoto City, Aomori City, and Fukuoka City

Racing EV

- Going to provide high output batteries to a team which will participate in a hill climb race to be held in the United States



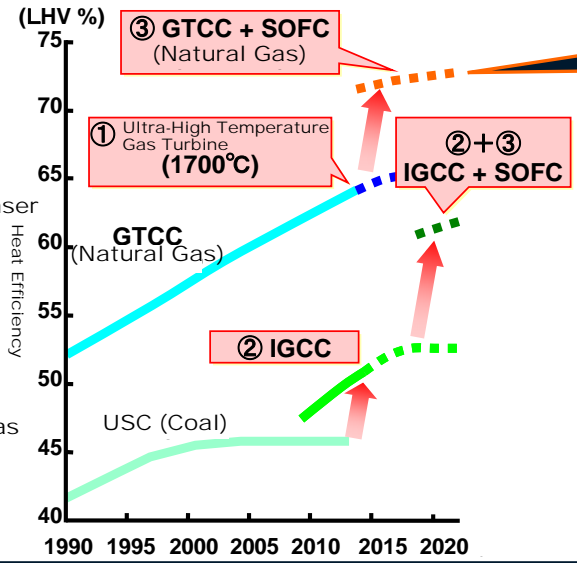
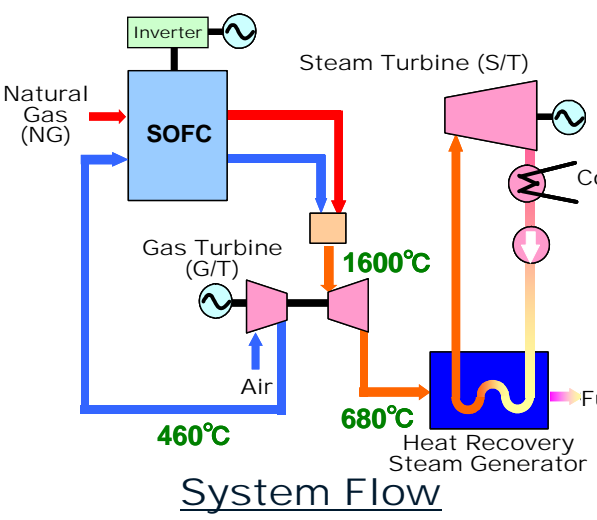
7. Future Technology Development (SOFC Triple Combined System)

Aim for further improvement in power generation efficiency with a triple combined system combining SOFC with GTCC

- SOFC (Solid Oxide Fuel Cell) = Highly-efficient fuel cell that operates at high temperatures
 - The key technology for materializing a low-carbon society
- Aim to provide a thermal power generation system with low cost of power generation and low CO₂ emissions with a triple combined system combining SOFC and GTCC

Status of SOFC Development

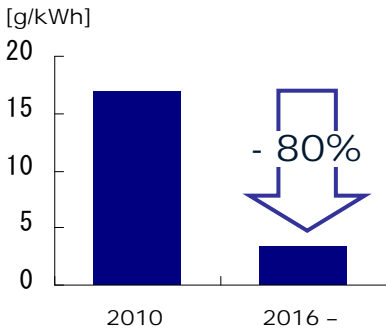
- FY2009: Established world-leading technology by achieving power generation capacity of 229 kW and 52% power generation efficiency with a hybrid system combining two cycles: SOFC and micro gas turbine (MGT)
- FY2012: Will begin developing a triple combined system integrating three cycles: SOFC, GT, and ST



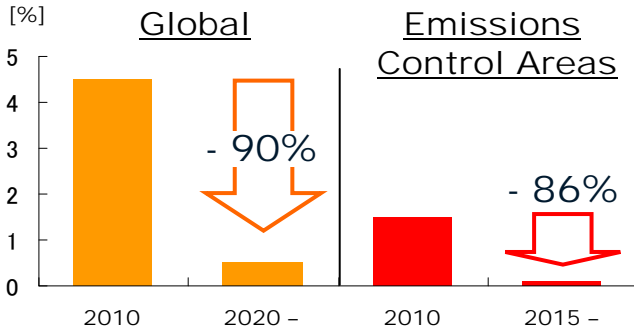
8. Marine Machinery and Engine Business (1/2)

IMO Emission Regulation

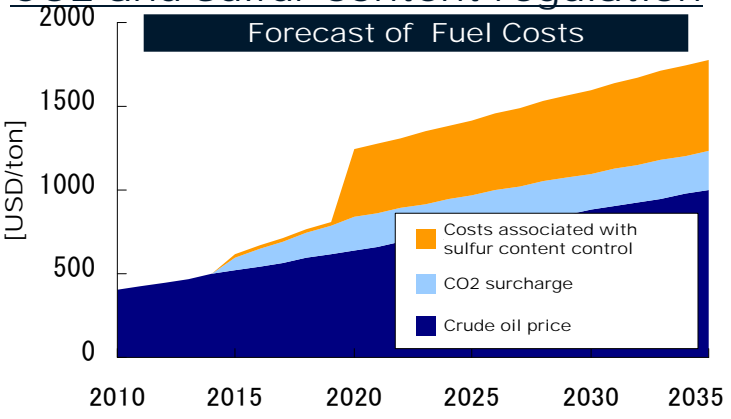
NOx Emission Limit



Sulfur Limit of Fuels



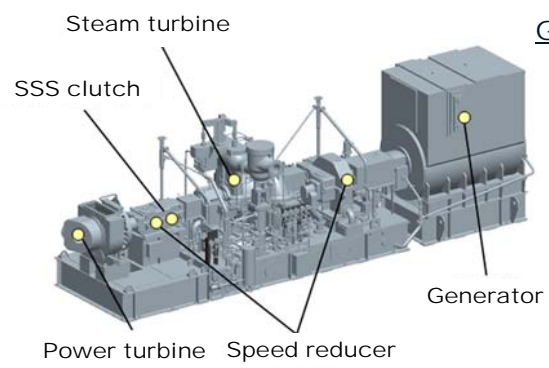
Rise in fuel prices associated with CO2 and sulfur content regulation



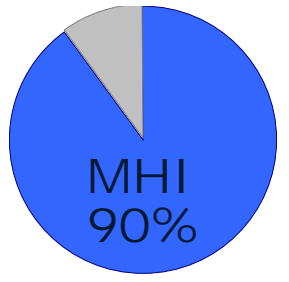
Promote MEET as a solution for environmental regulations and better fuel efficiency.

MERS: Mitsubishi Energy Recovery System

- An energy-saving system that recovers from the exhaust gas of marine engines to optimize heat efficiency

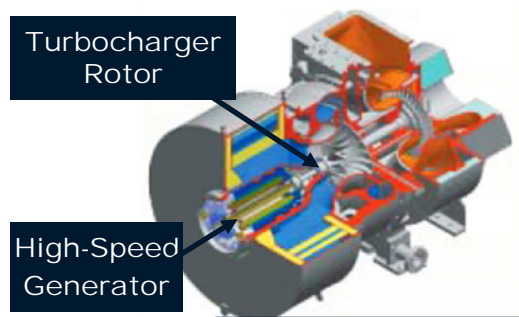


Global market share for MERS

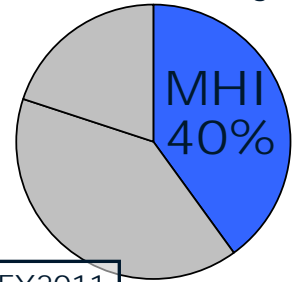


MET Hybrid Turbocharger

- A compact hybrid turbocharger combining the functions of generator and motor, utilizing extra exhaust gas from marine engine
- Top global market share for multi-functional turbochargers



Global market share for MET turbochargers



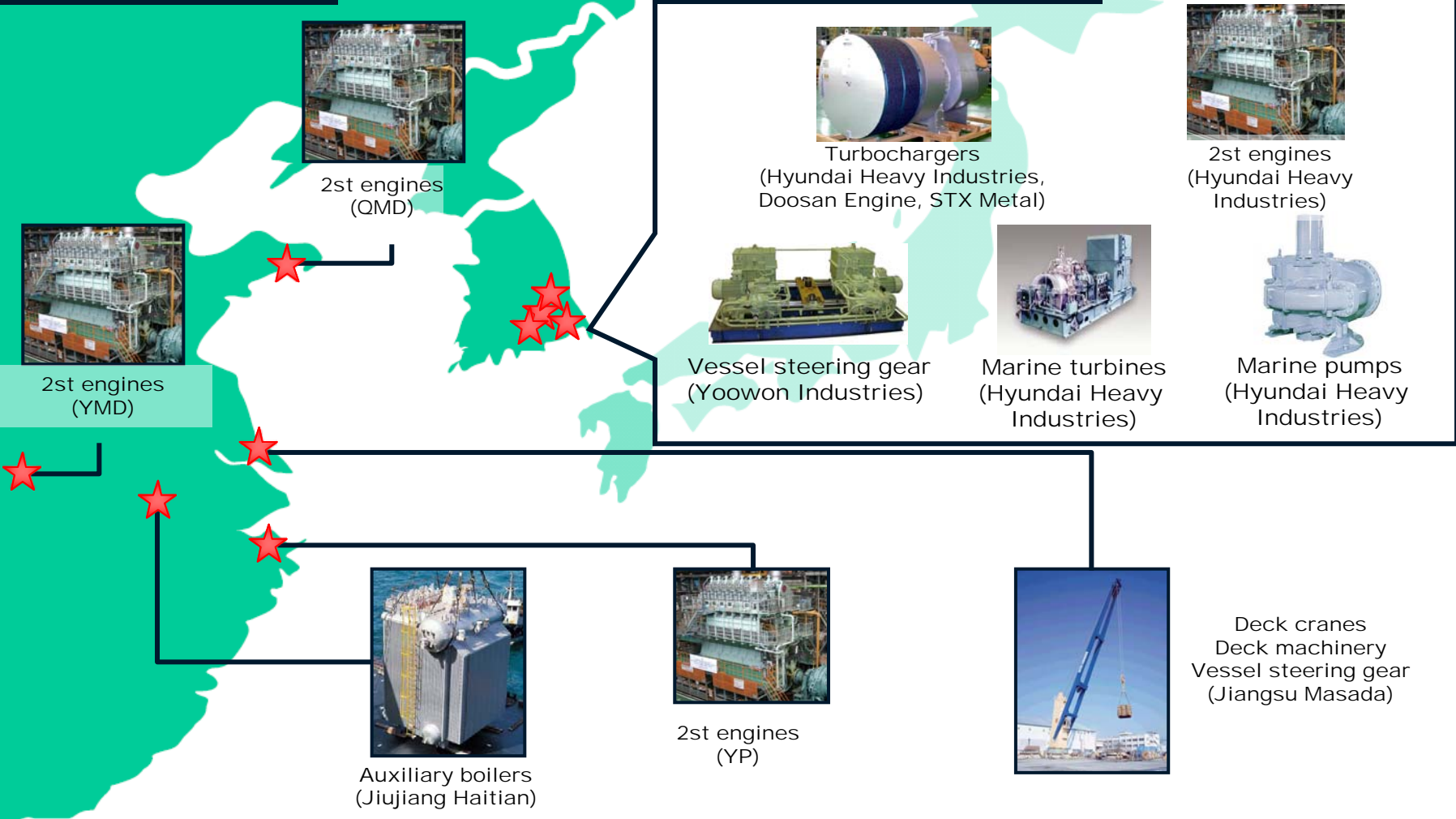
The 1st unit delivered in FY2011

8. Marine Machinery and Engine Business (2/2)

Increase market share by expanding alliances in the growing markets, China and South Korea.

Licenseses in China

Licenseses in South Korea





Our Technologies, Your Tomorrow

A red arrow graphic pointing to the right, positioned below the tagline.

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