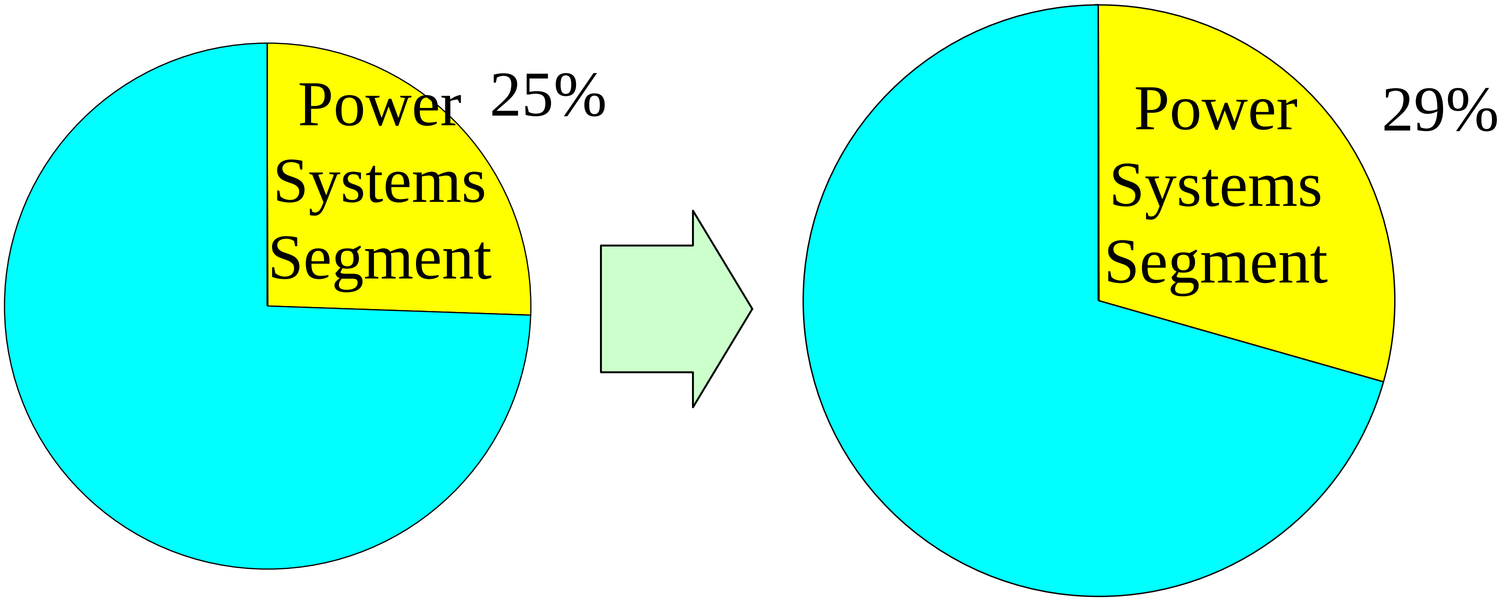
Renewable Energies Business Presentation Meeting

October 17, 2006
Power Systems Headquarters

1. Position of Power Systems Segment in MHI

FY2005
Actual

FY2008
(Business Plan for FY2006)



Consolidated net sales
2.8 trillion yen

Consolidated net sales
3.0 trillion yen

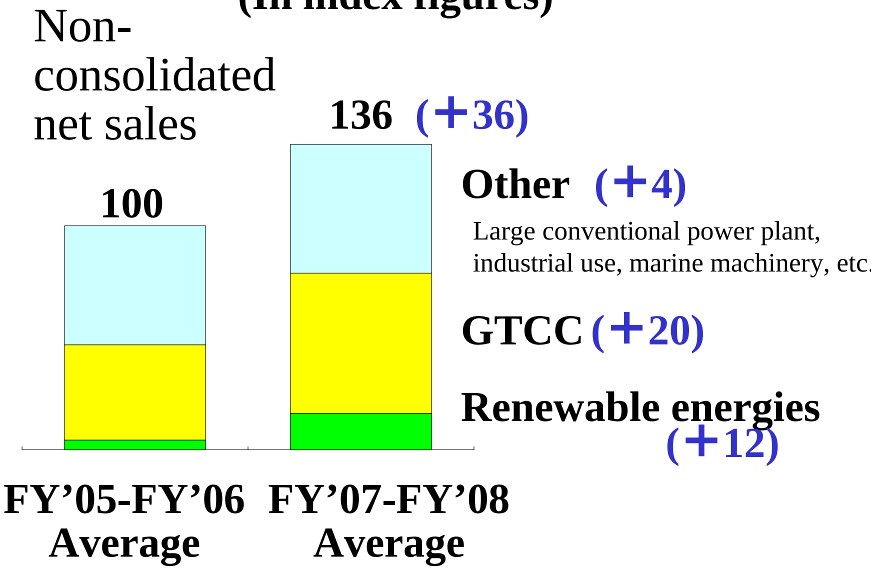
2. **Power Systems Headquarters** – Business Policy

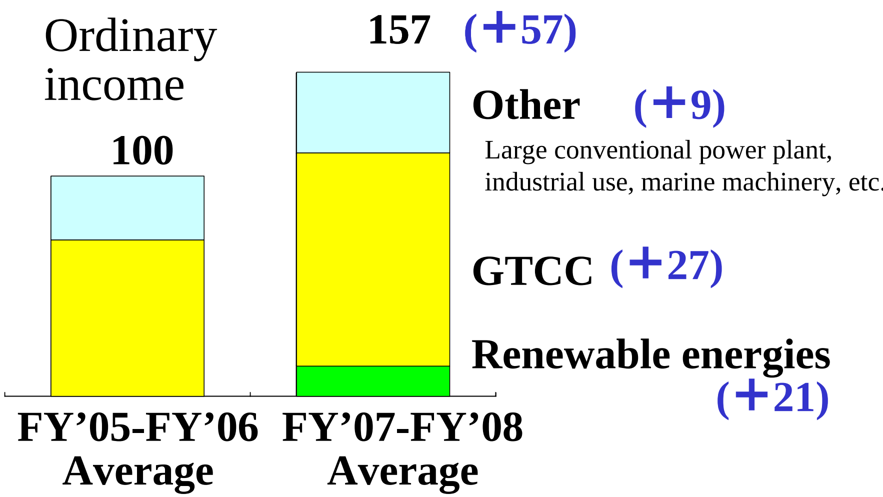
Concentrate on growth areas	・・・	Concentrate resources on GTCC and renewable energy-related products (wind turbines, solar cells, etc.) .
Raise profitability	・・・	Expand sales of highly profitable products. Expand service/maintenance business.
Change product strategy	・・・	Shift emphasis from generally available products to those using MHI's unique, cutting-edge technologies (air-blown IGCC, BFG-fired GTCC, thin film amorphous silicon (a-Si) type solar cells, and high-temperature gas turbines)

GTCC; Gas Turbine Combined Cycle, BFG; Blast Furnace Gas
IGCC; Integrated coal Gasification Combined Cycle

3. Composition of Products and Their Contribution to Sales/Income

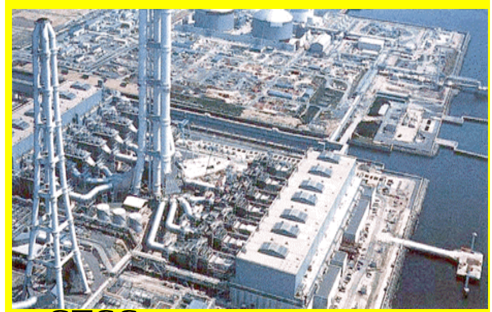
・・・(In index figures)・・・






Wind power generation system


Solar power generation system


GTCC

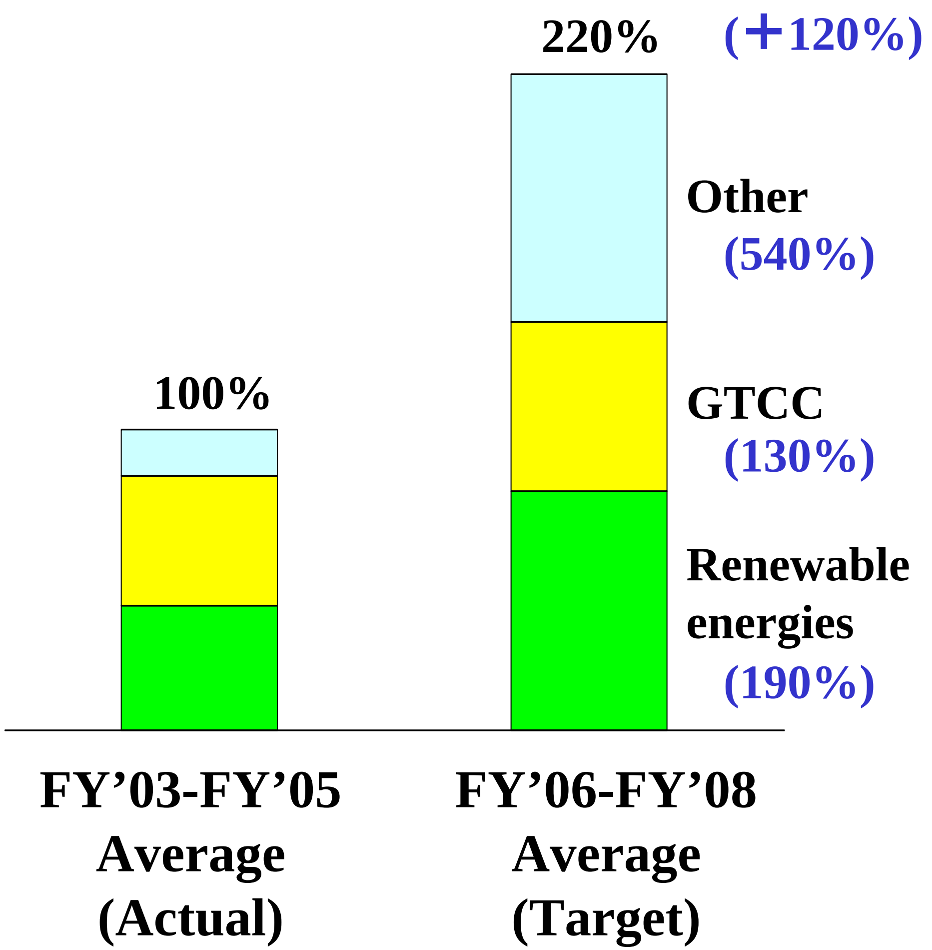

Large conventional power plant

Industrial use


Marine machinery

4. Power Systems Headquarters – Capital Investment Plans

・・・(In index figures)・・・



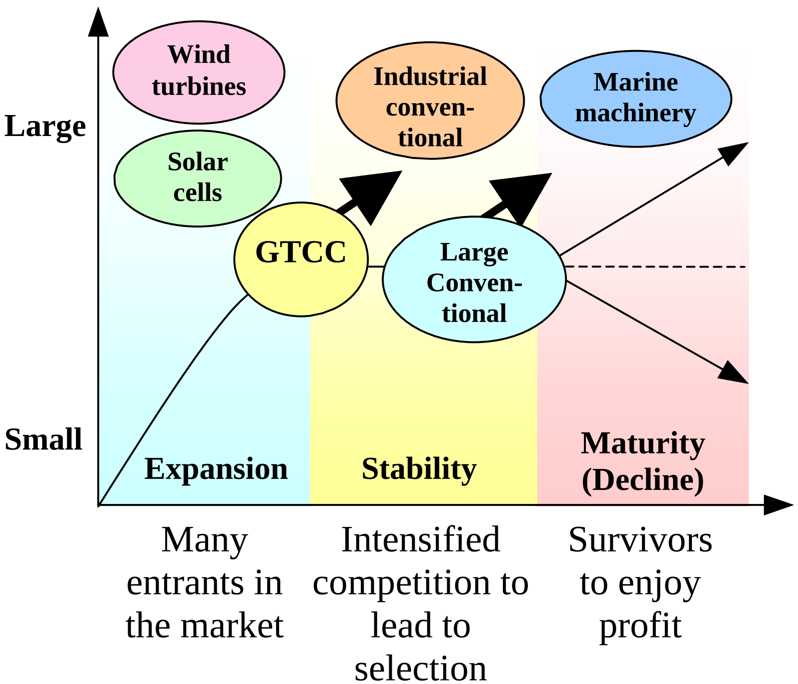
Major capital investment projects ahead:

- Facilities to produce gas turbine hot parts
- Plant to produce microcrystalline tandem solar modules (additional plant enlargement being considered)
- Wind turbines production facilities
- Facilities to produce gas turbine/steam turbine main bodies

5-1. Power Systems Headquarters – Products Portfolio (1/2)

MHI's position in the market

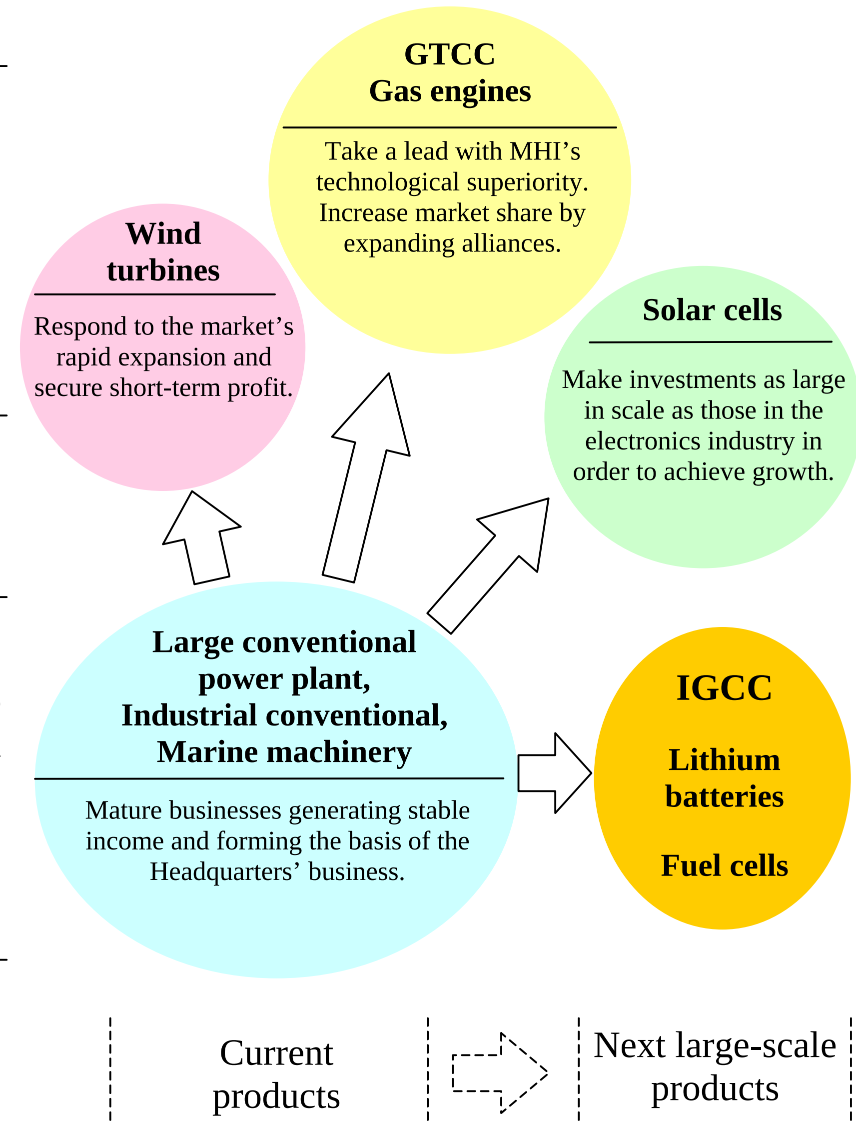
Opportunities for MHI



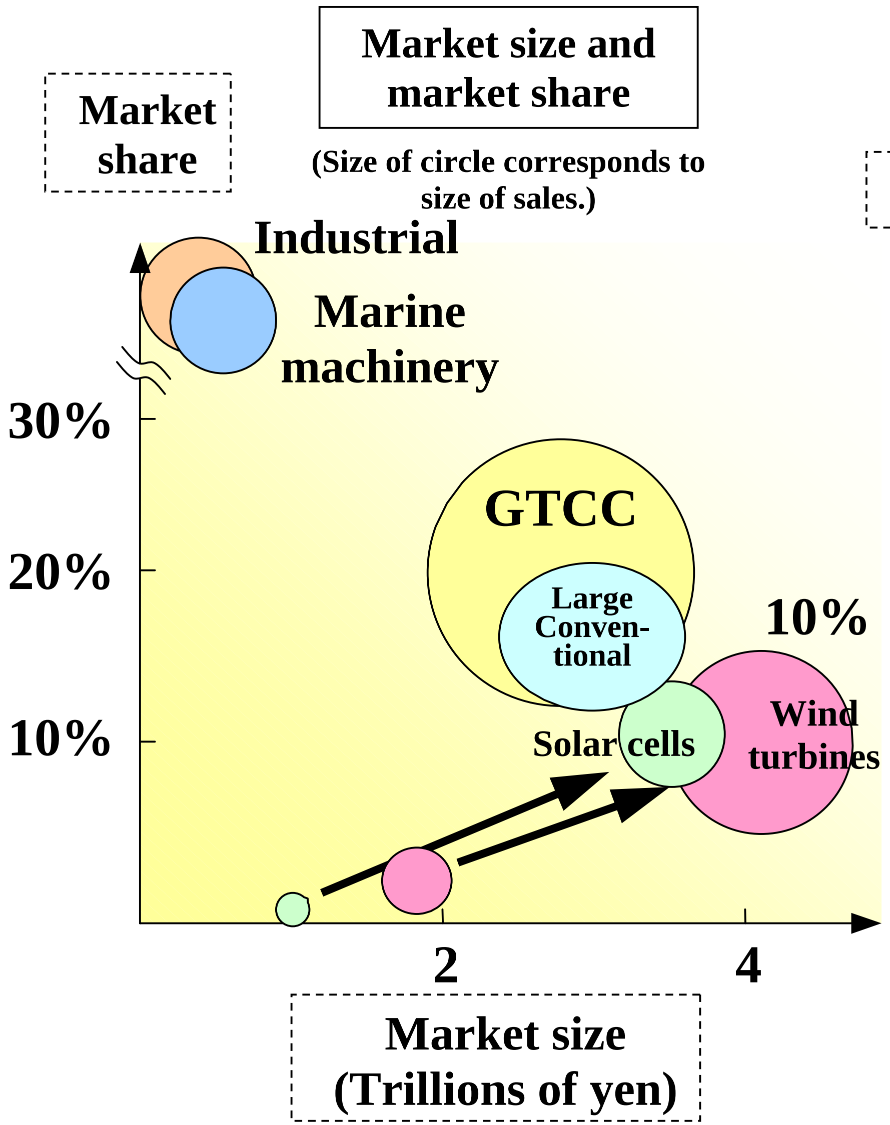
Maturity phases

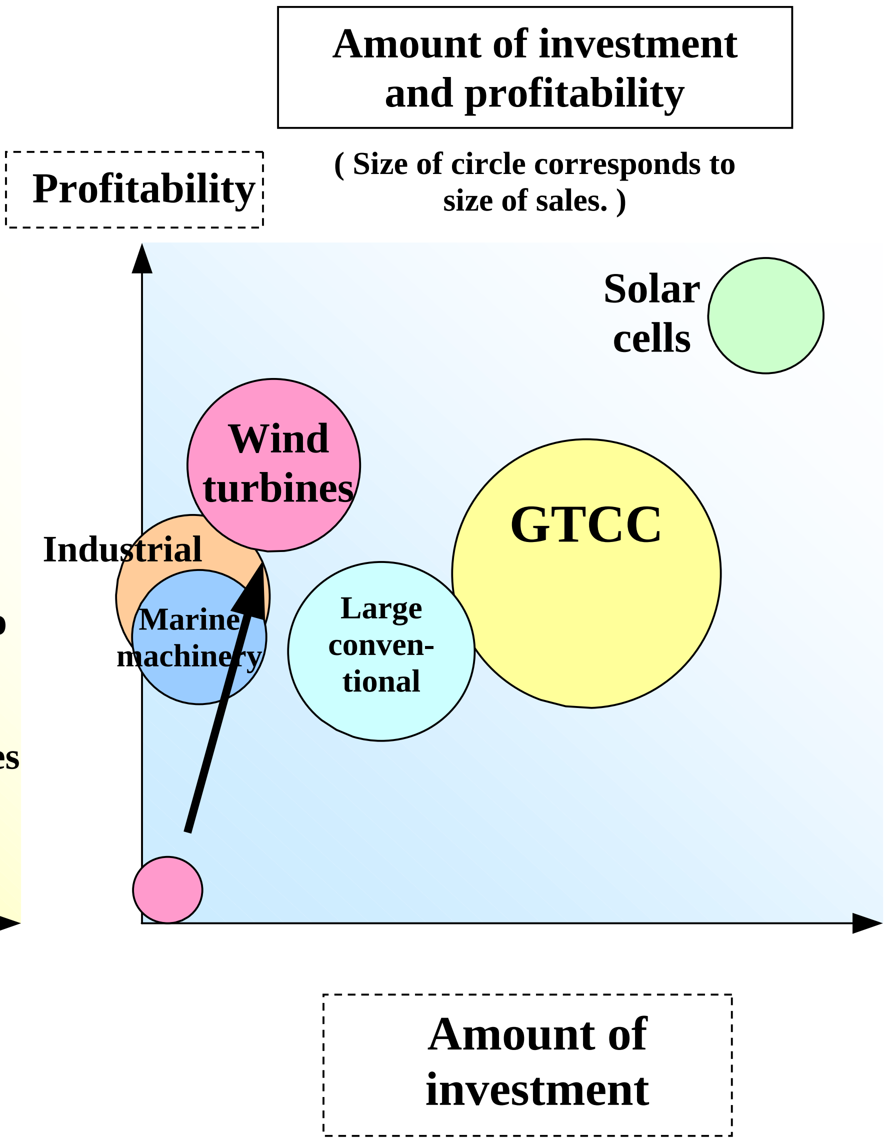
Growth areas with aggressive investment

Areas to be maintained with stable growth

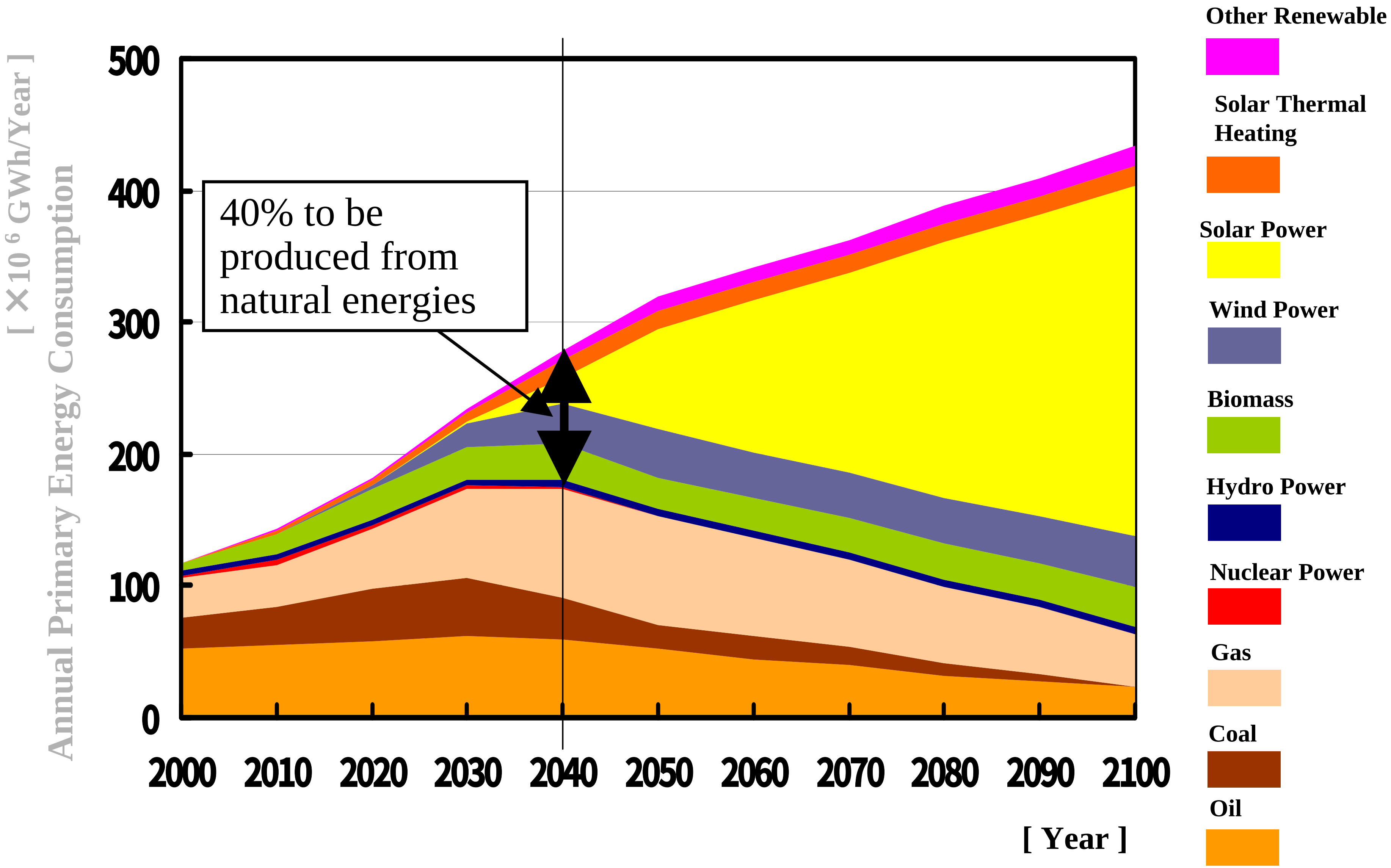


5-2. Power Systems Headquarters – Products Portfolio (2/2)





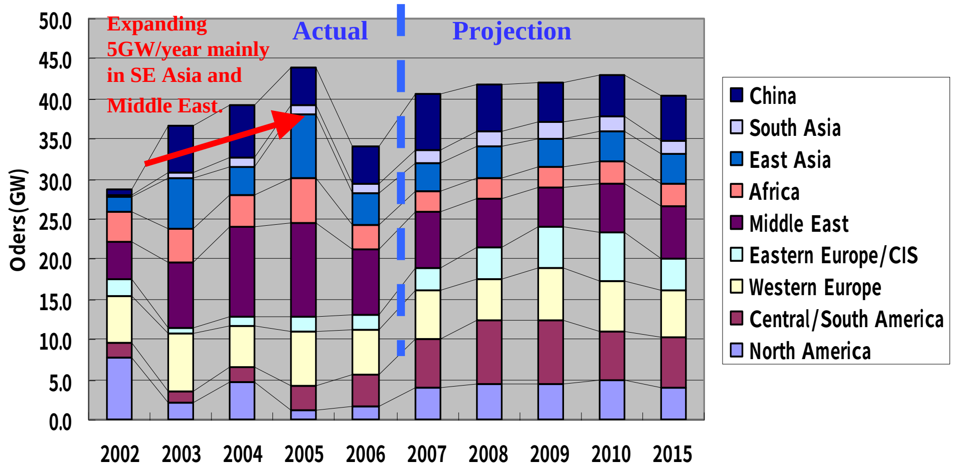
6. Long-term Projection of Global Demand for Primary Energies



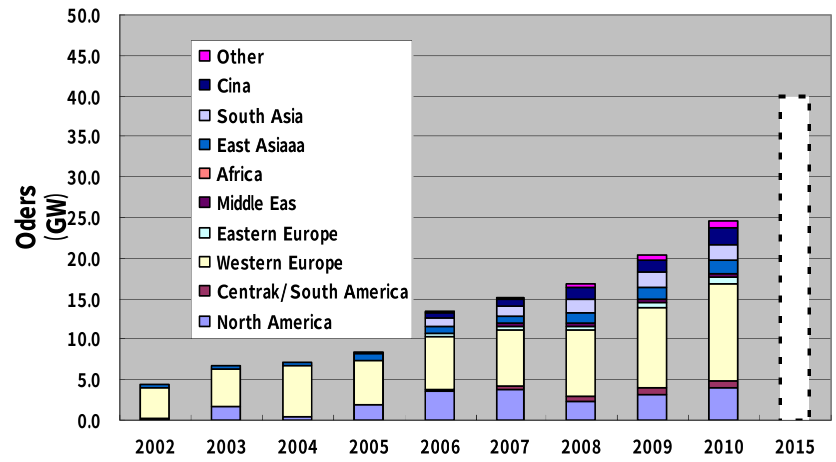
Reference：solarwirtschaft.de

7. Trends in Global Demand for Power Generation Systems for New Installation

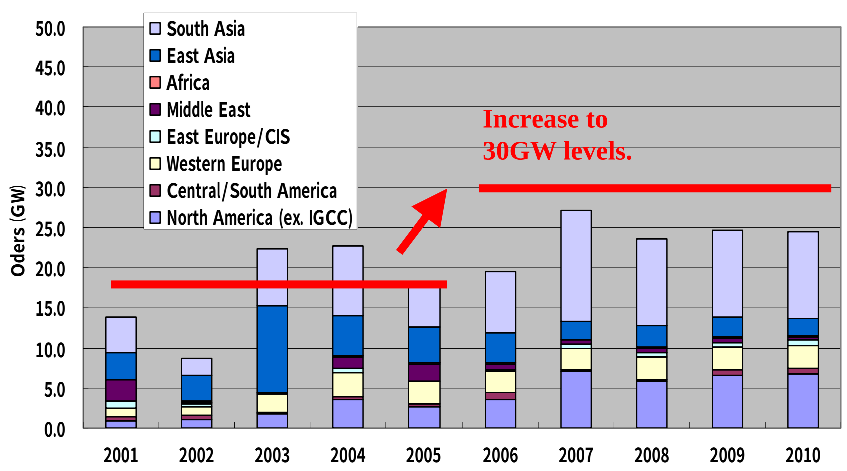
GTCC



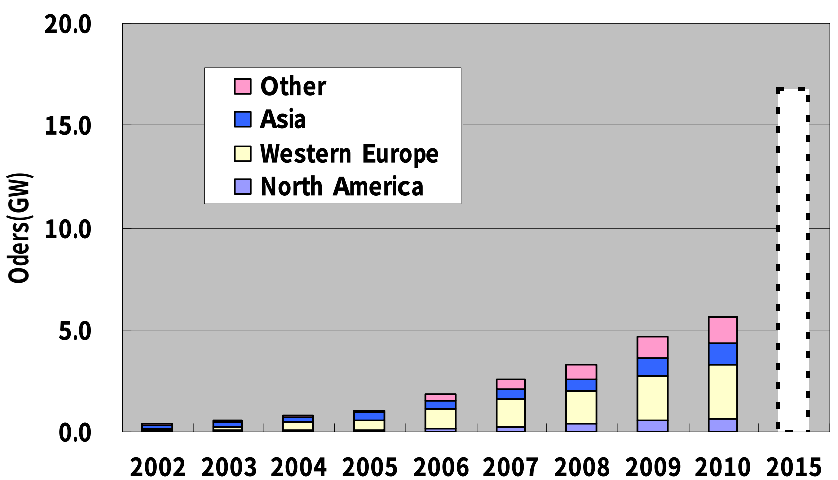
Wind turbines



Large conventional power plant

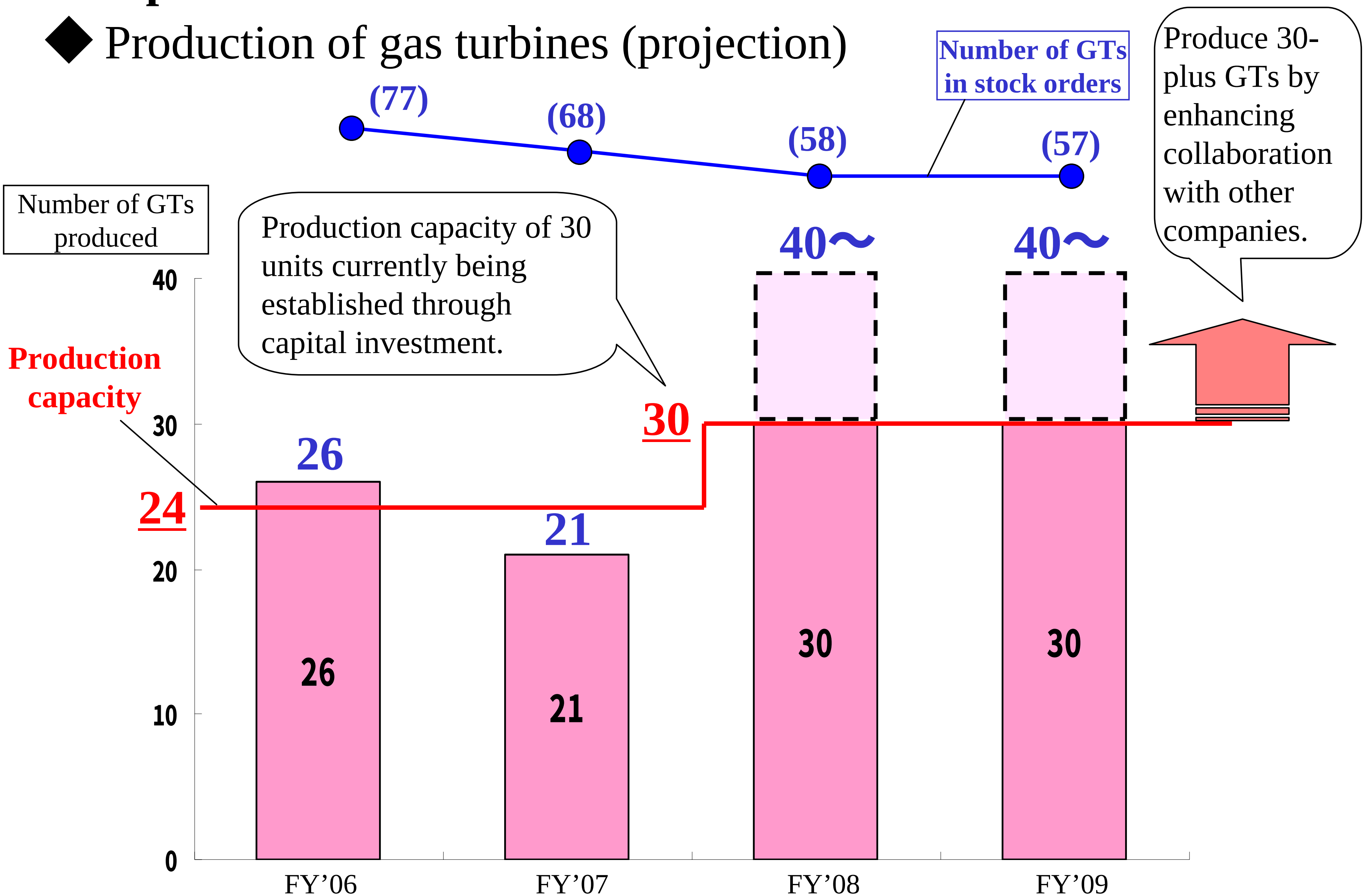


Solar power



8. Expand GTCC Business

◆ Production of gas turbines (projection)



9. Progress in Construction of A New Plant for Production of Gas Turbine Hot Parts (Takasago Machinery Works)

◆ Raise production capacity of hot parts ～ Construct a new plant

Operation to start in March 2007.
Amount of investment: Approx. ¥8bn

Blades plant
(under construction)

Combustor Basket plant
(under construction)

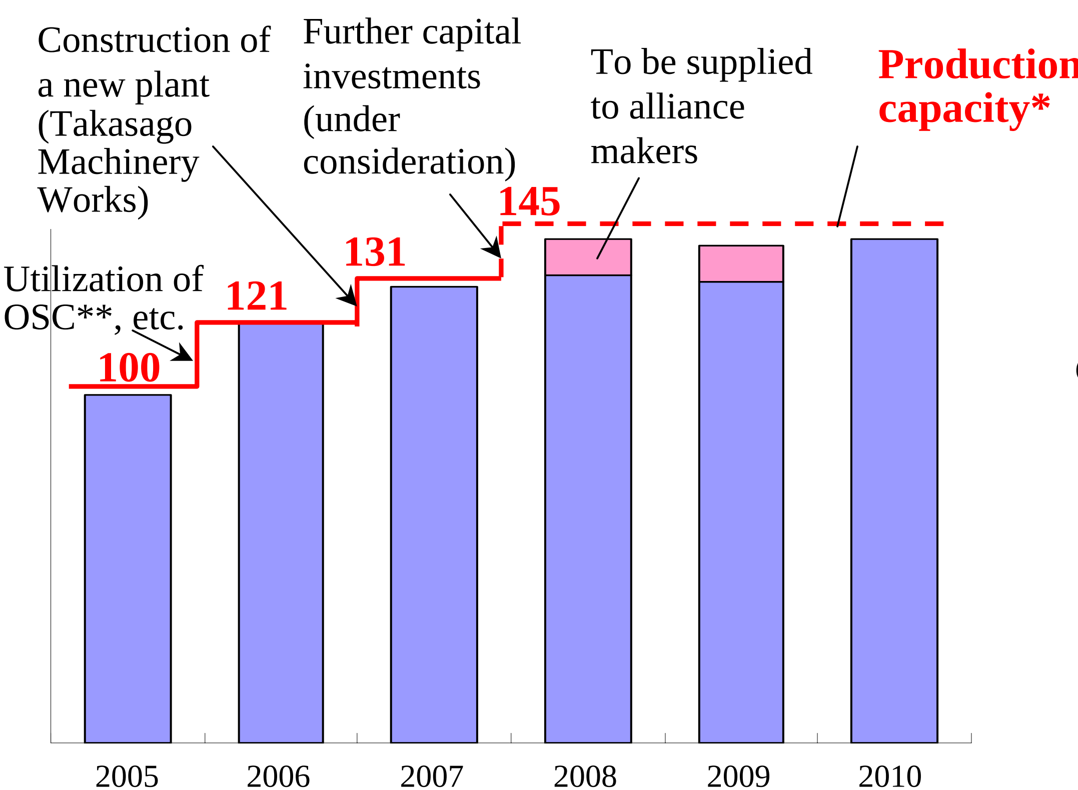
MHI is considering additional investments to respond to future demand in 2008 and thereafter.

10. Expand GTCC Business

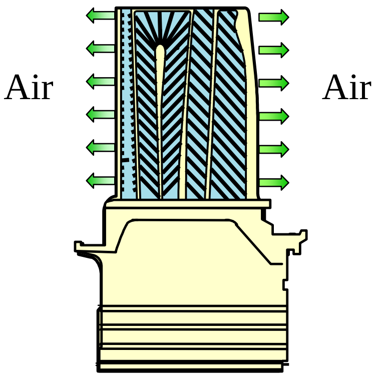
◆ Increase production of hot parts

MHI plans to achieve production increase target set for 2010 ahead of schedule in order to supply hot parts to alliance makers (in numbers besides 30 units produced).

Turbine Blades



Gas Turbine row 1 Blade



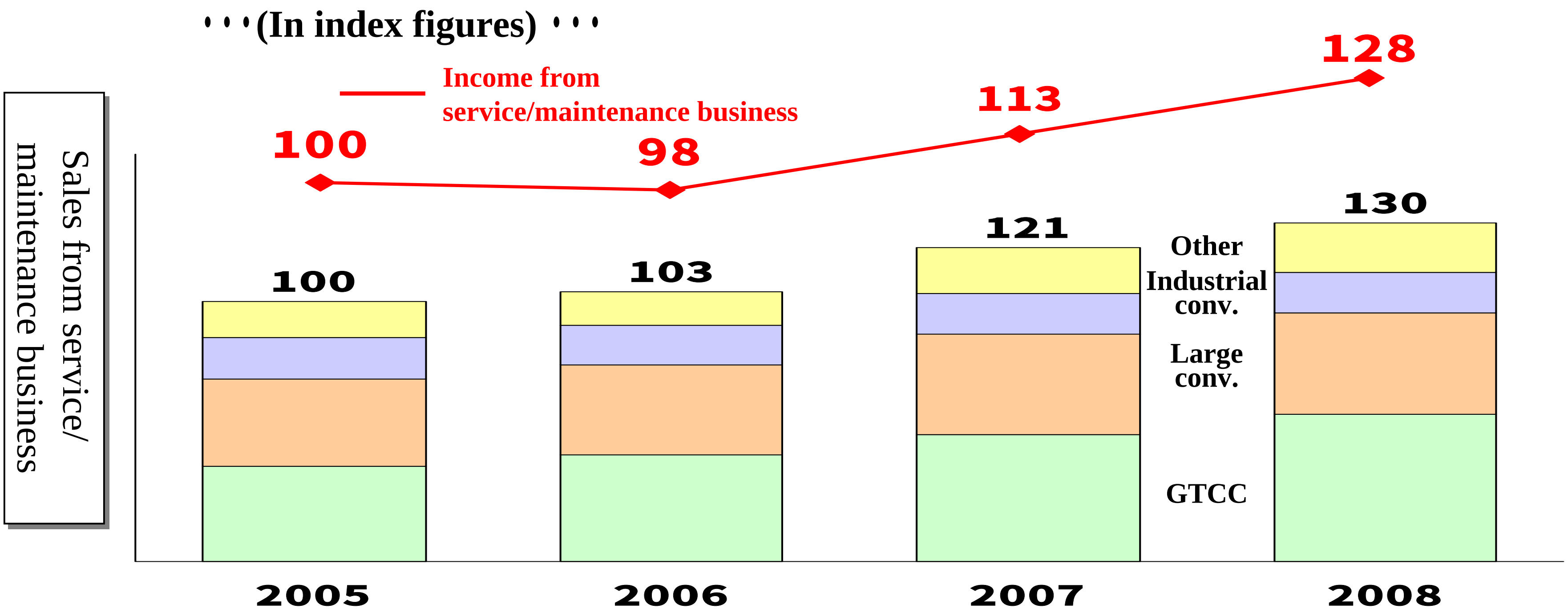
Internal cooling structure

Dry low Nox combustor

* Presented in index figures with production capacity in 2005 as 100.

** **Orlando Service Center** (Service Plant of MPSA)

11. Expand Service/Maintenance Business



Efforts to achieve the ratio of sales from service/maintenance business to total sales of 40% [Achieve higher customer satisfaction]

1. **Expand markets of MHI products; make entries in a wider range of markets of peers' products. Establish a global network to respond to rapidly increasing LTSAs and service/maintenance business that is facing increasing sophistication and intensifying competition.**
   (1) Expand services operations overseas (A service company for BFG-fired GT in China, etc.)
   (2) Collaborate with overseas manufacturers.
   (3) Provide rehabilitation service of peer-made boilers and turbines.

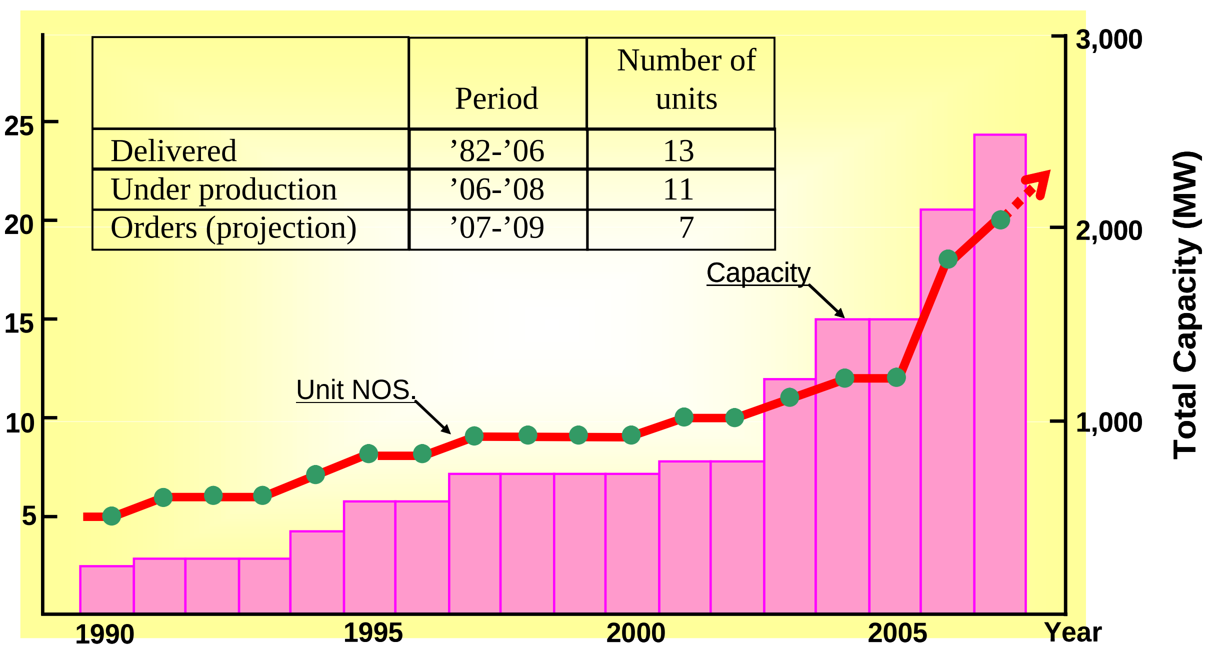
2. **Make entry into O&M market**

12. Expand BFG-fired Gas Turbines Business

- MHI is receiving a growing number of orders by leveraging its unique technology.

MHI maintains almost dominant market share in BFG-fired GTCCs. Going forward, MHI will leverage its unique technological superiority to win more orders from Chinese and other markets.

Order trends for BFG-fired GT



	Period	Number of units
Delivered	’82-’06	13
Under production	’06-’08	11
Orders (projection)	’07-’09	7

World’s largest BFG-fired GTCC (using M701F)

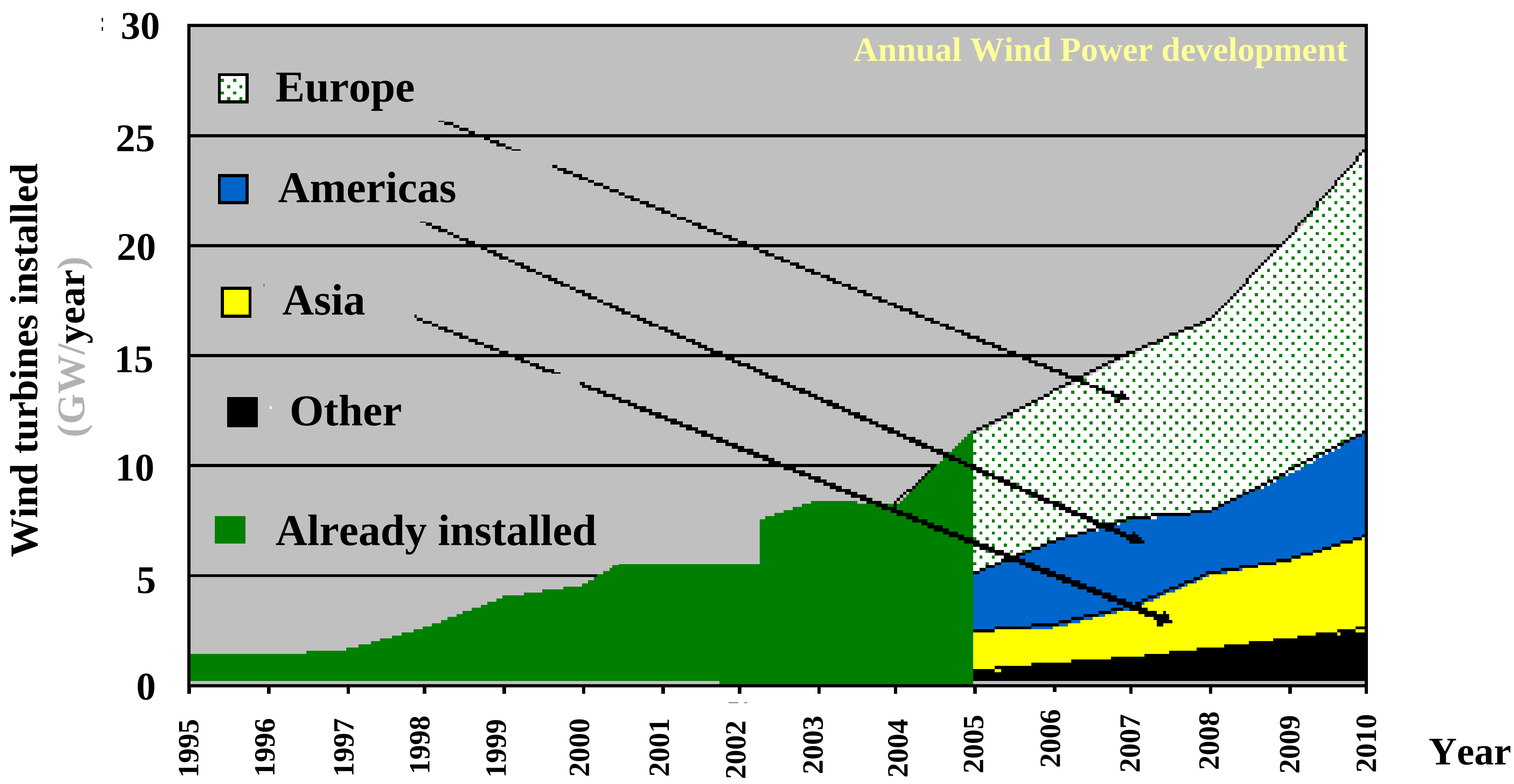
Kimitsu Cooperative Thermal Power Company, Inc. (Operation started in 2004)

Orders received from:

Japan: 8 units
China: 12 units
Eastern Europe, etc.: 4 units
India and Europe : Sales activity under way

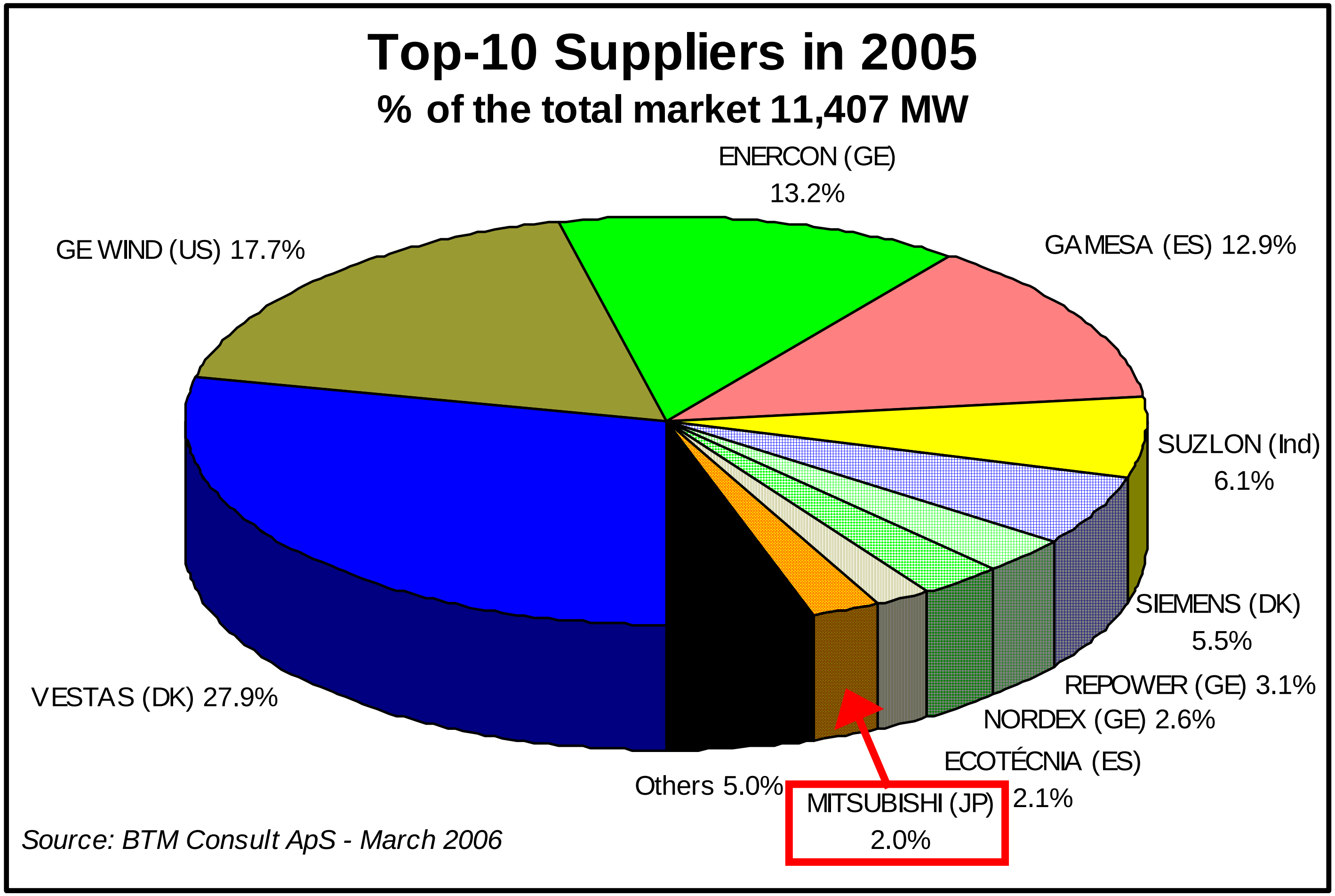
13. Trends in Global Wind Turbines Market

- **Global market is expected to continue expansion (11GW in 2005, 25GW in 2010, and 40GW in 2015).**
- **Currently, Europe accounts for approx 73% of the global market. North American and Asian (China and India) markets are expected to expand sharply.**



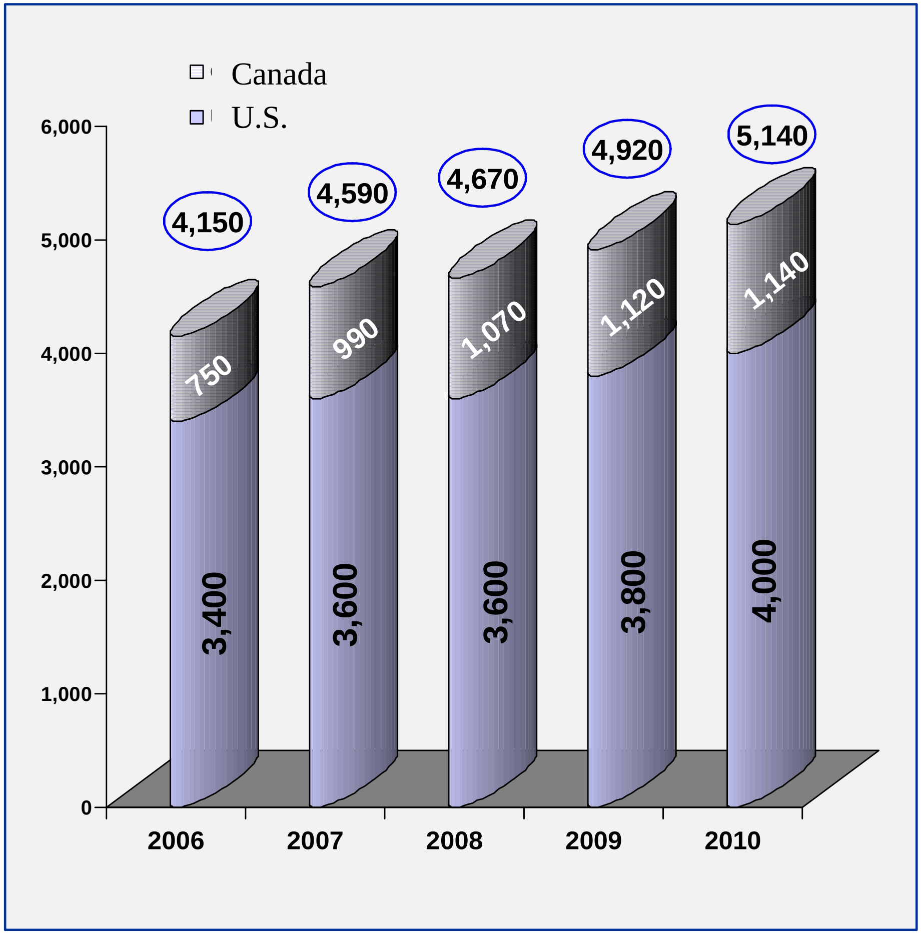
14. Market Share of Mitsubishi Wind Turbines

- **In 2002, MHI launched MWT-1000A on the market. In 2005, MHI accounted for 2.0% (233MW/ranked 10th) in terms of global market share (7% and 3rd in the U.S., 57% and top market share in Japan).**

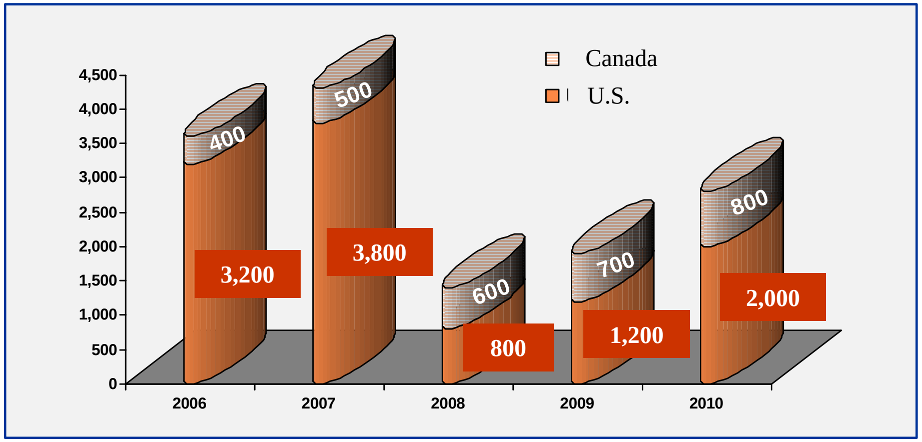


15. Growth of North American Wind Turbines Market

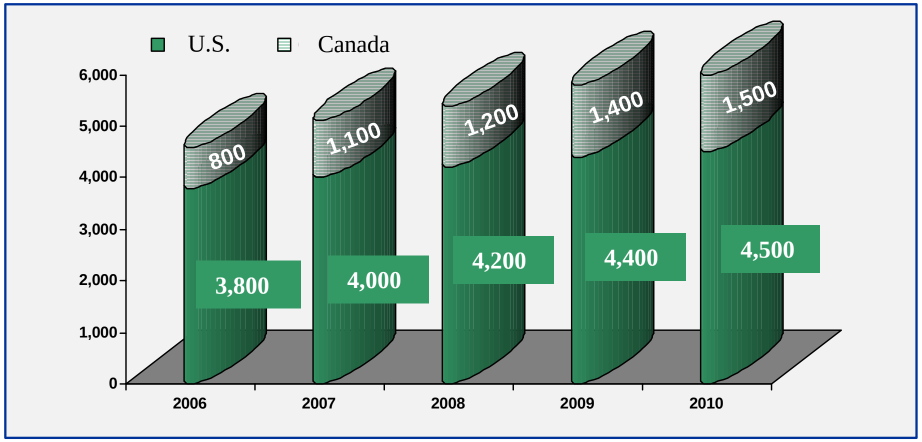
Annual increase in MW – Basic scenario (2006〜2010)



Annual increase in MW – Low growth scenario (2006〜2010)



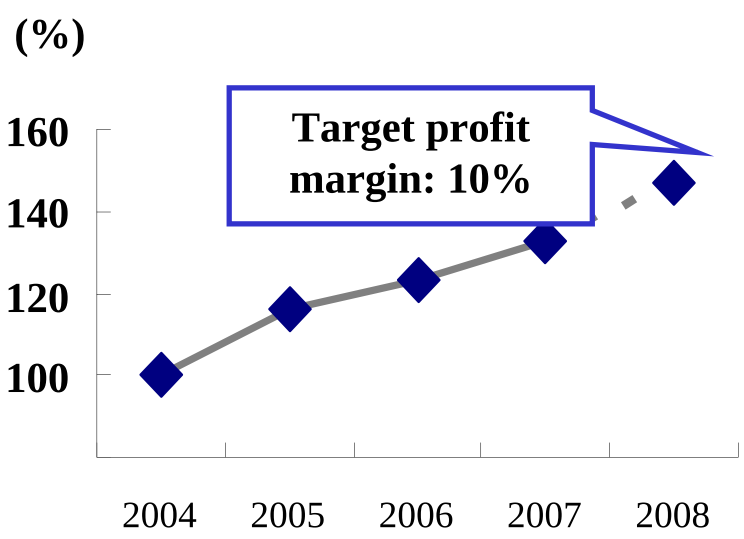
Annual increase in MW – High growth scenario



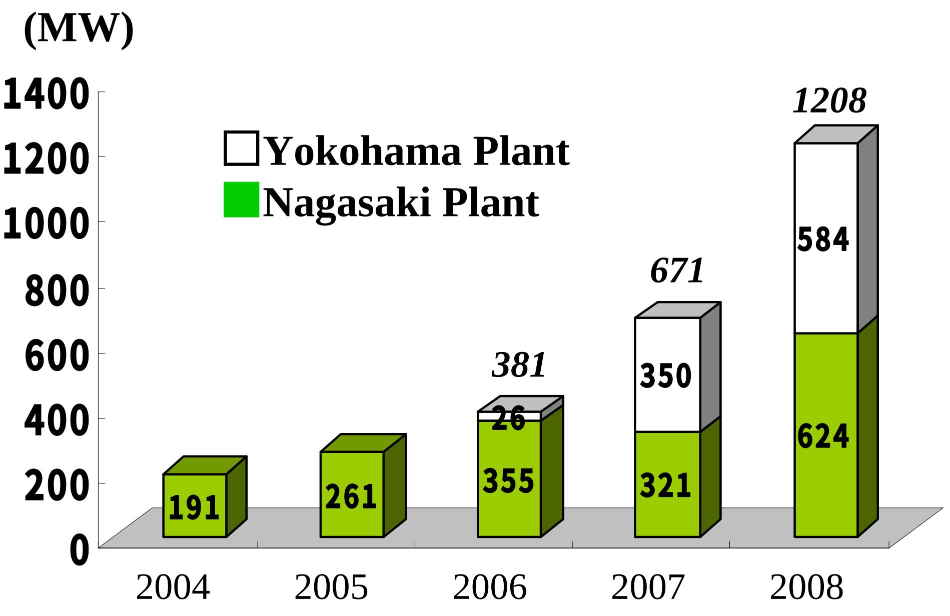
16. Trends in Market Prices of Wind Turbines and Production Plans for Mitsubishi Wind Turbines

- **Market prices of wind turbines started to rise in 2004. Currently, the market is the "seller's market" to the levels unseen before.**
- **MHI will expand production bases for Mitsubishi wind turbines to increase production to over 1000MW in 2008.**

Trends in prices of wind turbines
(Price per output (kW) with the figure in 2004 as 100)



Production plans for Mitsubishi wind turbines (MW)



17. Plans to Expand Wind Turbines Plants

(Production of nacelles at Nagasaki Plant)

- **Dedicate the Nagasaki Plant, the main wind turbines plant, to production of 2.4MW models and increase production capacity from:**

  480MW → 650MW +

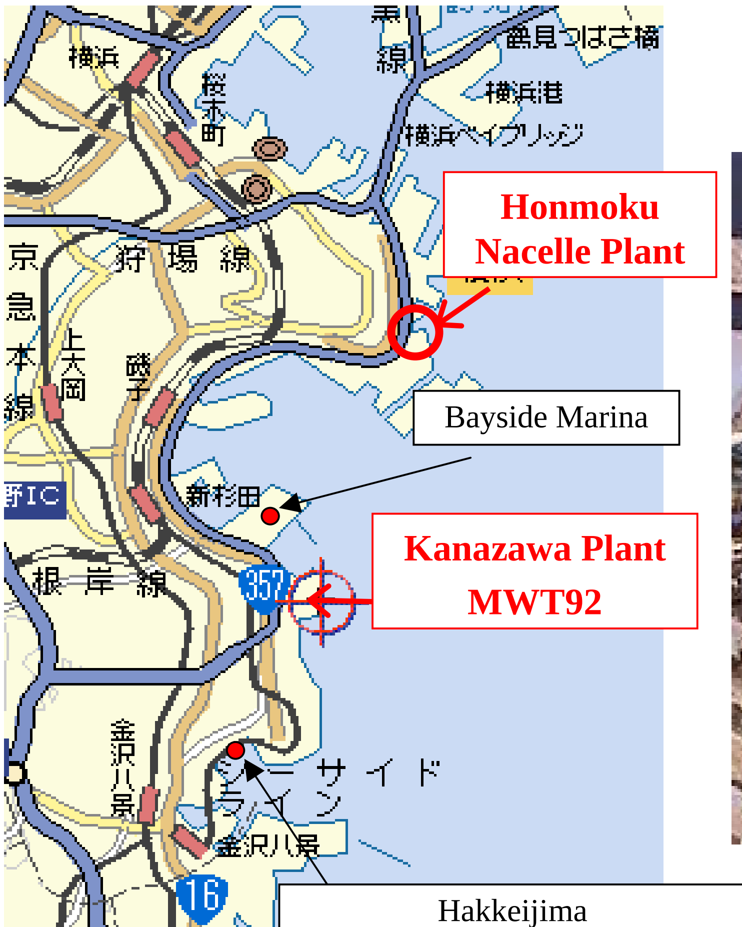
Nacelle production line

Nagasaki Plant

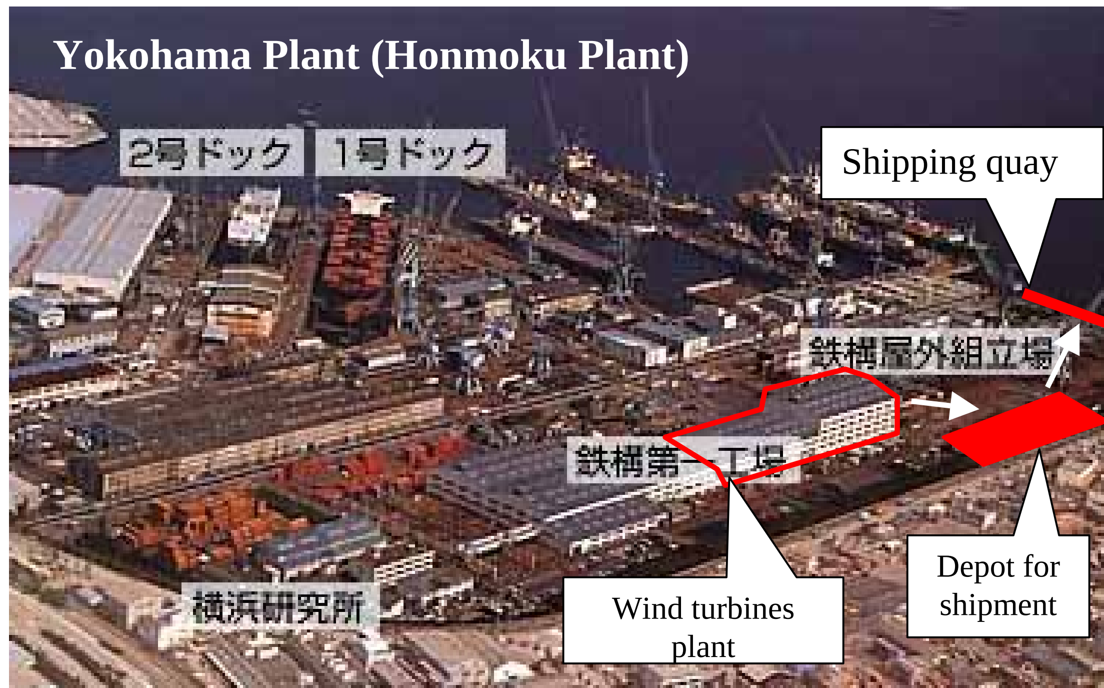
Rotor head production line

18. Production of Nacelles at Yokohama Plant (Honmoku Plant)

- Leverage a large space at Yokohama Plant (production facilities for steel structures and bridges at Honmoku Plant to be converted) and port facilities.
- Start production in October to produce nacelles at two plants (in Yokohama and Nagasaki).
- Start establishing a supply chain in the Kanto area following the completion of a new nacelle production plant.



- Secure production capacity at Yokohama Plant as high (650MW) as at Nagasaki Plant.



19. Production of Nacelles at Yokohama Dockyard & Machinery Works (Honmoku Plant)

Yokohama Plant (in Honmoku)

20. Expansion of Blade Production Plant（VIENTEK）

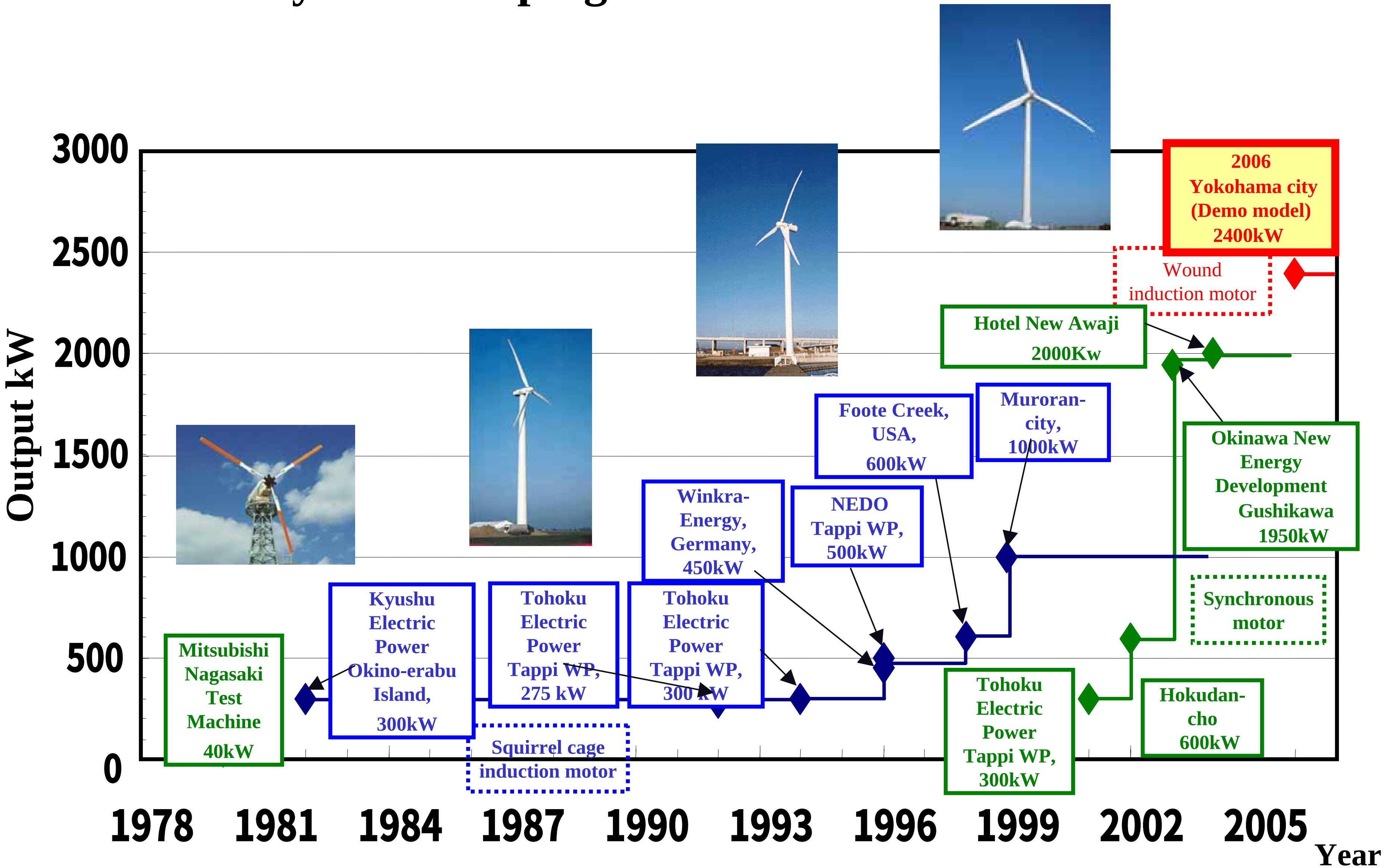
- Capacity expansion at the Mexico plant (VIENTEK) to increase production of wind turbine blades for 2.4MW machines marketed in the core U.S. market.
  （Capacity expansion at the Nagasaki Plant to increase production of wind turbine blades for the Japanese market.)

Blade production capacity: up from current 400MW to 1200MW+.

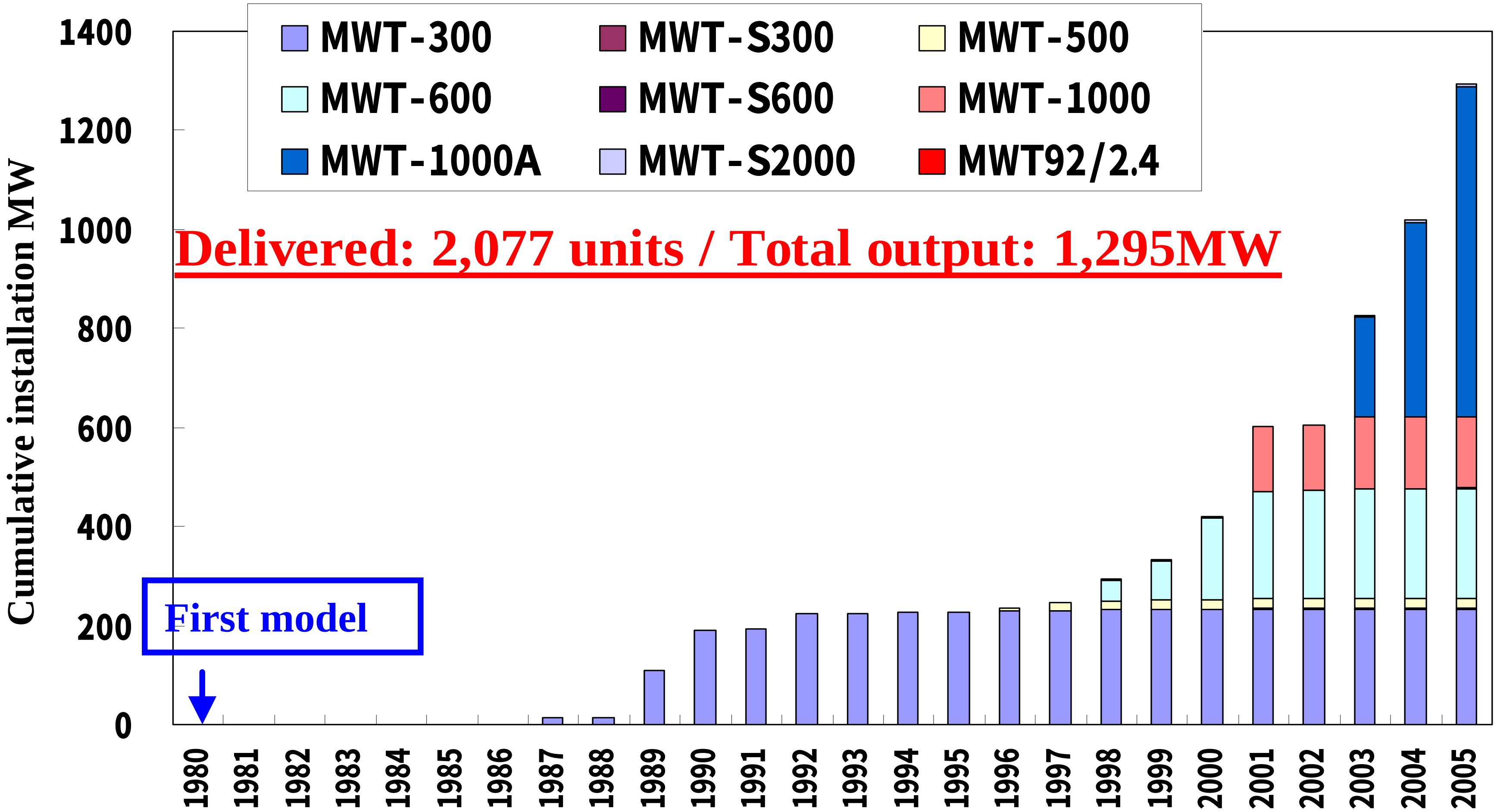

VIENTEK plant: blade shipment

Blade production line

21-1. History of Developing Mitsubishi Wind Turbines



21-2. Delivery of Mitsubishi Wind Turbines



As of End/FY2005
(Operation started as of March 2006)

22. Mitsubishi Wind Turbines - Outline

MWT62/1.0

MWT92/2.4, MWT95/2.4

Operation	**Market launch in 2003**	**Market launch in 2008**
Rated Output	1000 kW	2400 kW
Rotor Diameter	61.4 meters	92/95 meters
Hub Height	69/60 meters	70/80 meters
Power Regulation: Full Span Pitch Control		
Wind Class : IEC Class IIA		

23. Yokohama 2.4 MW Demo Model

Rated Output: 2.4MW
Rotor Diameter: 92m
IEC Class IIA

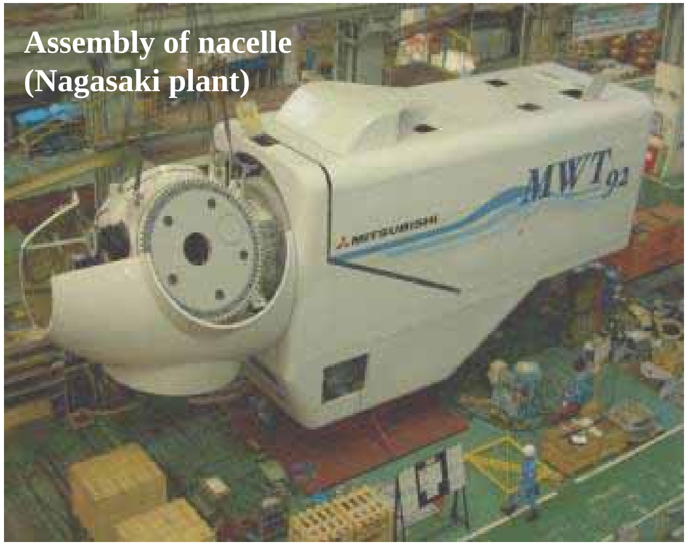
- **Performing a thorough examination of performance and reliability by using a demo model of large-sized wind turbine at the Yokohama Plant (in Kanazawa)**

Test: lightening damage to wind turbine blade (demo model; Apr 2, 2006). 63 coulomb measured. No problem detected.

New Model (MWT92/2.4)

Demo model (full view)

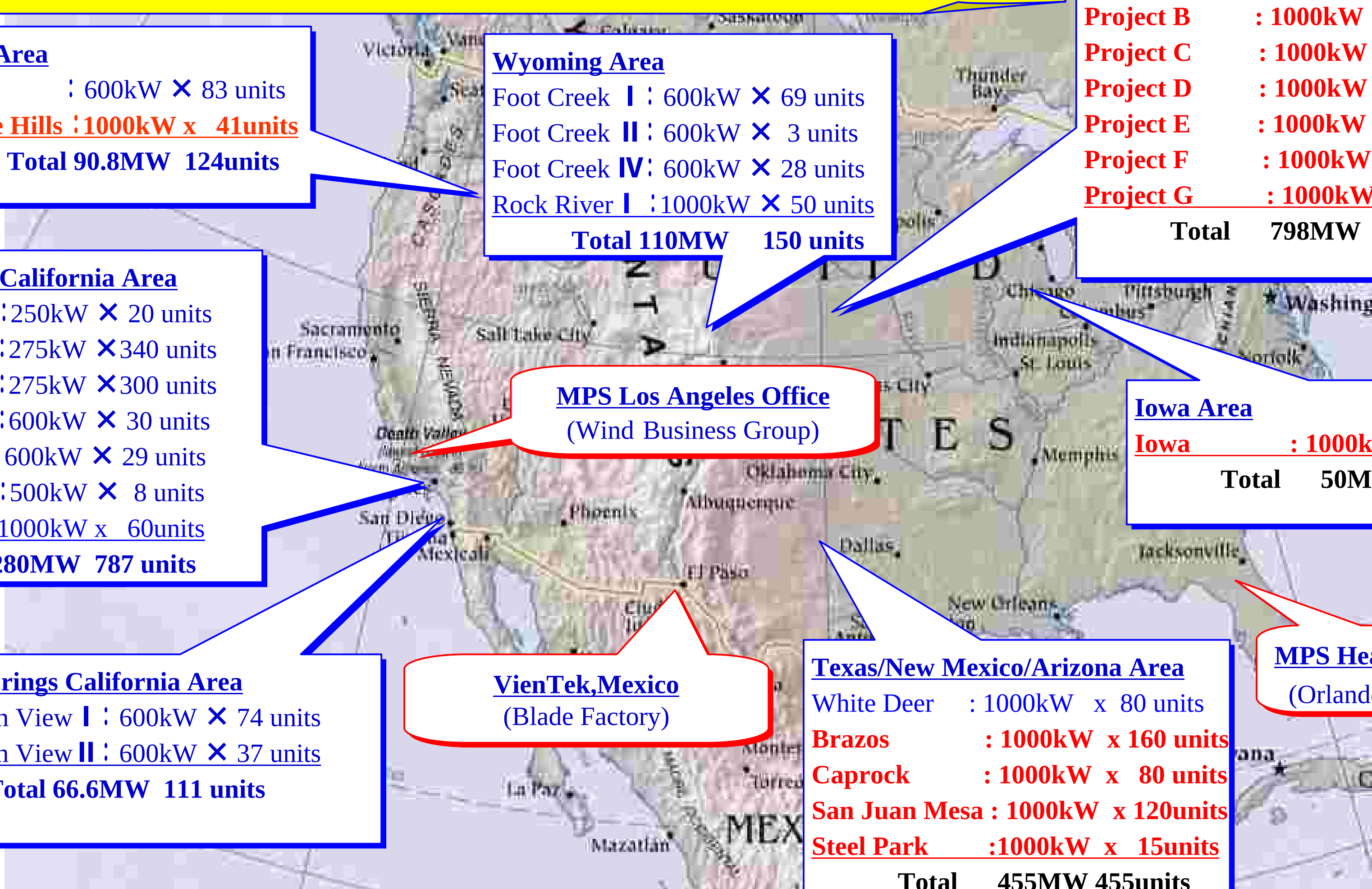
Demo model (Nacelle, rotor head)



Assembly of nacelle (Nagasaki plant)

24. Mitsubishi Wind Turbines in the U.S.

Total 1,850MW 2,475 units (sales as of may 2006)



Oregon Area
Condon ： 600kW ✕ 83 units
Combine Hills ：1000kW x 41units
Total 90.8MW 124units

Wyoming Area
Foot Creek Ⅰ： 600kW ✕ 69 units
Foot Creek Ⅱ： 600kW ✕ 3 units
Foot Creek Ⅳ： 600kW ✕ 28 units
Rock River Ⅰ ：1000kW ✕ 50 units
Total 110MW 150 units

Undisclosed
Project A : 1000kW x 38 units
Project B : 1000kW x 90 units
Project C : 1000kW x 45 units
Project D : 1000kW x 135units
Project E : 1000kW x 160units
Project F : 1000kW x 250units
Project G : 1000kW x 80units
Total 798MW 798units

Tehachiapi California Area
Toyowest Ⅰ ：250kW ✕ 20 units
Mojave'89 ：275kW ✕340 units
Mojave'90 ：275kW ✕300 units
Mojave'99 ：600kW ✕ 30 units
Morwind ：600kW ✕ 29 units
Mogul ：500kW ✕ 8 units
OASIS :1000kW x 60units
Total 280MW 787 units

MPS Los Angeles Office
(Wind Business Group)

Iowa Area
Iowa : 1000kW x 50 units
Total 50MW 50units

Palm Springs California Area
Mountain View Ⅰ ： 600kW ✕ 74 units
Mountain View Ⅱ： 600kW ✕ 37 units
Total 66.6MW 111 units

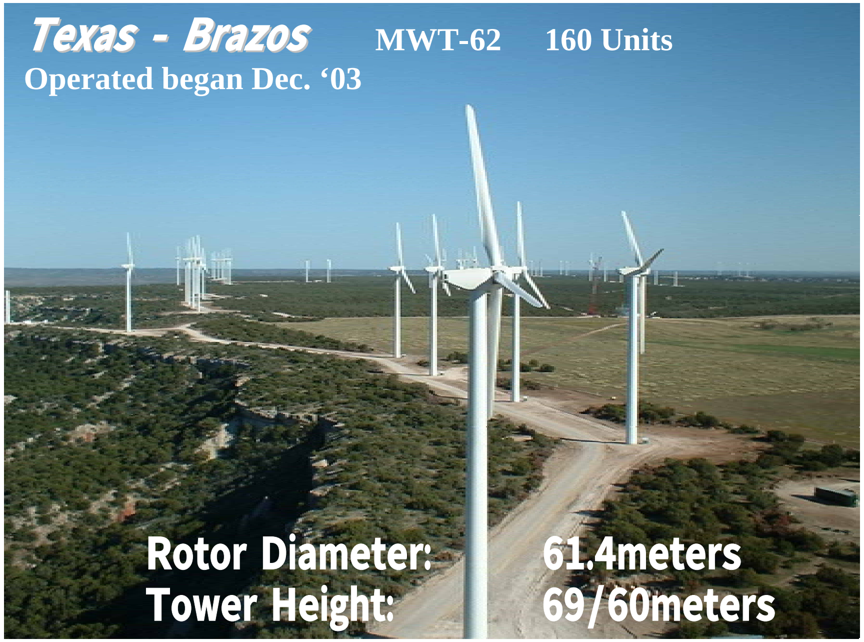
VienTek,Mexico
(Blade Factory)

Texas/New Mexico/Arizona Area
White Deer : 1000kW x 80 units
Brazos : 1000kW x 160 units
Caprock : 1000kW x 80 units
San Juan Mesa : 1000kW x 120units
Steel Park :1000kW x 15units
Total 455MW 455units

MPS HeadQuarter
(Orlando,Florida)

Red color: MWT62/1.0

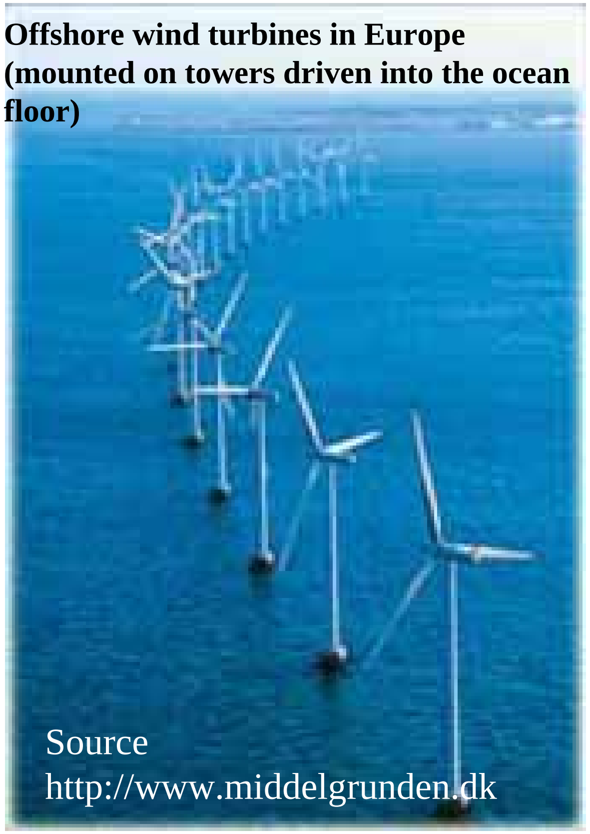
25. Mitsubishi Wind Turbines in the U.S.



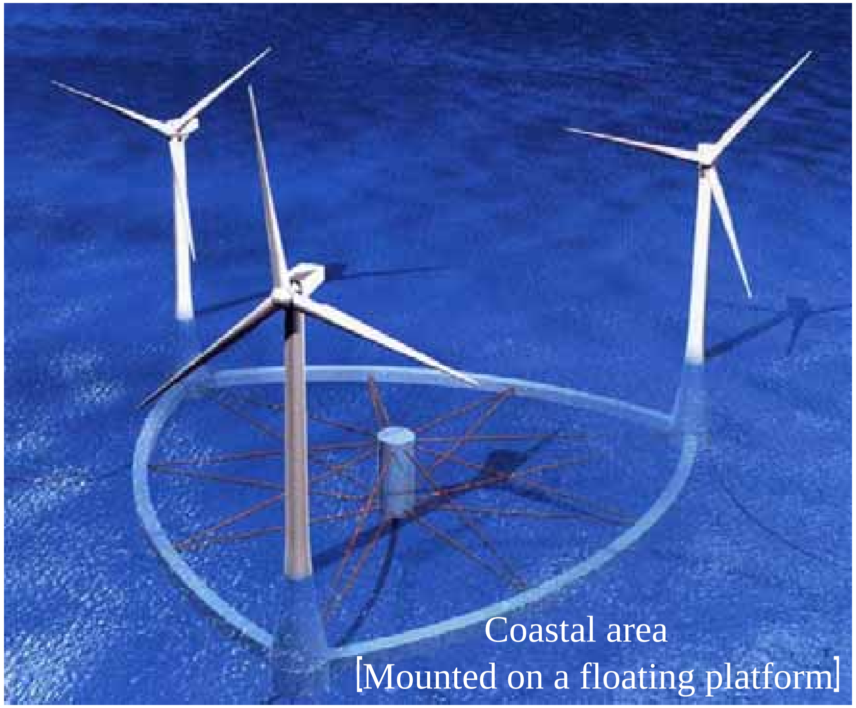
26. Development of Offshore Wind Turbines

- **Installation of offshore wind turbines is expected to grow to take advantage of favorable wind conditions. Fundamental technologies are under development in Japan and abroad.**
- **MHI is the only group in the world that engages in both the wind turbine and shipbuilding (marine structure) businesses. MHI will leverage its overall technological capabilities to deliver world-class offshore wind turbines.**

Offshore wind turbines in Europe (mounted on towers driven into the ocean floor)

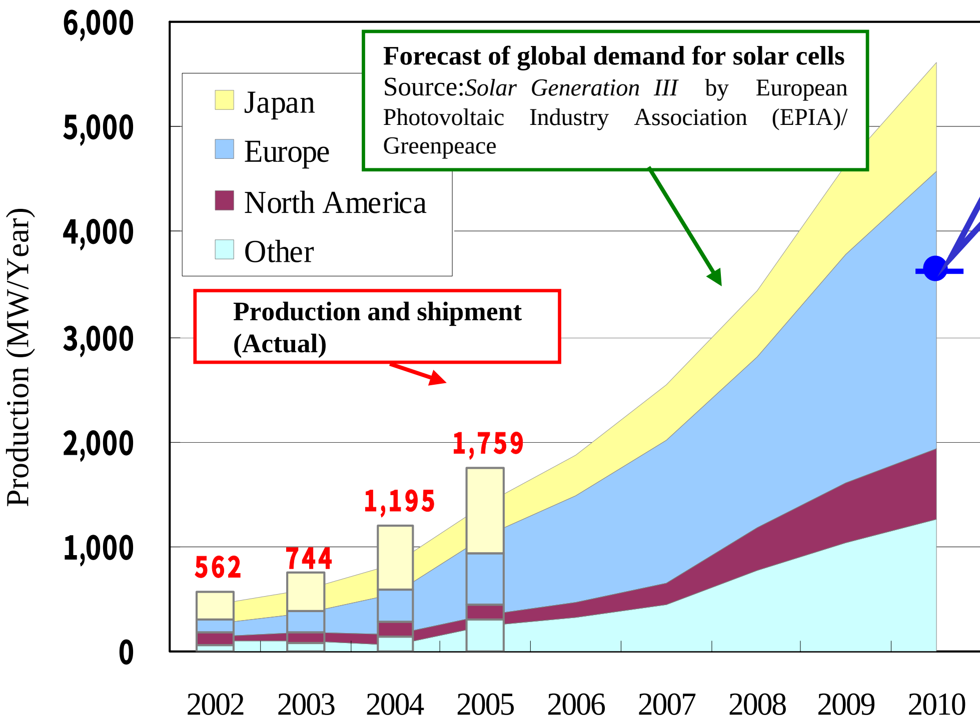


Example of offshore wind turbines mounted on a floating platform (Tokyo University)



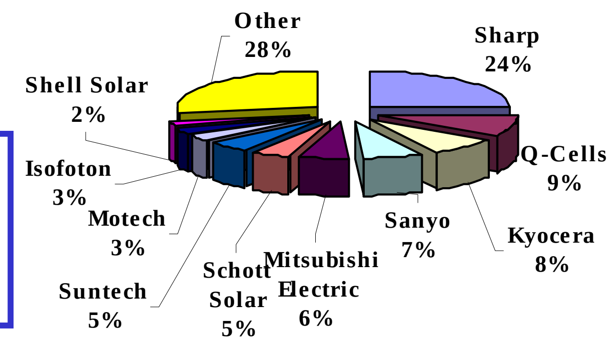
27. Solar Cells - Business Environment

Global market

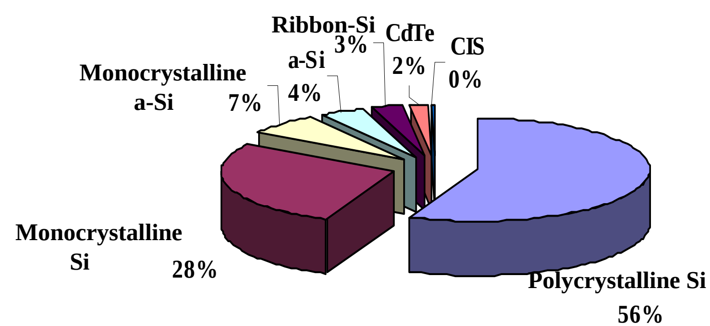


Projection as of Dec 31, 2005

Market share by manufacturer



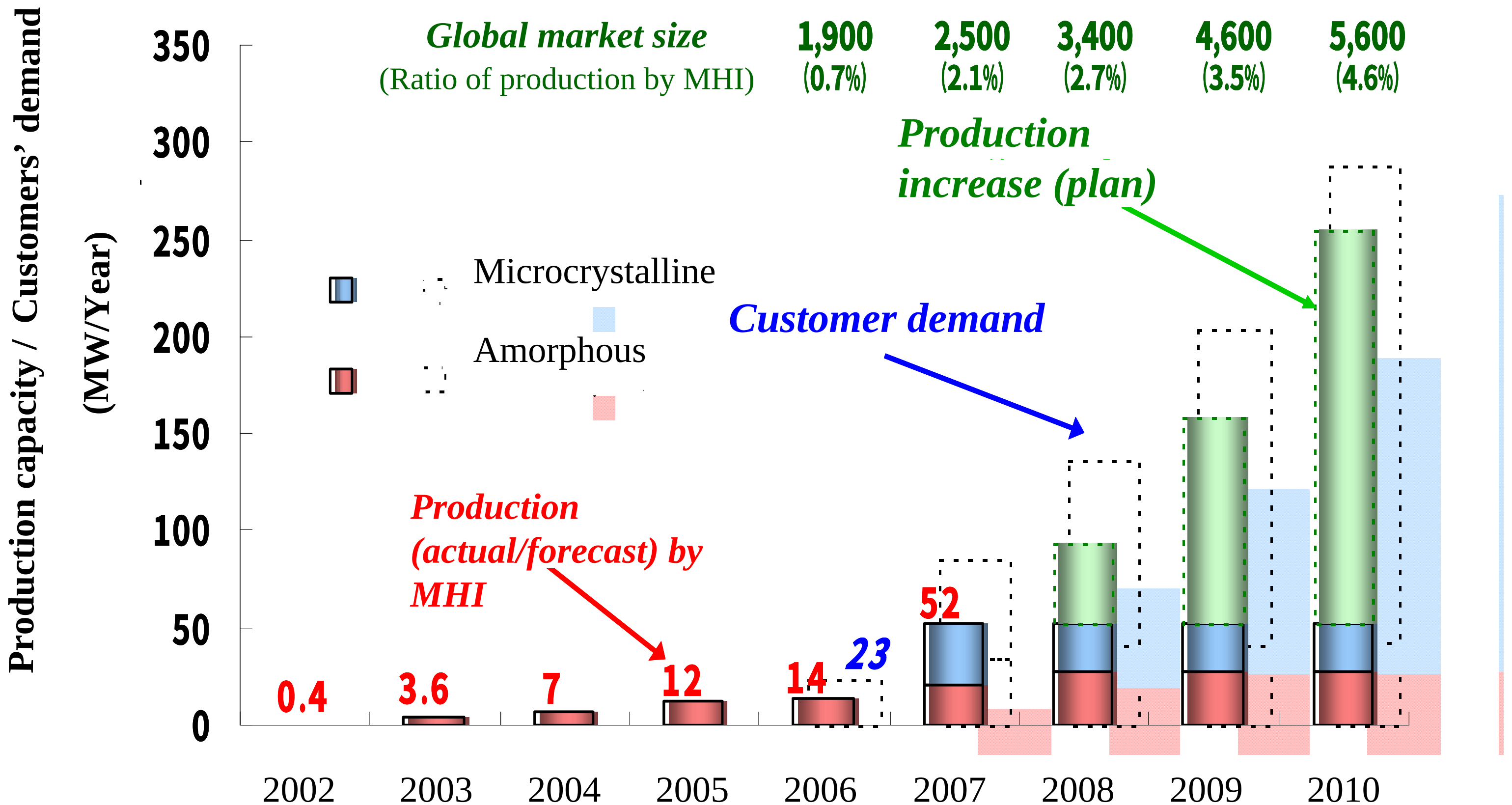
Market share by type



As of 2005, MHI ranked 20th in the global solar cell market. MHI will increase production to join the world's top 5 companies by 2010 as a leading thin-film solar cell maker.

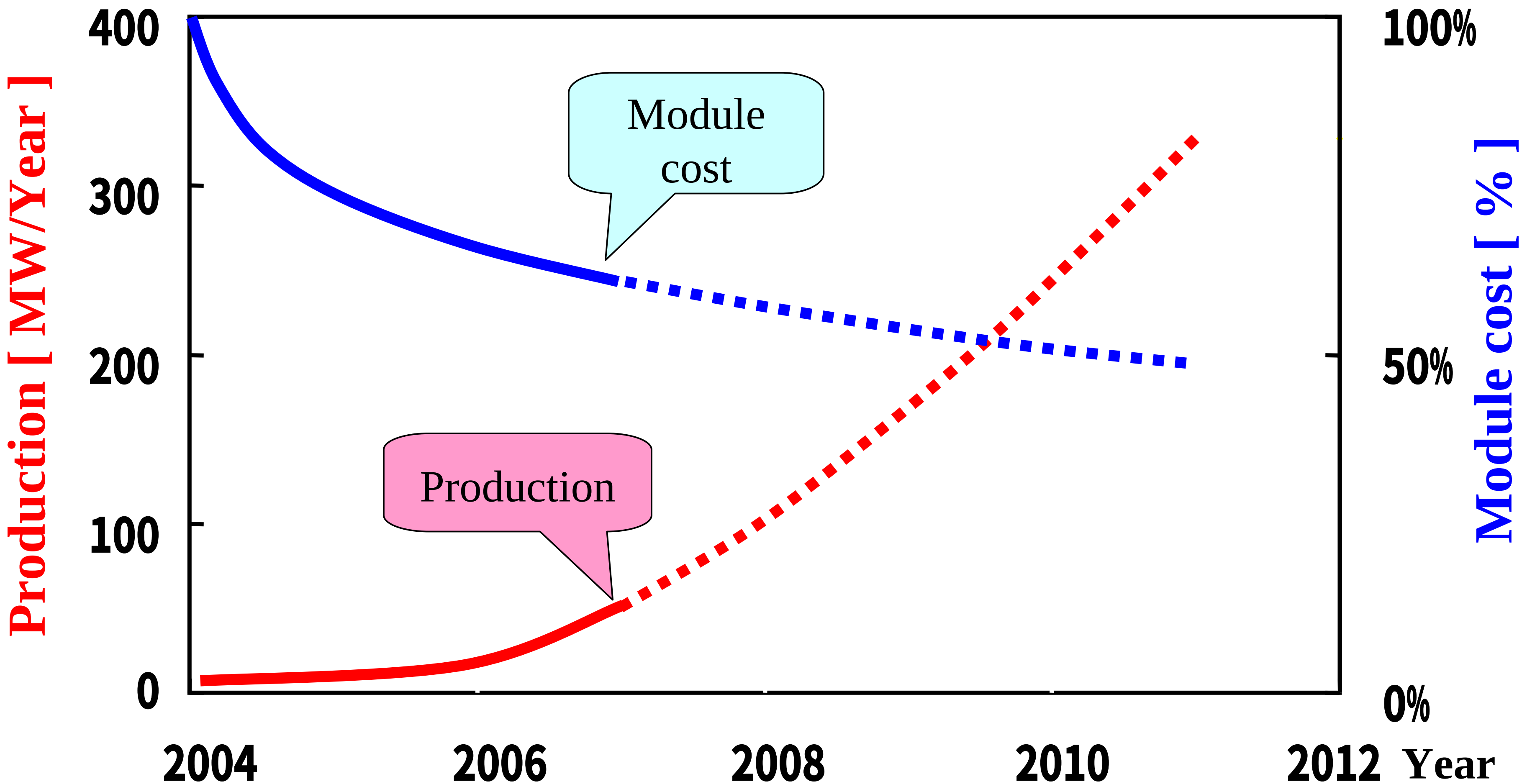
28. MHI's Production Capacity and Sales Outlook

Volumes of purchase by existing MHI customers are expected to increase sharply. These customers have requested MHI to increase supply volumes rapidly and significantly.

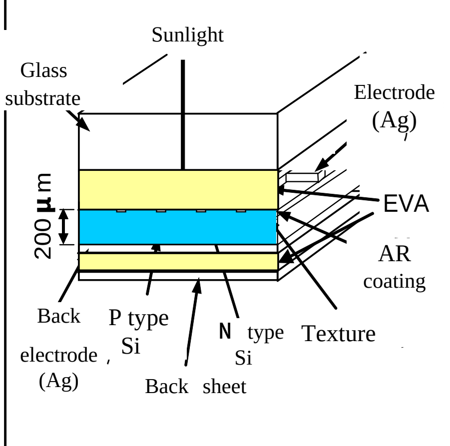
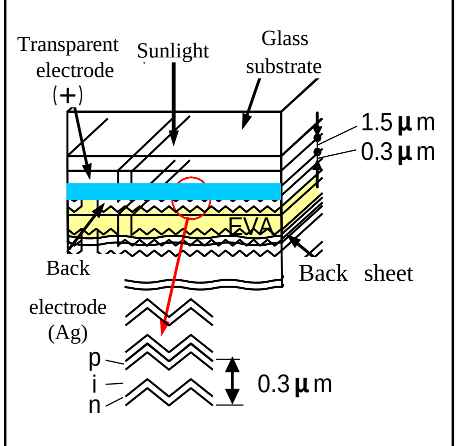
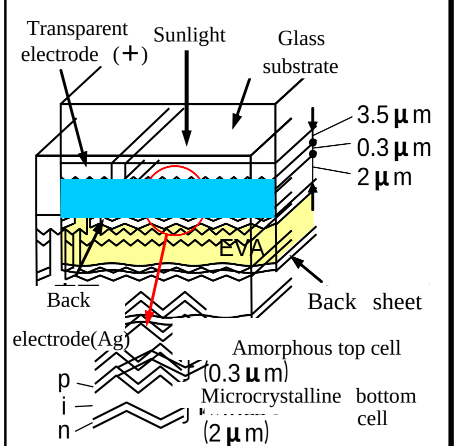


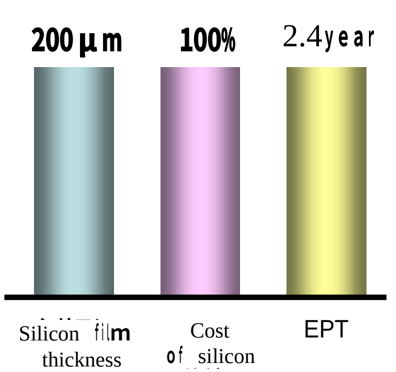
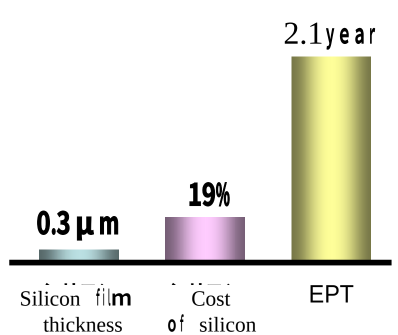
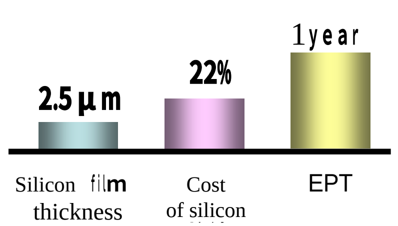
29. Trends in Production and Cost

Module cost is expected to decrease sharply as production increases.



30. Comparison of Solar Cells

<table>
<tr><th></th><th>Crystalline</th><th>Amorphous</th><th>Tandem</th></tr>
<tr><td>Cross Section</td><td>
</td><td>
</td><td>
</td></tr>
<tr><td>Cost ratio</td><td>100%</td><td>90%</td><td>80%</td></tr>
<tr><td>Cell efficiency</td><td>14～17%</td><td>7～8%</td><td>11～12%</td></tr>
<tr><td>Annual Power Generation
(Thermal Coefficient)</td><td>100%
(-0.4%/℃)</td><td>110%
(-0.2%/℃)</td><td>105%
(-0.3%/℃)</td></tr>
<tr><td>Volume of silicon & Cost

$\mathrm{EPT} = \dfrac{\text{Energy}}{\text{Annual Power Generation}}$</td><td>
</td><td>
</td><td>
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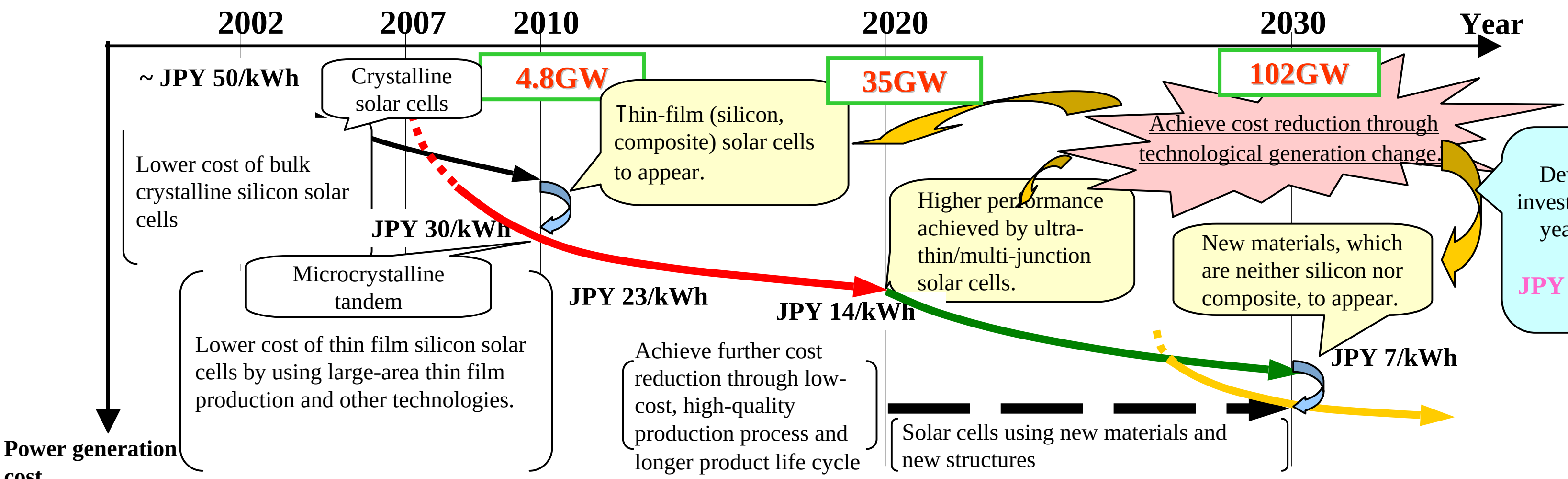
31. Road Map on Solar Cells for NEDO

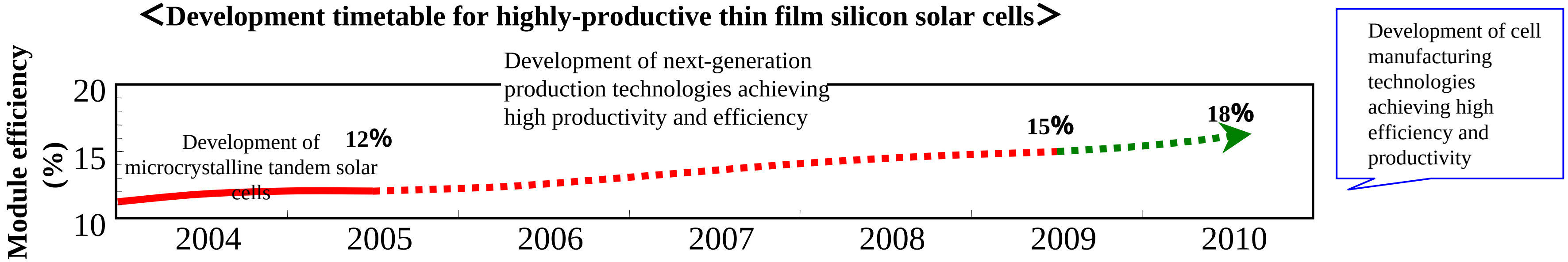
Microcrystalline tandem solar cells to replace crystalline solar cells

Lowering system prices is key to diffusion of solar cells. Accordingly, mass production of solar cells using thin-film silicon technology or composites is attracting attention as a substitute for crystalline solar cells. In particular, MHI’s proprietary technologies (for production of high-speed, large-area films) are highly valued by NEDO and peers.



Source：NEDO "PV Roadmap 2030 (PV2030)"

<Development timetable for highly-productive thin film silicon solar cells>



32. Rendering of the New Plant

A new plant for production of microcrystalline tandem solar modules with annual production of approx. 40MW to be constructed adjacent to the amorphous solar cell production plant (capex: approx. ¥10bn).

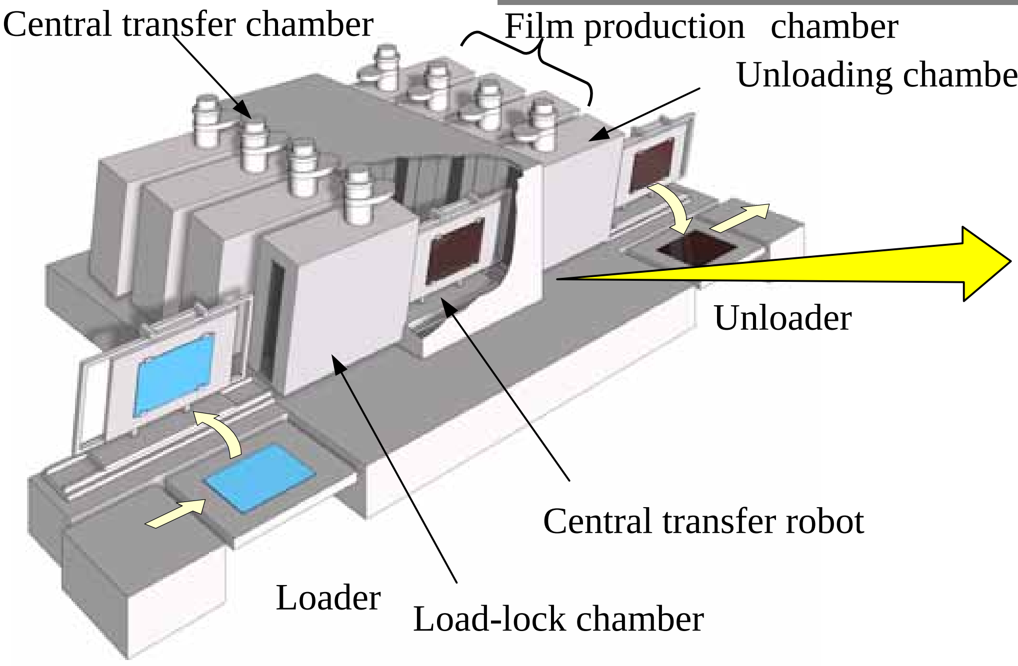
New products to be launched in April 2007.

Rendering of the new plant for production of microcrystalline tandem solar modules (steel framed, two-story building with dimension of 150m(W)x50m(D)x15m(H))

33. Production Facility for Microcrystalline Tandem Solar Cells

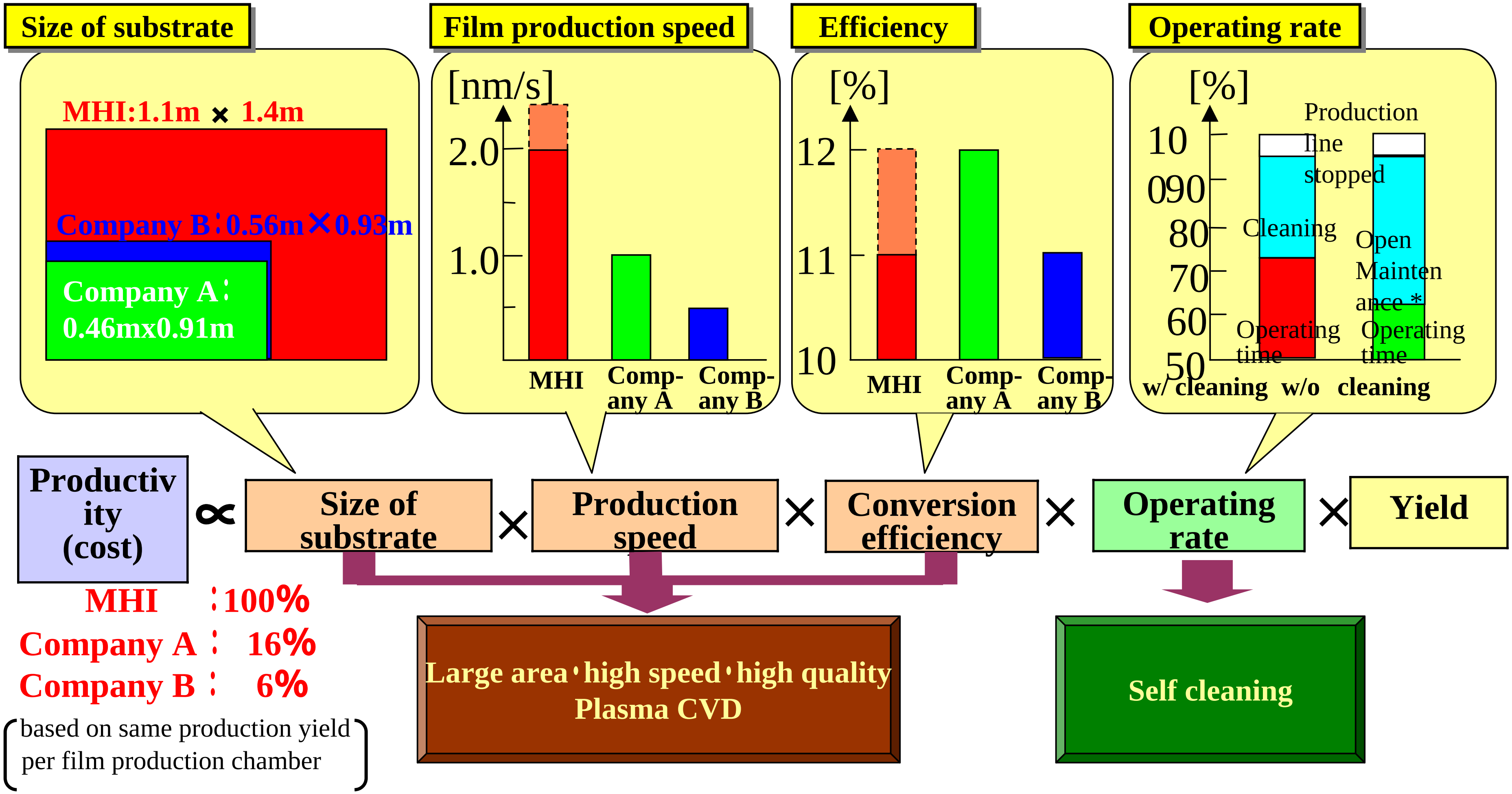
The plasma CVD production line, the central part of a microcrystalline tandem solar cell production facility, has an efficient and compact structure based on MHI's expertise in amorphous solar cells.

Production facility for microcrystalline tandem solar cells (Full view)



Plasma CVD production line

34. Technologies Differentiating MHI from Peers in Production of Thin-film Si Solar Cells



➢Peers: Placing too much focus on efficiency improvement (system development entrusted to equipment makers)

➢MHI: As an equipment maker, MHI works to improve the full scope of technologies for cost reduction. (MHI's proprietary technology)

35. Large Scale Solar Power Generation System

<Facilities outline>

- Name of plant：Buttenwiesen PV Plant ,Germany
- Output：1,000kWp
- Number of panels： 10,000 (amorphous solar modules modules made by MHI)

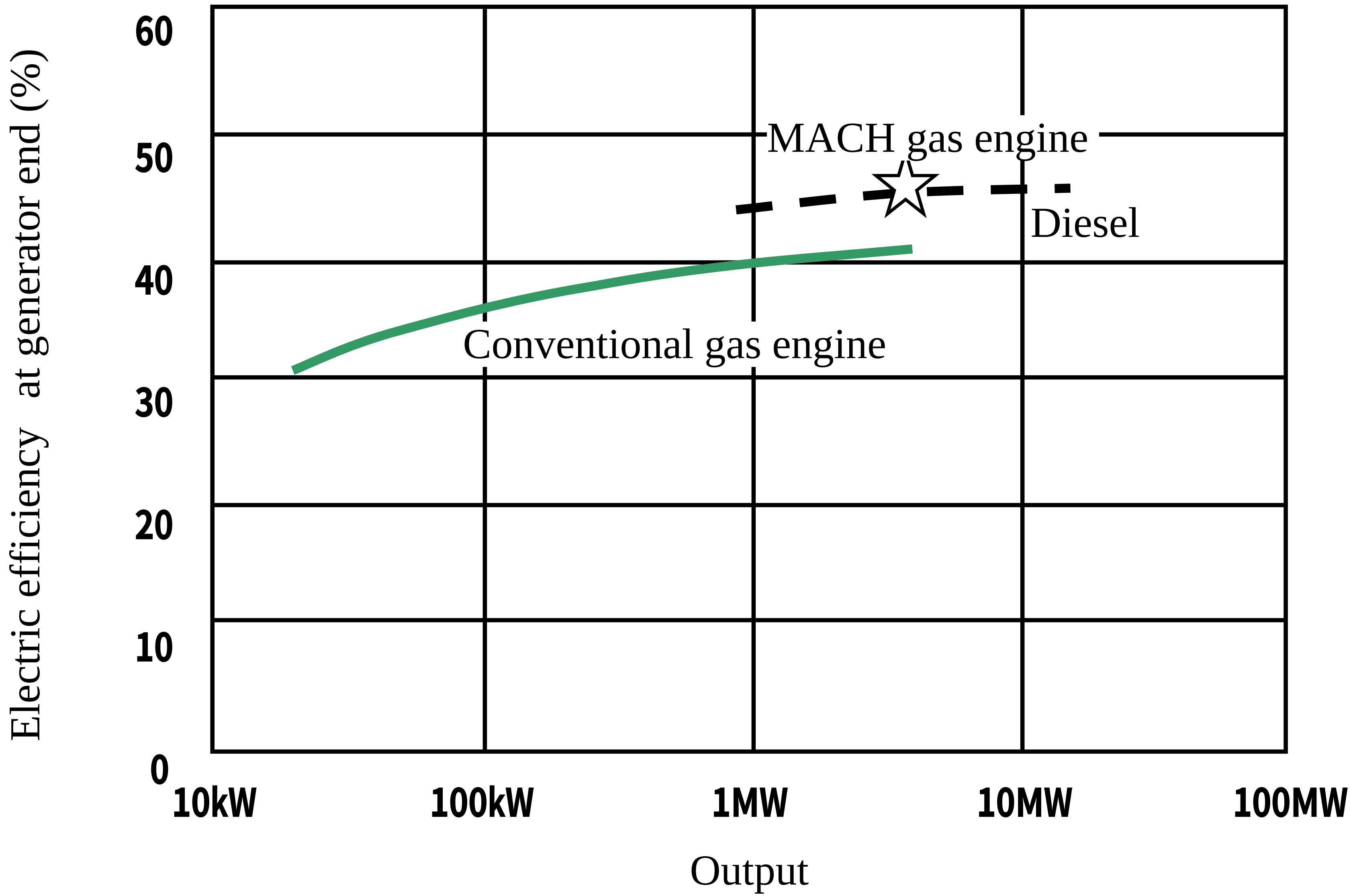
36. Characteristics of MACH-30G

・Achieved world's highest level electric efficiency and low NOx levels.
・High reliability (developed based on the KU30 series (over 400 units were ordered))
・Seamless customer support package (from planning maintenance and after service)

MACH-30G Main specifications /50Hz (in brackets：60Hz)

		8MACH-30G	12MACH-30G	14MACH-30G	16MACH-30G	18MACH-30G
Number of cylinders		8	12	14	16	18
Cylinder bore ×piston stroke	mm	300×380				
Number of revolutions	min^{-1}	750(720)				
Rated output (at power generation end)	kW	2,550 (2,450)	3,800 (3,650)	4,450 (4,250)	5,100 (4,900)	5,750 (5,500)
NOx	ppm	200 or less：converted to O2=0%				

37. Efficiency of MACH-30G



38. MACH-30G - Awards and Market Share

Agency for Natural Resources and Energy (ANRE) Director-General's Prize of Japan (2002)

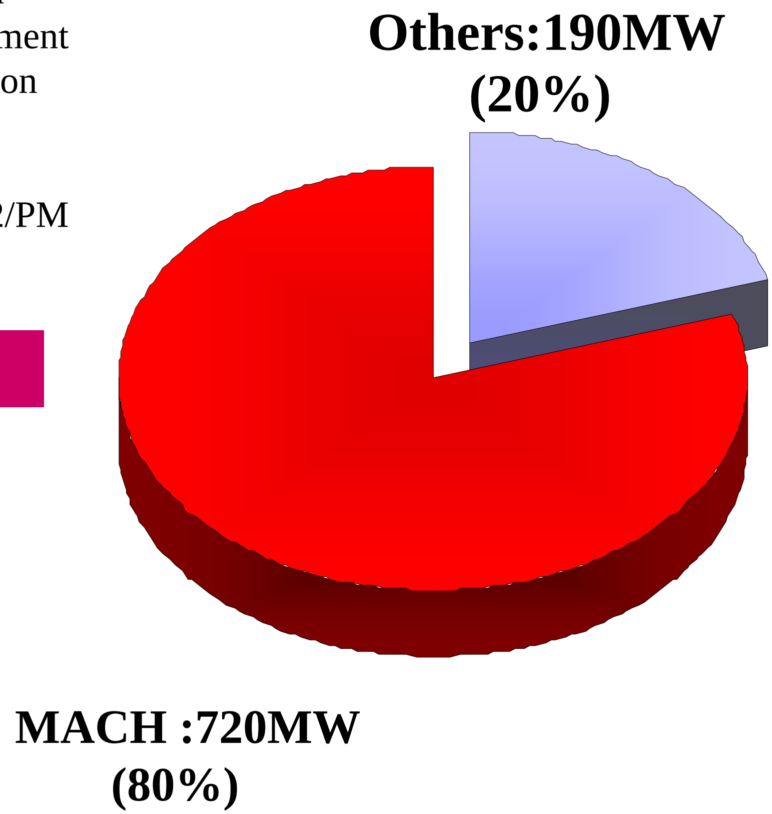
MACH-30G was awarded in the 23rd Energy Saving Machinery and Equipment Awards in the field of power generation engines for its high performance including significant improvement in efficiency and reduction in NOx/CO2/PM (Particulate matter) and other pollutants.

JGA's Technical Award (2003)

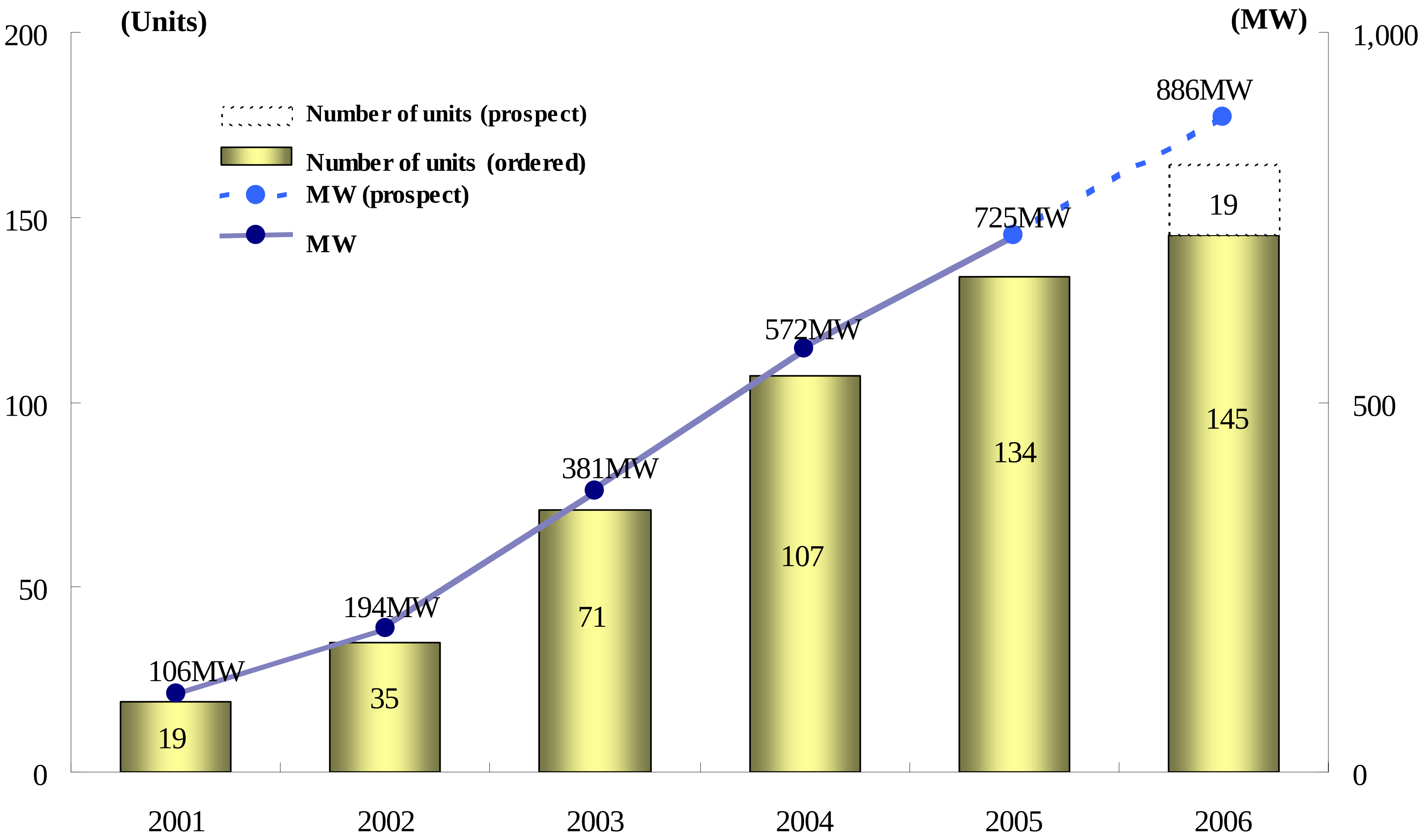
Awarded by the Japan Gas Association (JGA) for achieving high efficiency, high operating performance and high environmental performance in the area of gas fueled machinery and equipment.

Japanese market share of gas engines (3.5〜7.5MW class)

(FY2001(when MACH was launched) 〜FY2005)



39. MACH-30G - Orders Received



40. Overview of MACH-30G (Example)

Customer: Sodegaura Power Station, Nippon Steel Corporation 18MACH-30G × 10Units

41. IGCC (Integrated Coal Gasification Combined Cycle)

Air Blown IGCC is the Best System for Power Generation

1. Features

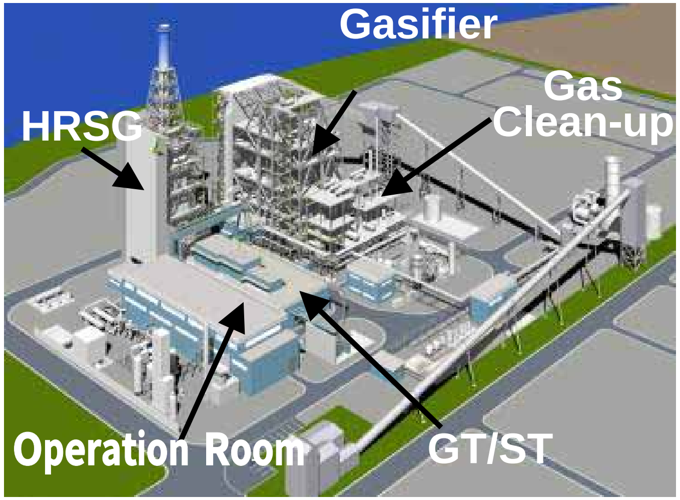
(1) More than 10% lower CO_2 Emission Intensity than latest USC conventional coal fired plant by Higher Plant Efficiency with Air-blown IGCC

(2) Fuel Flexibility for high moisture Low Rank Coal like PRB Coal.

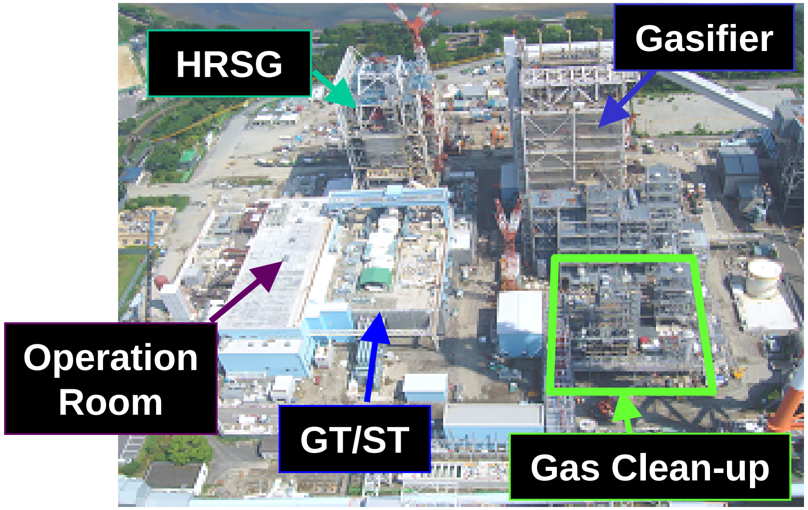
(3) Higher Reliability with Waterwall Structure based on mature boiler experiences

(4) Much Experiences in Low calorific gas firing G/T

2. 250MW-class Demonstration Plant



Clean Coal Power R&D Co., LTD.



Operation starts in Sep. 2007

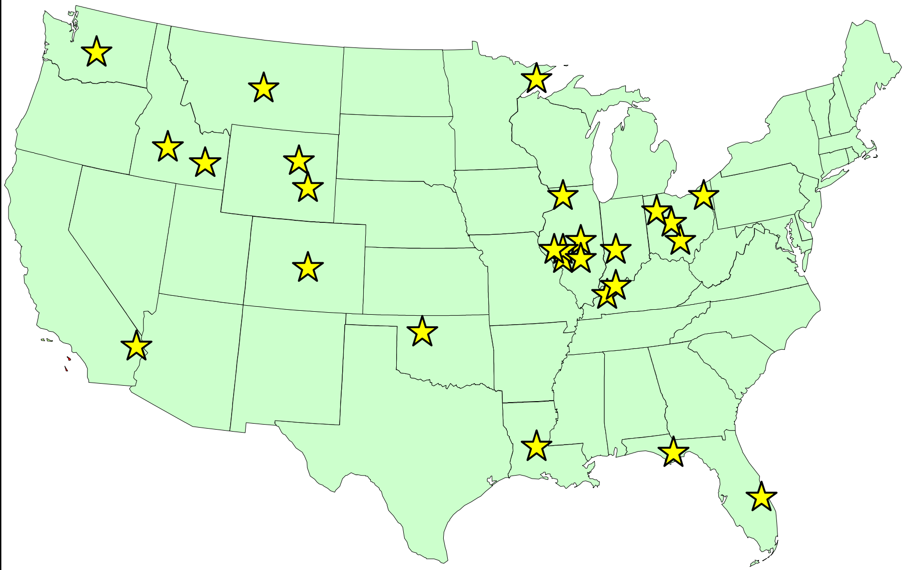
IGCC:Integrated coal Gasification Combined Cycle
Power River Basin (PRB) coal: a low rank coal with higher moisture content and lower heating value, but available at low cost because of its plentiful reserves.

42. IGCC (Integrated Coal Gasification Combined Cycle)

3. IGCC projects in the U.S.

EPACT (Energy Policy Act; signed in Aug 2005) set measures including subsidies, tax incentives for investments, etc.

→ Triggering IGCC projects across the U.S.



★: IGCC projects being considered

4. Commercial Plant Performance

Item	Unit	250MW Demo. Plant	Commercial Plant (60Hz)
Gross Output	MW	250	500
Design Coal	–	Bituminous Coal	Bituminous Coal
Gasifier	–	Air-blown Dry coal feed	Air-blown Dry coal feed
Gas Clean-up	–	Wet Clean-up	Wet Clean-up
Gas Turbine	–	M701DA	M501G
Net Plant Efficiency	%,HHV	40.5	46
Emission SOx	ppm	8	8
(16%O2) NOx	ppm	5	5
PM	mg/Nm^3	4	4

Mitsubishi IGCC ready for Commercial plants in Japan and the U.S.

43. MHI's Efforts to Develop Fuel Cells

SOFC (solid oxide fuel cells)

NEDO technology development project (2004 - 2007)

Tubular type SOFC
Jointly developed with J-Power

→ Development of "Combined System" with levels of 200kW

→ Mid-sized dispersed type power sources; Replacement for large-sized thermal power generation

MOLB-type SOFC
Jointly developed with Chubu Electric Power

MOLB：MOno-Block Layer Built

→ Cogeneration system for Japan Pavilion

→ Cogeneration system for Electric Power Pavilion

Project of experimental study in Aichi World Expo 2005 (March - September)

PEFC (polymer-electrolyte fuel cell)

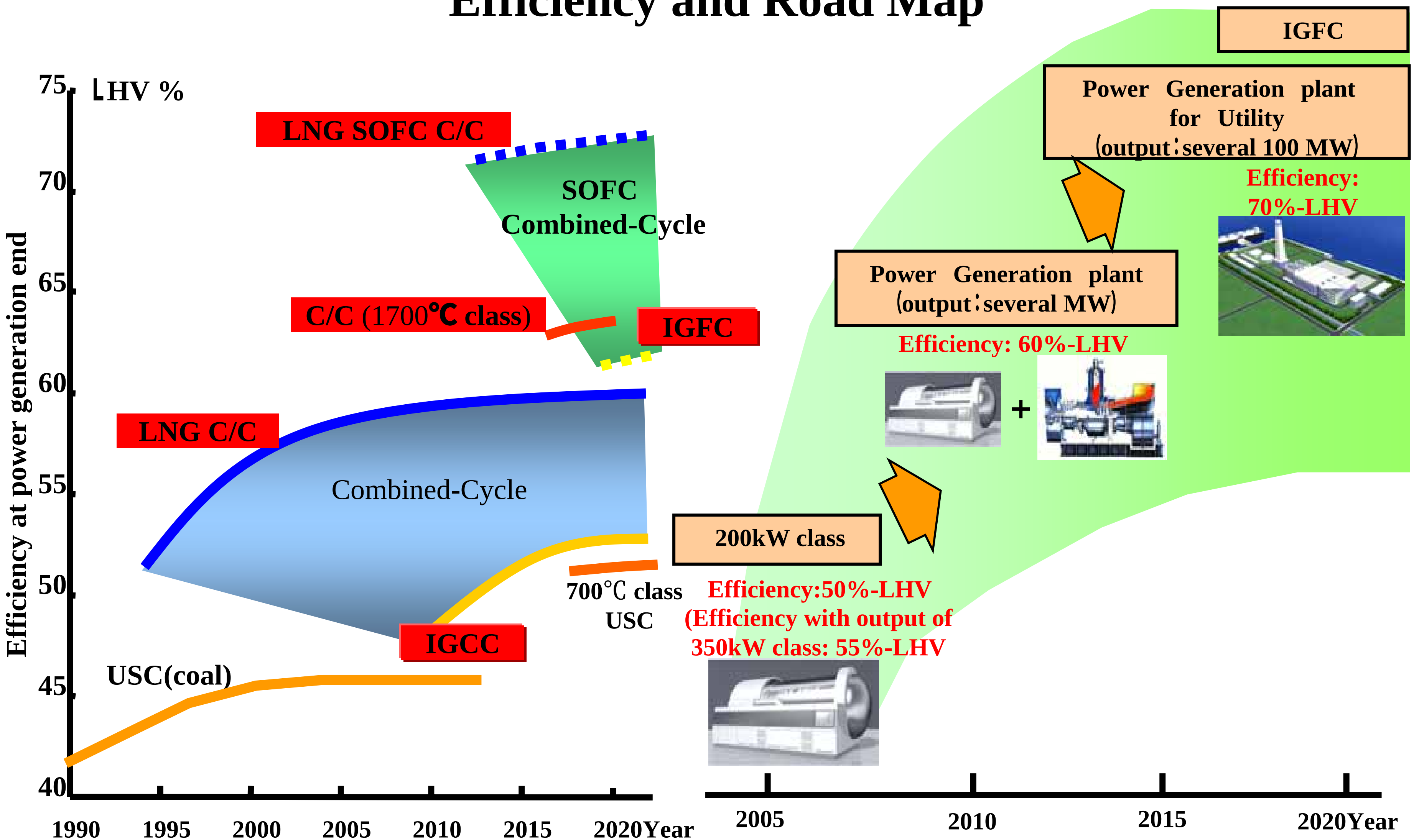
PEFC for mobile applications

→ **PEFC for "Urashima", deep sea cruising AUV developed by JAMSTEC**

As an autonomous underwater vehicle (AUV), Urashima recorded the world's longest continuous cruising of 317km in February 2005.

JAMSTEC "URASHIMA"

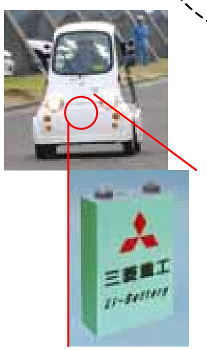
44. SOFC Combined-Cycle Power Generation System Efficiency and Road Map



IGCC: Integrated Gasification Combined Cycle
IGFC: Integrated Gasification SOFC Combined Cycle
USC: Ultra Super critical pressure Coal-fired plant

45. Road Map for Lithium Rechargeable Batteries

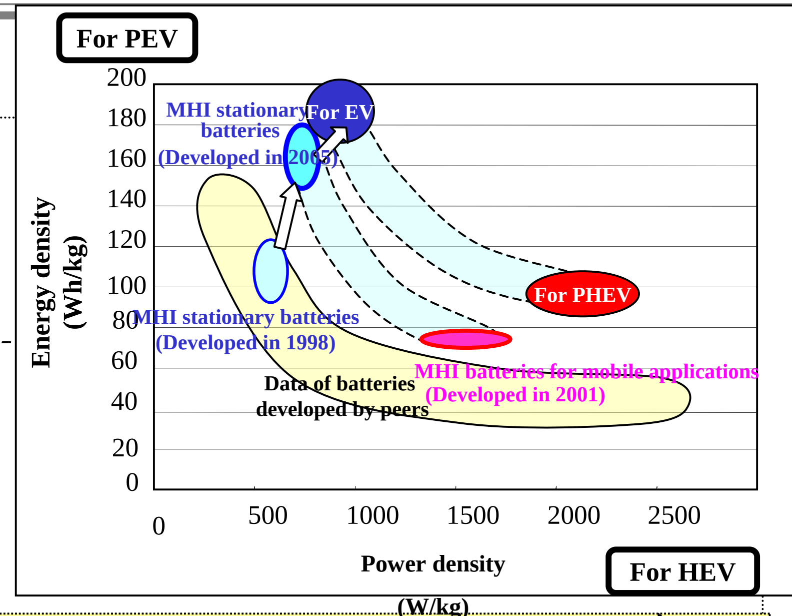
Batteries for EV



EVs (fleet sales)

Cell batteries for EVs

Module batteries for EVs



Phases of development

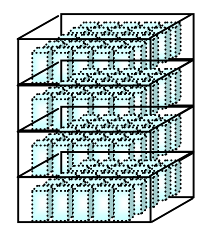
- Raise performance of batteries
- ・Reduce cost ・Develop mass production technology
- Pre-mass-production
- Full-scale mass production

Stationary batteries

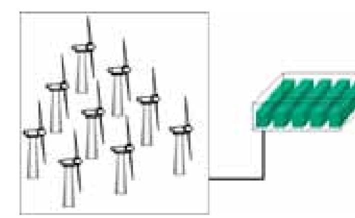
Stationary battery cells

Stationary module batteries

Power storage system



Unit w/100kWh

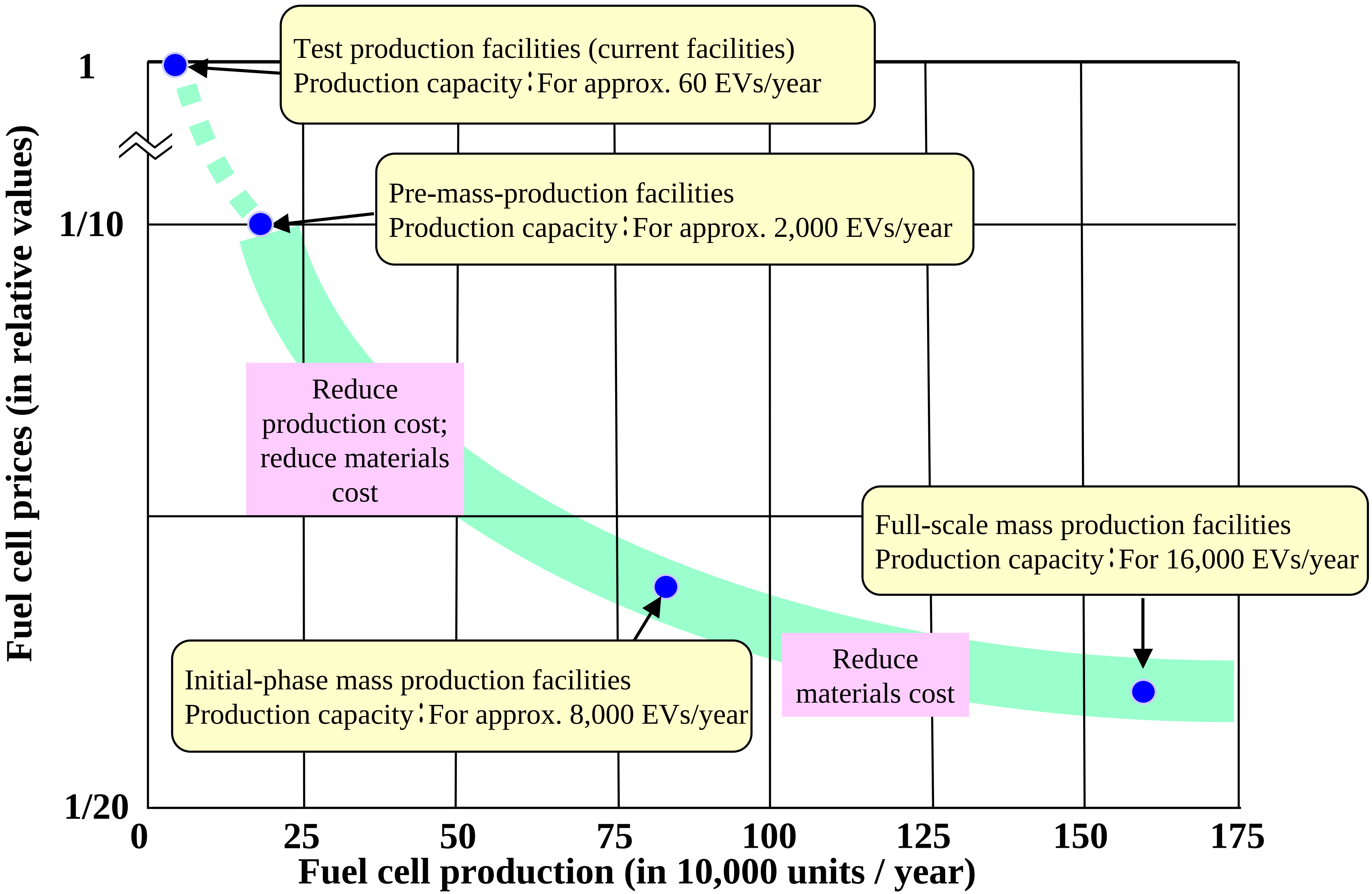


System ensuring stable supply of natural energies

Electricity storage business; R&D on use of natural energies

2006 | 2007 | 2008 | 2009

46. Estimation of Fuel Cell Prices



47. Future of Power Generation