Power Systems Business Operation

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MITSUBISHI HEAVY INDUSTRIES, LTD.

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1. Overview of 2008 Business Plan and Current Measures

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Summary of 2008 Business Plan

- **Orders:**

  Orders decreased due to the slow recovery of demand and suspension of the wind turbine business stemming from the USITC's* initial determination (business resumed after the USITC's final determination) (* US International Trade Commission).

- **Sales/Profits:**

  Overcoming tougher competition and the stronger yen stemming from the recession

- **Principal Measures/Achievements:**

  Next-generation GTCC: Completed development of J-series gas turbines, which KEPCO has decided to adopt

  Demonstration of new coal-utilization technology: Nakoso IGCC demonstration plant has achieved over 8,000 hours cumulative operation

Current Measures

- Pursuing further cost competitiveness

  Expanding procurement and local production in China, United States, India, etc.

- Reducing fixed costs

2. Business Environment and Overview of 2010 Business Plan

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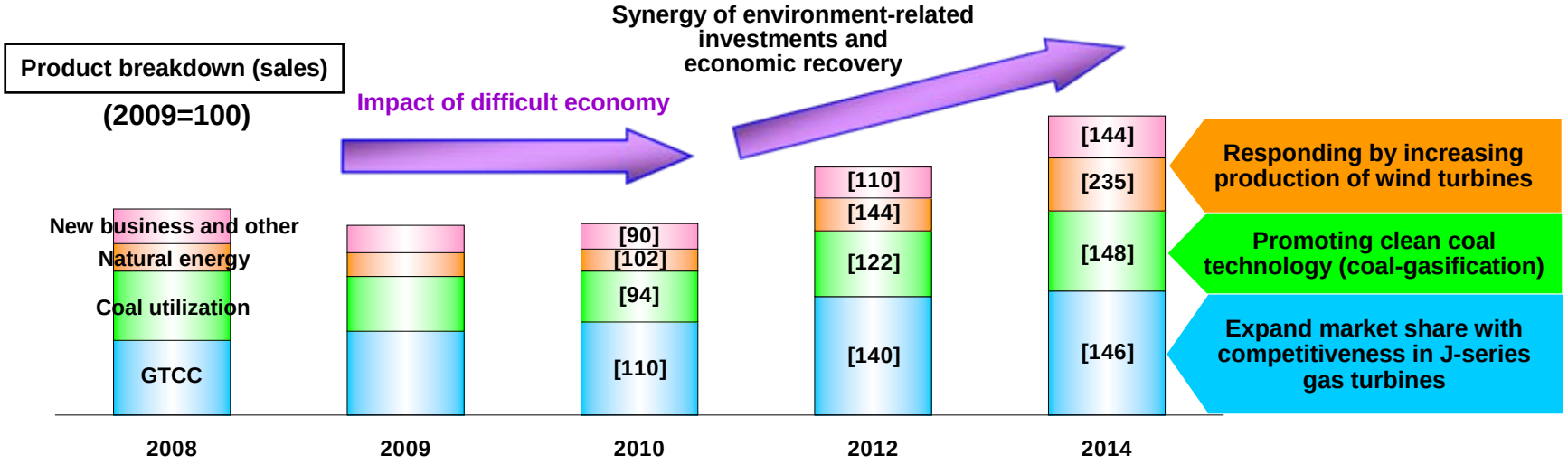
Business Environment

- Next-generation energy project have not progressed due to uncertain GHG policies and future trend of fuel price (No clear direction for “Energy Shift”)

Building an operating structure adapting for changes in the market and transforming eco-friendly technologies into products

Overview of 2010 Business Plan

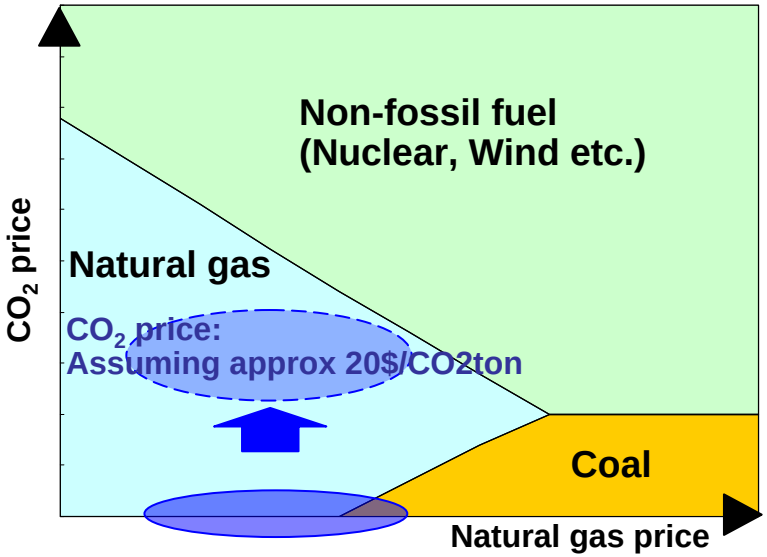
- Expanding business by localization in promising markets
- Reinforcing the service business network
- Product development in growth fields (high-efficient thermal power, natural energy, secondary batteries, etc.)



3. Trends in Power Systems Market

Industrial countries
(North America, Europe, Japan)

- Will continue to CO_2-free renewable energy (wind turbine)
- Replaced to high-efficiency GTCC from aging coal-fired power plant (North America: Mining shale gas and tight sand gas)
- Main energy will change depending on fuel prices, construction cost and governmental environmental policies

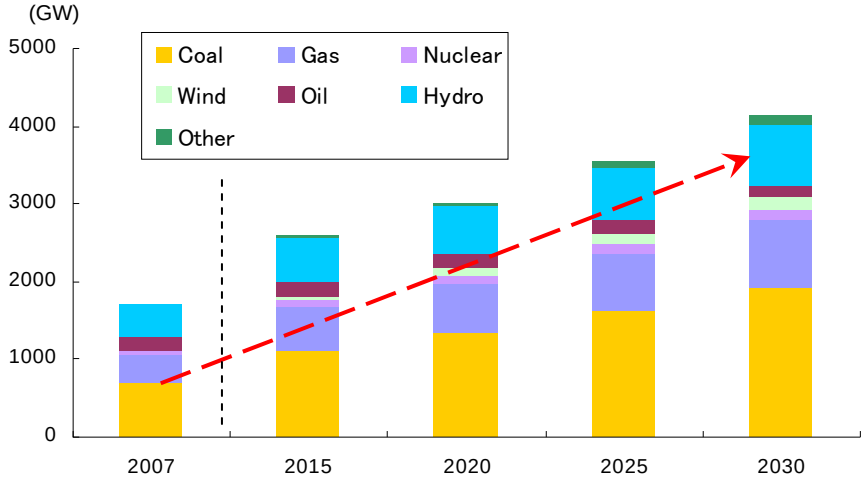


Case in North America
(present)

Emerging countries
(BRICs, Southeast Asia, Middle East, etc.)

- Growth has also remained firm after the financial crisis and orders continue to be placed.
- Cumulative installed capacity of emerging countries will comprise 50% of the global installed capacity by 2030.
- India: Conventional coal-fired power plant will remain the mainstream.
- Southeast Asia, etc.: Will continue to place GTCC orders at a high level.
- China: Will increase nuclear and GTCC and study IGCC

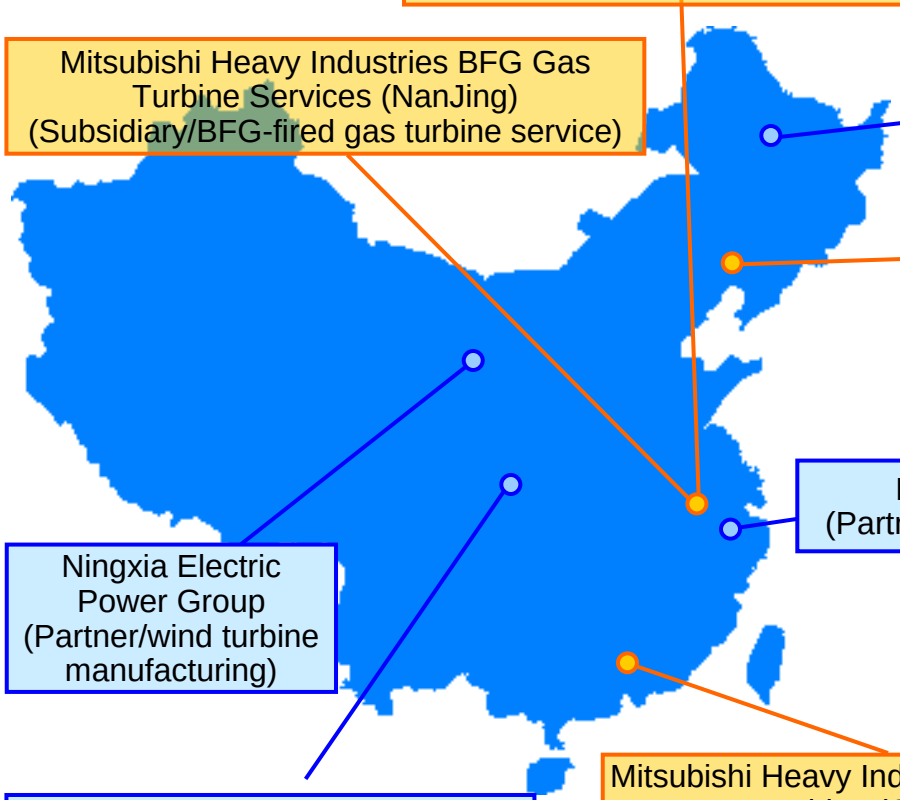
Emerging countries:
Cumulative installed capacity forecast



(MHI's estimate from World Energy Outlook 2009)

4. Approach in Emerging Countries (1/3)

China



Nanjing TianLing Energy Technology
(JV/BFG-fired GTCC engineering)

Mitsubishi Heavy Industries BFG Gas Turbine Services (NanJing)
(Subsidiary/BFG-fired gas turbine service)

Halbin Group
(Partner/boiler, thermal-power turbine, and nuclear turbine manufacturing)

MHI Shenyang Pump Engineering
(JV/thermal-power pump engineering)

- **Deeping partnership with local partners**
- **Boosting orders**

Hangzhou Steam Turbine
(Partner/gas turbine manufacturing)

Ningxia Electric Power Group
(Partner/wind turbine manufacturing)

Dongfang Turbine
(Partner/gas turbine manufacturing)

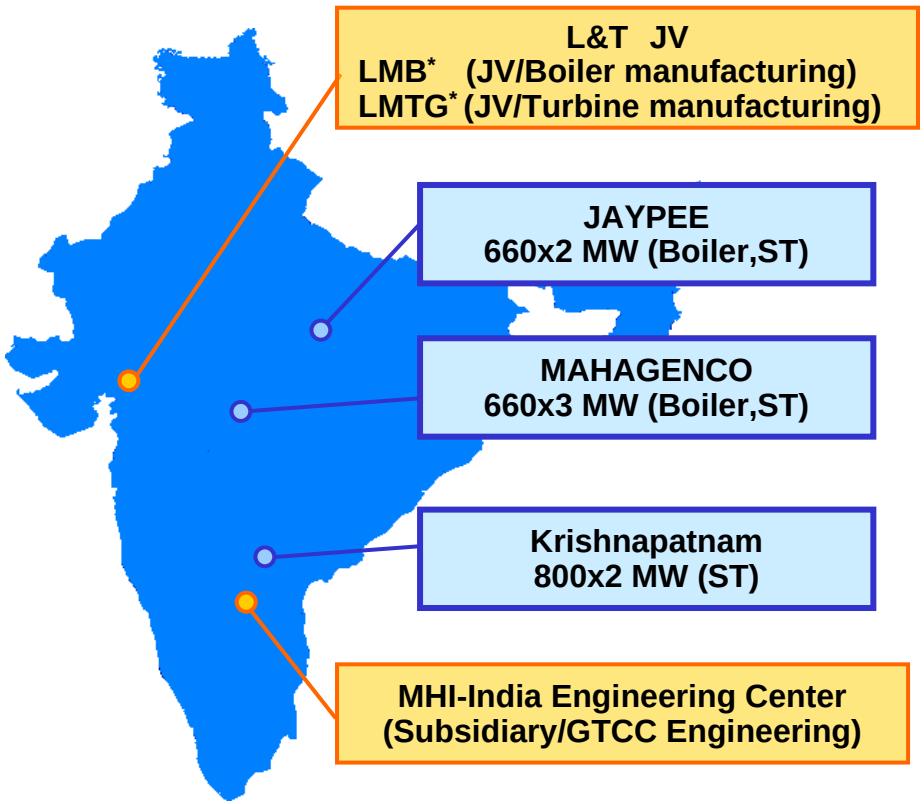
Mitsubishi Heavy Industries Dongfang Gas Turbine (Guangzhou)
(JV/gas turbine component manufacturing/service)

Partners' orders
(Cumulative total of past five years)

Product	Order scale
Gas turbine	2 GW
Steam turbine	31 GW
Boiler	28 GW

4. Approach in Emerging Countries (2/3)

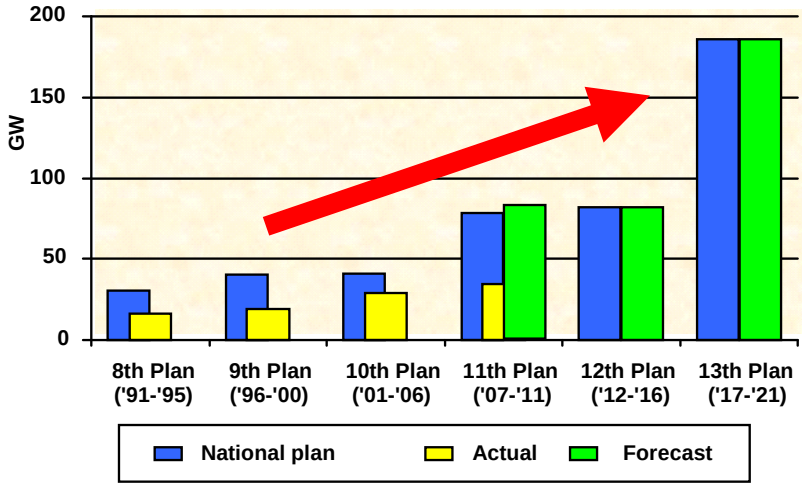
India



- The number of supercritical pressure coal-fired power plants increased rapidly
- Joint ventures with L&T established
  - Boiler production capacity: 4 GW/year
  - Turbine production capacity: 4 GW/year
- Deploying steady business activities

  Orders for 660-800 MW boilers (5 units) and turbines (7 units)
- Expanding engineering centers

Thermal power market in India



* LMB: L&T-MHI Boilers Private Limited
LMTG: L&T-MHI Turbine Generators Private Limited

4. Approach in Emerging Countries (3/3)

Brazil

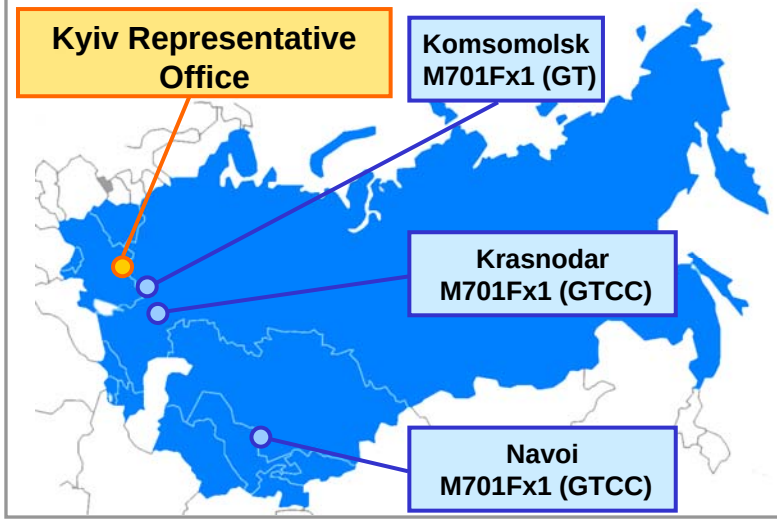
CBC
(Subsidiary/boiler manufacture)

Overview of CBC
- Acquired from THYSSEN in 1963
- Number of employees: Approx. 900
- Products
  Manufacture of boilers, heat exchangers, pressure vessel, environmental equipment, etc.

- Electrical demand is set to increase ahead of the 2016 Olympics.
- New offshore oilfield has been discovered and associated gases are being produced (promising for GTCC and gas engine)
- Petrobras, an oil and gas utility is planning large-scale investment projects.

- Developing new markets centering on CBC

Russia and CIS



- Demand for replacement of aging thermal power plants

- Representative office set up in Kyiv, Ukraine for business operation
  (GTCC-based CHP, gas engine, coal-fired power plant)
- Recent orders :
  Russia: Krasnodar GTCC
  Uzbekistan: Navoi GTCC
  Ukraine: Komsomolsk GT

5. Approach for Partnerships, Local Production and Overseas Procurement

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- Reinforcing SCM: Collaborating with new suppliers
  Supporting domestic suppliers' overseas business
- Hedging exchange risk

MPS-Americas

Combustor Plant for Gas Turbines

MPS-Europe

Nanjing TianLing Energy Technology

Halbin Group

Doosan Heavy Industries & Construction

Ningxia Electric Power Group

Dongfang Gas Turbine

Hangzhou Steam Turbine

VienTek
Blade Plant for Wind

MPSA
Nacelle Plant for Wind

L&T MHI JV
Turbine Plant

Boiler Plant

MPS-AP

JV in Guangzhou
Hot gas path parts Plant for Gas Turbines

CBC
Boiler Plant

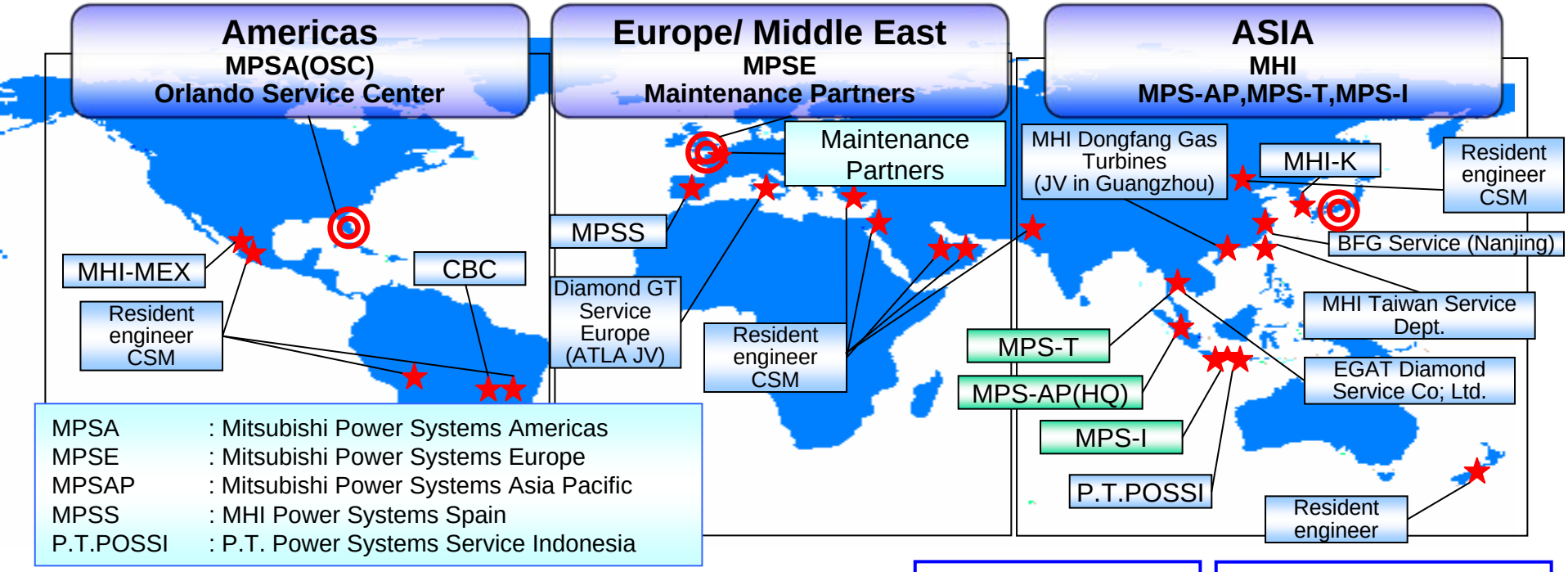
Engineering center

Partner

Procurement base

Production base

6. Expanding Service Business

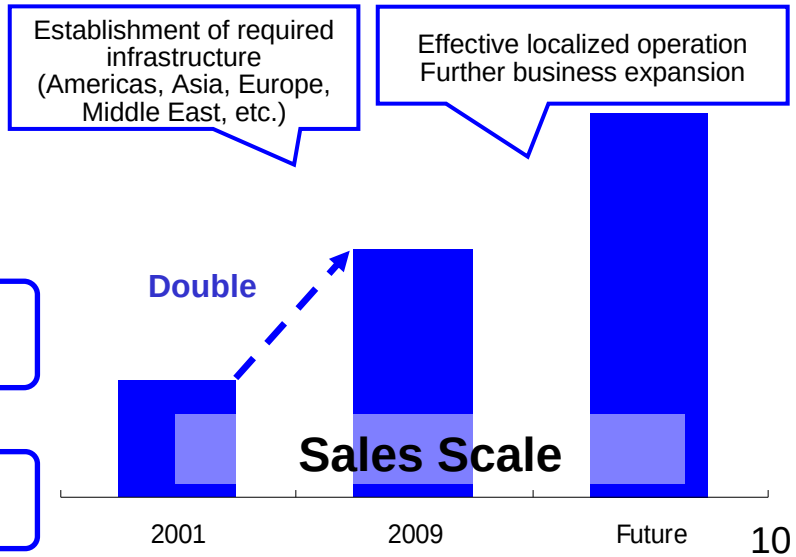


Establishment of *Diamond Service Network* for sales expansion

- **Deploying the know- how from our domestic service business**
- **Offering a global quality service and global business models**
- **Promoting localized operation in Americas, Europe, and Asia**

Establishment of key service infrastructure completed

Continue localization
Develop as key business segment for Power Systems



7. Product Development in Growing Fields

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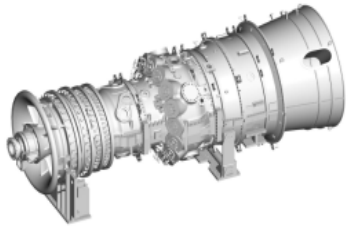
Continuous technology development for high environmental and economic performance

High-efficiency Gas Turbine

- J series gas turbine
- World-leading, high-efficiency low NOx technology



Wind

- Comprehensive technologies in power systems, aerospace, and ships
- High capacity

Lithium-ion Secondary Battery

- For grid systems
- Research achievement with electric utilities
- Laminated large-capacity model

IGCC

- Air-blowing gasification
- Technology for low-grade coal utilization

Geothermal

- Geothermal pioneering technology
- World's largest market share

MEET for Ships

Highly efficient and eco-friendly technology

- High reliability for ships
- Incorporating eco-friendly technologies from land power systems products

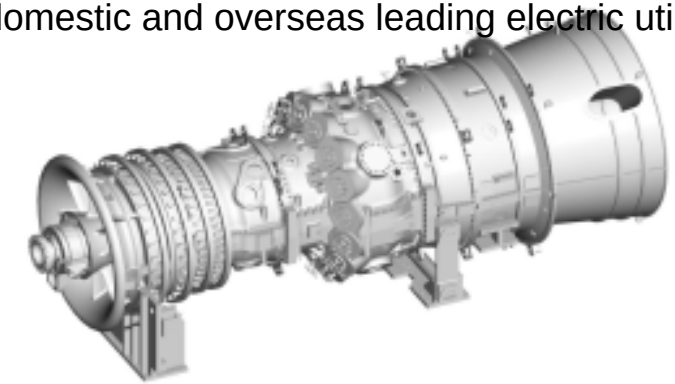
High-Efficiency Gas Turbine

New-generation Gas Turbine J-series released from Japan

- Over 60% combined efficiency
- 50% reduction in CO_2 emissions compared with conventional coal-fired power plants
- Adapted as 1st unit (M5101J x 6 units) at KEPCO Himeji Power Station #2

[Rendering image of Himeji Power Station #2]

- Contributing to 25% reduction in CO_2 emissions in Japan by replacement with a high-efficiency gas-fired power plant
- Utilization of unconventional natural gas is expanding and gas price expected to remain stable in the medium and long term
  - ➢North America, China, etc.
- Business discussion are underway with domestic and overseas leading electric utilities



Schedule of 1st unit

2010	2011	2012	2013
Manufacturing at plant →	→		Starting operation in October ▼
		Onsite construction →	→

Wind

Constructing a wind turbine assemble plant

Ranked 4th (*) in deliveries (installation) for fiscal 2009: plant for assembling wind turbine facilities in the State of Arkansas (* Source: AWEA)

- Start plant construction within 2010 (Initial number of employees: 300)
- Start production from the second half of 2011.

Production capacity: 600MW/year (250 units of the 2.4MW turbine)

US International Trade Commission (USITC's final determination)

January 8: **USITC's final determination: MHI's not in violation of the Tariff Act**

⇨ **Resuming business in the United States**

May 20: **File complaints against GE in the United States**

Patent infringement
(Federal District Court of Middle District of State of Florida)

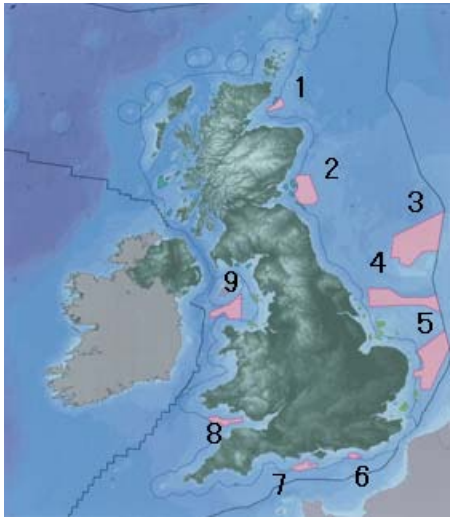
Damages suit for violation of the Antitrust Law and illegal act
(Federal District Court of West District of Sate of Arkansas)

Offshore wind turbine development

- Promoting 5-7 MW class large-capacity wind turbine development (with subsidies from the British government)

  Aming to get an order for the Offshore Wind Turbine Round 3 Project of Britain (from 2015: 32 GW)

[Britain's Offshore Wind Turbine Round 3 Project] (Nine areas)



- Plans to participate in a NEDO national project for TEPCO

  Promoting offshore wind turbine demonstration in Japan (From 2011: Choshi offshore)
- Potential for offshore wind capacity: 68 GW

  (Reference: total installed capacity in Japan is approx. 270 GW)

  Employment boosting effects in associated fields in Japan

  (Principal wind turbine units, components, steel, submarine transmission wires, ship building, ocean civil engineering, port and harbor development, etc.)

Lithium-Ion Secondary Battery

- **MHI has built a mass-production demonstration plant to enter into the lithium-ion secondary battery business field.**
- **MHI will apply them to vehicles, such as forklifts, and to energy storage systems that stabilize renewable energy, anticipating market expansion, by utilizing the experience of in-house products.**

Mass production demonstration plant (image)

- Nagasaki Shipyard in Nagasaki Prefecture
- Annual production: 66 MWh
- Start production in the autumn of 2010

- **Studying on commercial mass-production hopefully from 2011**
- **Improving merchantability by applying to MHI's products**

Features of MHI's lithium-ion secondary batteries

Large-capacity of square lamination

World-leading class unit cell capacity (50 Ah/P140 type)

High output

Materialize high output characteristic (3350 W: 2400 W/kg)

Safety structure

- Designing own components after taking their performance and safety into account
- Cleared safety examinations such as UN test

* Hazardous material test on a UN recommendation

For Vehicles

Application example: 4 to 5 t diesel engine-powered hybrid forklifts

Module batteries

GRENDIA EX Hybrid

For Energy Storage Systems

Application example: micro grid systems for island in Kyushu Electric Power's project

66 kWh system

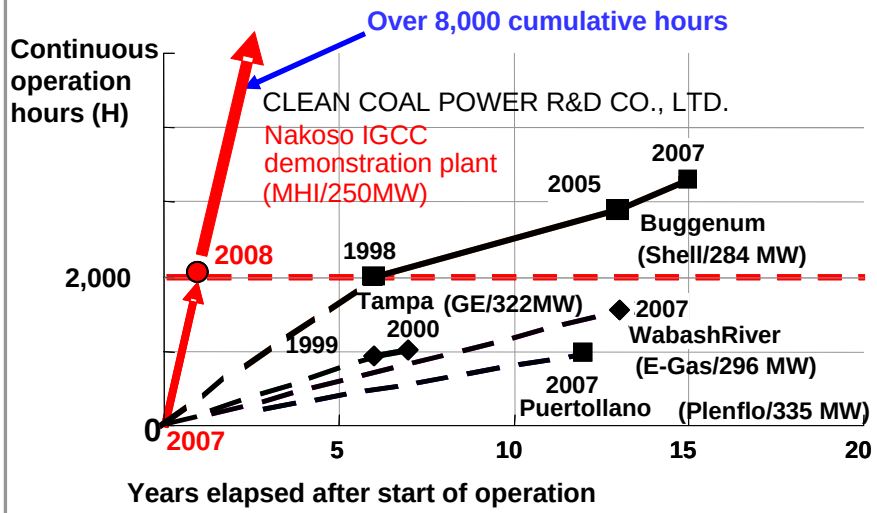
Kuroshima, Kagoshima Prefecture

Clean Coal Utilization Technology

IGCC

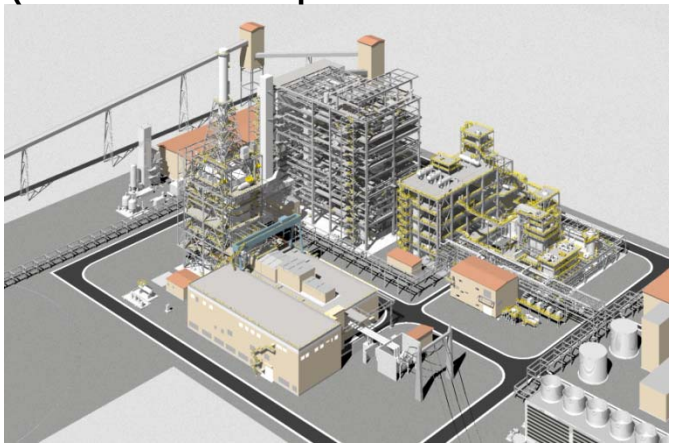
Demonstrating high reliability to advance into the stages of commercialization and overseas deployment

- Cumulative operation hours: Over 8,000 hours
- Availability*: Over 90% * Not including planned suspension

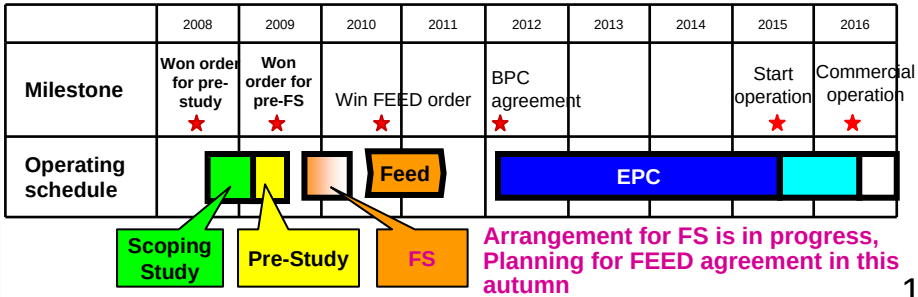


Example of commercial project

ZeroGen Project in Australia (IGCC commercial plant + CCS demonstration)



Type of coal	Australian bituminous coal
Generating-end output	530 MW
Gasified system	Dry coal feed, air-blowing
Gas turbine	M701G2 GT (1 on 1)
CO_2 recovery rate	65%
CO_2 captured amount	2-3 million t/year



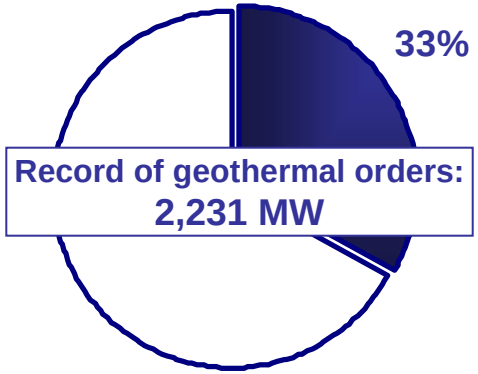
Features of MHI's IGCC and coal gasifier

- Air-blowing IGCC with world-leading efficiency
- High-efficiency 2-stage entrained bed gasification fitting for low-grade coal, gas, liquid fuel, and chemical raw material production

Geothermal

Features of Geothermal Power Plant

- Inexhaustible and independent of the weather (stable supply)
- Eco friendly energy with low CO_2 emissions



McCoy Power Report 2000-2009

- Ranked first in the world (2000 to 2009)
  (Our cumulative orders: over 100 units)
- Creating a market as a pioneer of geothermal power
- Contributing to the energy solution in geothermal resource countries

Further actions to retain leadership in the market

- Expanding collaboration with local partners
- Developing new turbines

Iceland Nos. 3 and 4 units of Hellisheidi Power Plan

Iceland Nesjavellir Power Plant

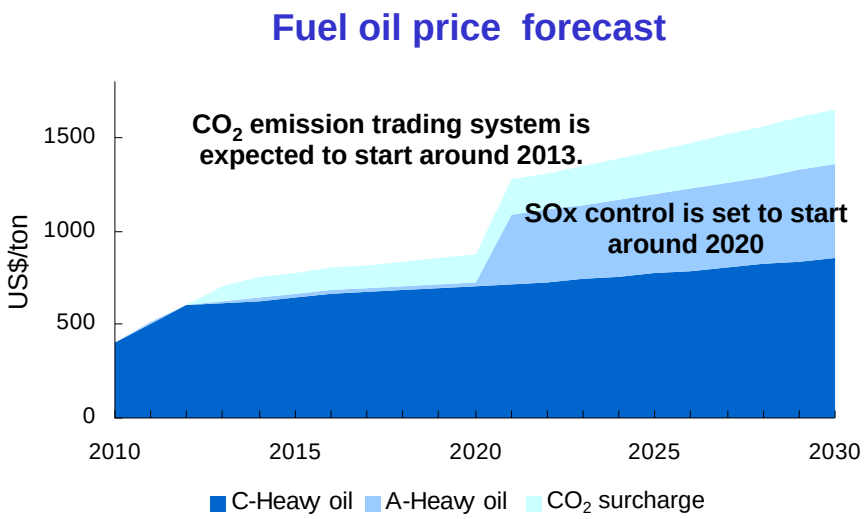
Marine Engine Business

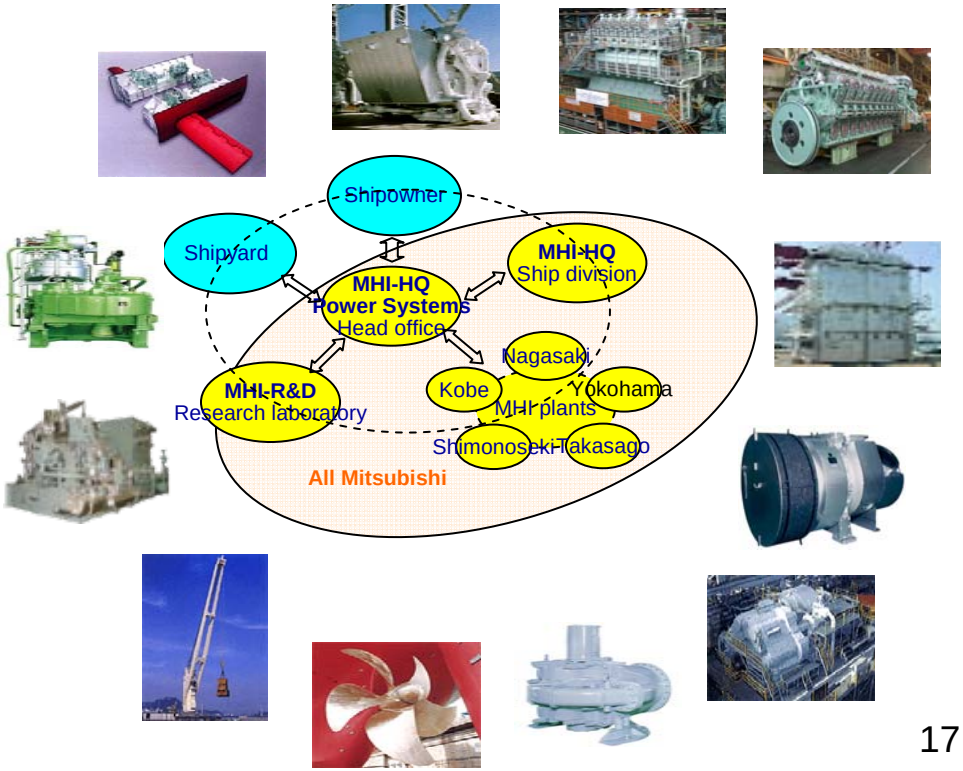
Against tighter environmental control and soaring fuel prices, MHI will start marine solution business in functional combination with MHI's marine engines and equipment.
: Project MEET (Mitsubishi Marine Energy & Environmental Technical Solution-System)

Tighter environmental control

- The International Maritime Organization (IMO) plans to impose strict environmental control in designated ocean areas (NOx: 80% reduction from 2016 and SOx: 98% reduction from 2015).
- CO_2 emission control are inevitable since the CO_2 emission of marine engines in the ocean (870 million tons/year) exceeds Germany's emissions (769 million tons/year).

Soaring fuel oil price





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