

# Business Briefing on Air-Conditioning & Refrigeration Systems

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# Relations Between Air-Conditioning & Refrigeration Systems and Business Domains

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"> <li>• Power companies</li> <li>• Gas companies</li> <li>• Resource companies (oil, chemicals, steel)</li> </ul>		<ul style="list-style-type: none"> <li>• GTCC</li> <li>• Large-scale thermal power plants</li> <li>• Nuclear power plants</li> </ul>	<ul style="list-style-type: none"> <li>• Environmental plants</li> <li>• Chemical plants</li> </ul>			
Machinery, Equipment Systems	<ul style="list-style-type: none"> <li>• Core industries (steel, etc.)</li> <li>• Automotive industry</li> <li>• Logistics, etc.</li> </ul>		<ul style="list-style-type: none"> <li>• Stationary engines</li> </ul>	<ul style="list-style-type: none"> <li>• Compressors</li> <li>• Metals machinery</li> <li>• Crane &amp; material handling systems</li> </ul>		<ul style="list-style-type: none"> <li>• Turbochargers</li> <li>• Forklift trucks</li> <li>• Engines</li> </ul>	<ul style="list-style-type: none"> <li>• Air-conditioning equipment</li> <li>• Machine tools</li> </ul>
Transportation	<ul style="list-style-type: none"> <li>• Airlines (air)</li> <li>• Shipping companies (sea)</li> <li>• Railways (land), etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Commercial Ships</li> </ul>		<ul style="list-style-type: none"> <li>• Transportation system</li> </ul>	<ul style="list-style-type: none"> <li>• Commercial aircraft</li> </ul>		
Defense & Aerospace	<ul style="list-style-type: none"> <li>• Ministry of Defense (land, sea, air)</li> <li>• JAXA</li> </ul>	<ul style="list-style-type: none"> <li>• Destroyers &amp; submarines for the Ministry of Defense</li> </ul>			<ul style="list-style-type: none"> <li>• Defense aircraft</li> <li>• Missiles</li> <li>• Space Systems</li> </ul>	<ul style="list-style-type: none"> <li>• Special vehicles</li> </ul>	

1. Introduction to Air-Conditioning & Refrigeration Systems
2. Summary of FY 2011  
(Review of 2010 Mid-Term Business Plan)
3. Business Policy for Achievement of 2012  
Mid-Term Business Plan
4. Priority Measures Under 2012 Mid-Term  
Business Plan

# 1. Introduction to Air-Conditioning & Refrigeration Systems (1)

\* Sales and domestic/overseas sales shares are based on FY 2011 consolidated results. The market sizes are estimated by MHI.

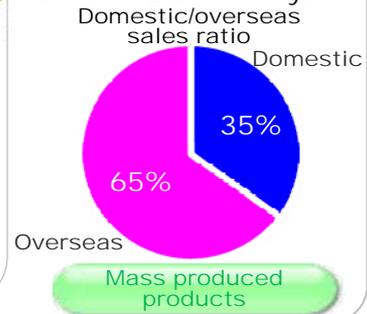
## Air-conditioners (PAC/RAC)

Aiming to evolve from a minor player in a huge market to a dominant leader in a niche market

**PAC**

**RAC**

[Global market size in 2011]  
Approx. 8 trillion yen  
In addition, the hot water supply and heating market is worth 2-3 trillion yen.

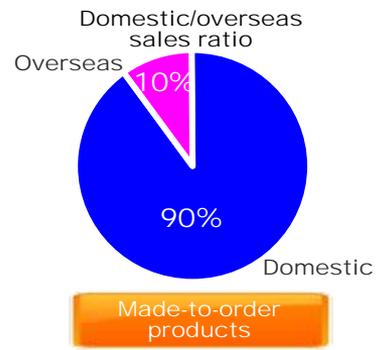


## Centrifugal Absorption Liquid Chiller (TACRM)

Taking a comfortable lead in Japan



[Global market size in 2011]  
Approx. 0.3 trillion yen

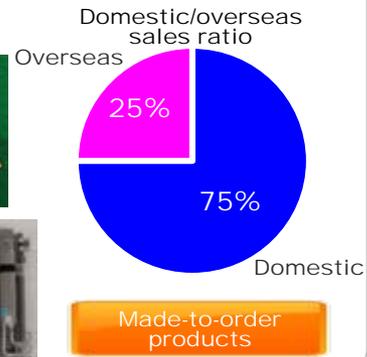


## Car Air-Conditioner (CAC)

World number two in scroll compressors and electric compressors



[Global market size in 2011]  
Approx. 3 trillion yen

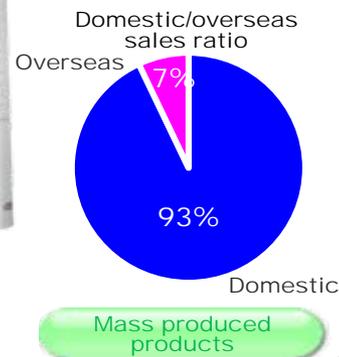


## Transport refrigeration units (TRU)

Taking a comfortable lead in Japan

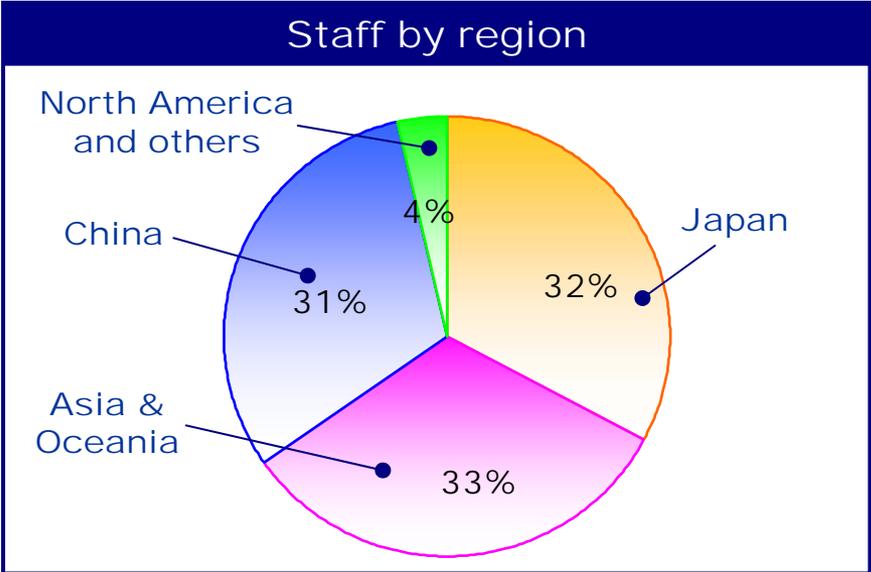
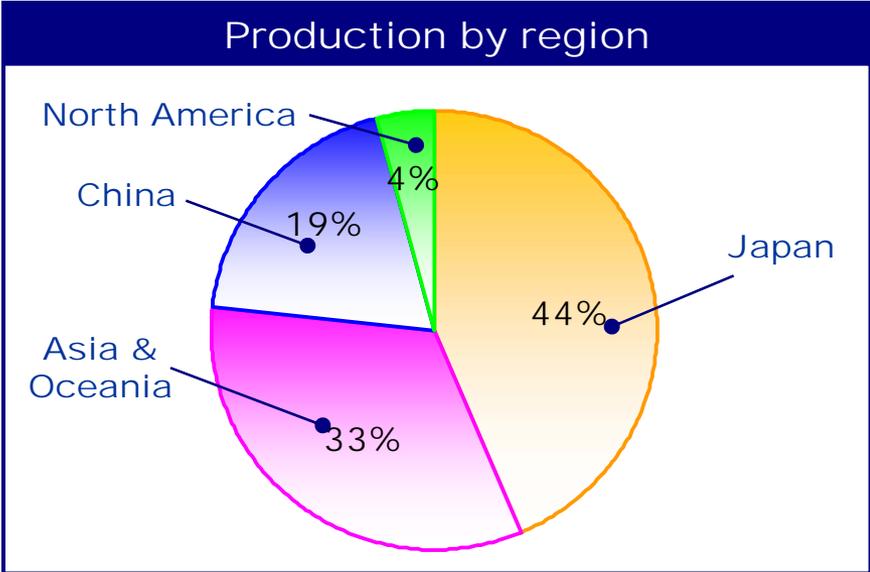
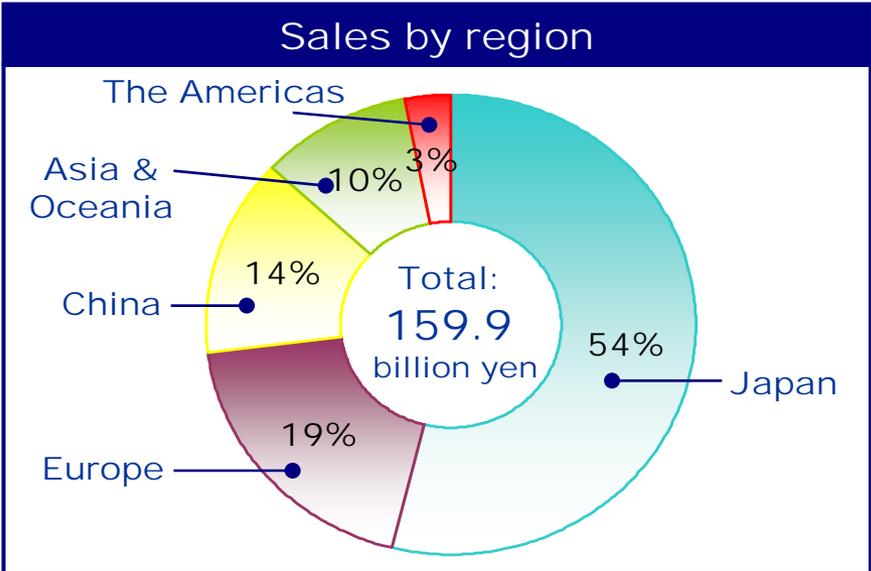
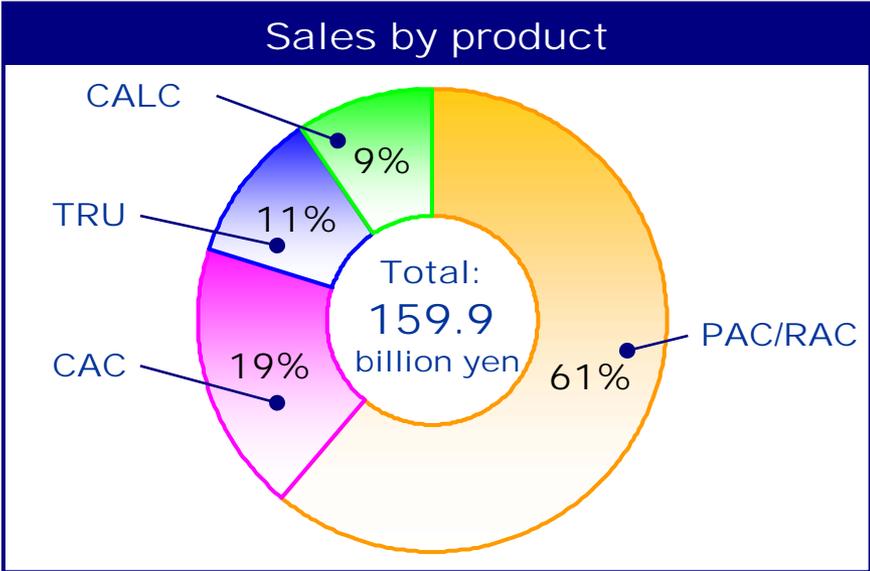


[Global market size in 2011]  
Approx. 0.2 trillion yen



# 1. Introduction to Air-Conditioning & Refrigeration Systems (2)

\* Figures reflect consolidated results for FY 2011.

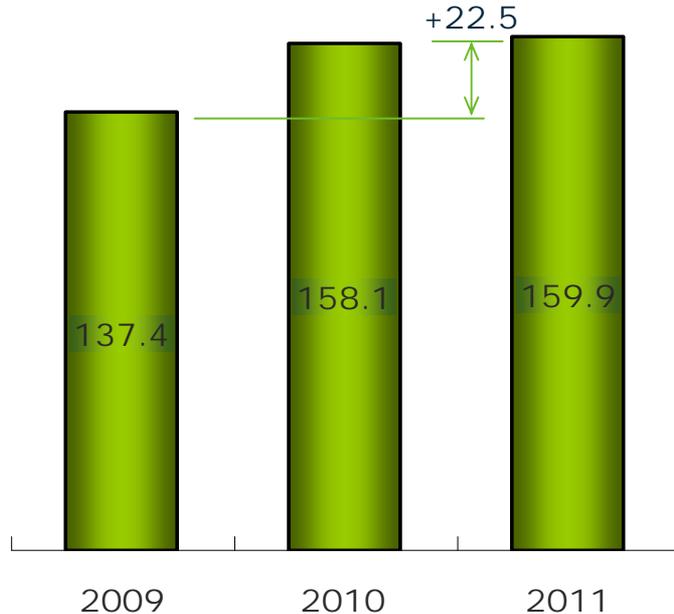


## 2. Summary of FY 2011 (Review of 2010 Mid-Term Business Plan) (1)

Unit: JPY billion

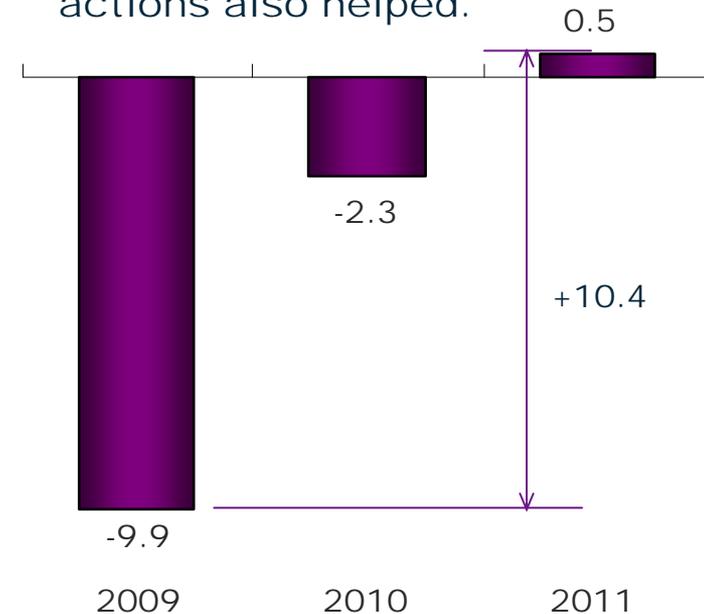
### Orders received (≈ net sales)

- Up 22.5 billion yen from FY 2009 level
- Among other products, PAC/RAC displayed healthy growth.
- Orders increased, mainly from Europe and from China.



### Operating profit

- Up 10.4 billion yen from FY 2009 level
- After hitting bottom in 2009, sales rallied. This led to growth in the gross margin.
- PAC/RAC production shifted overseas to improve profitability. Strict management and other actions also helped.

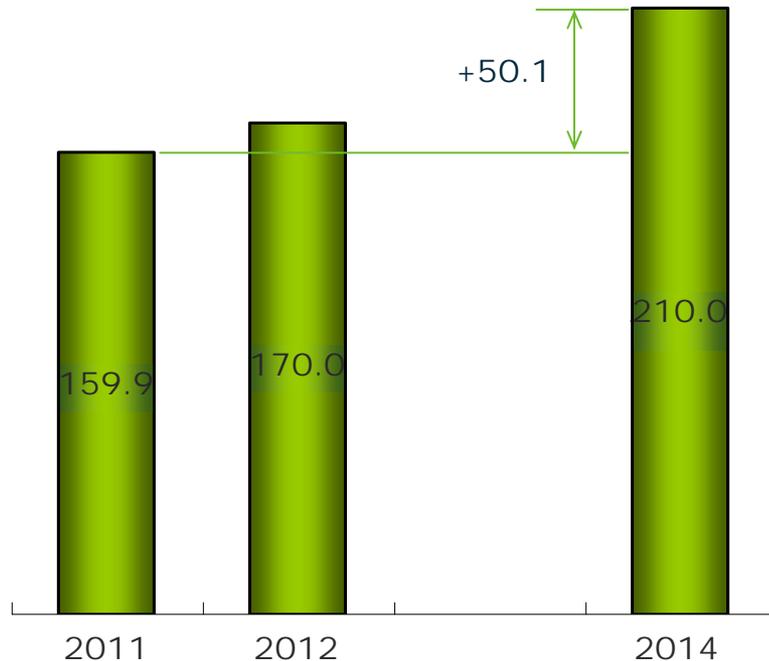


-  The Air-Conditioning & Refrigeration Systems failed to reach forecast sales and operating profit for FY2011. Principal reasons include:
  - Adverse impacts of the earthquake in March 2011 and the flooding in Thailand in October on supply chains in Japan and overseas
  - Domestic production cuts by automakers after the earthquake and the strong yen
  - Soaring prices of materials and rare earth metals
  
-  The process of reform and growth defined in the 2010 Mid-Term Business Plan—which included expanding overseas production and improving funds efficiency to revamp and develop environmentally benign products and achieve collaboration for growth—were executed virtually as planned.

Unit: JPY billion

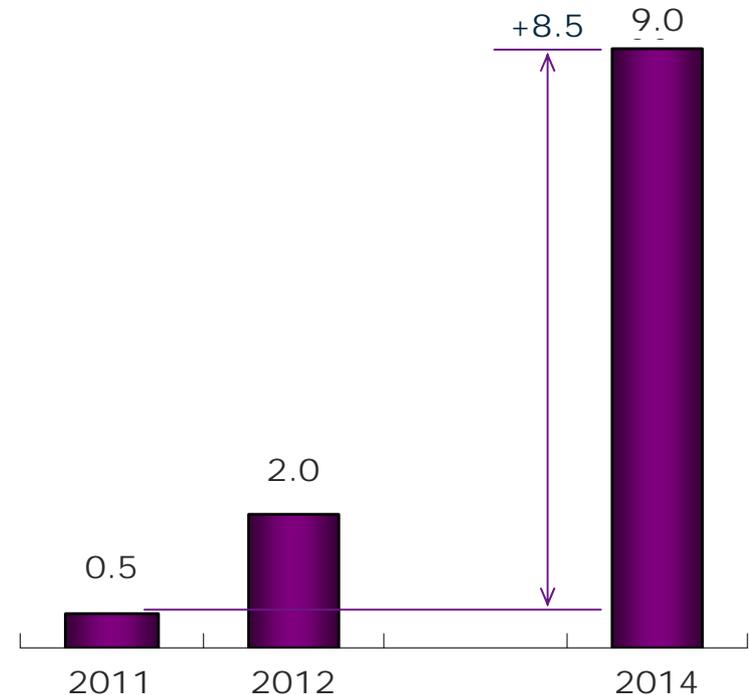
## Orders received (≈ net sales)

- Expand the business, chiefly in PAC/RAC and overseas CAC operations.
- Attain PAC/RAC sales expansion in China and Asia
- Achieve growth in the domestic and overseas heat pump and hot water supply business.
- Commence CAC production for a large-scale overseas program for which the order has been received.



## Operating profit

- Boost overseas PAC/RAC and CAC production in an effort to cut costs.
- Complete the shift to full overseas production in PAC/RAC within 2012.
- Bring a new overseas CAC plant in Thailand online and resume full-scale mass production at the U.S. plant.



The 2012 Mid-Term Business Plan follows the 2010 Mid-Term Business Plan. (*Rolling Plan*)

Policy

- ◇ Aim to play a role in MHI's environmental business and to become a manufacturer of air-conditioning and refrigeration systems that help preserve the global environment.
- ◇ Establish a light, nimble business structure to operate as a dominant niche player and then open the way to becoming a global niche leader.

## Establish a light, nimble business structure (1): Overseas expansion (i)

### Overseas expansion

#### ◇ PAC/RAC

- Complete the shift of PAC to full overseas production in 2012. (In PAC/RAC, all but scroll compressors will be produced outside Japan.)

MACO in Thailand adds a new plant capable of producing large outdoor units.

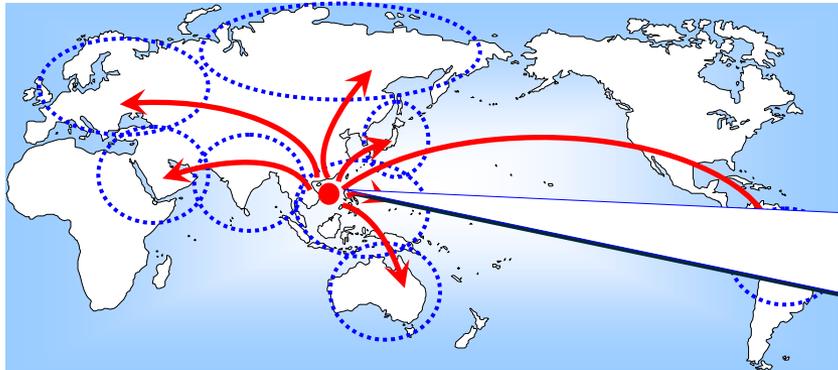


## Establish a light, nimble business structure (1): Overseas expansion (ii)

### Overseas expansion

#### ◇ PAC/RAC

- Shift to direct transactions between MACO in Thailand and overseas bases to skip back office operations in Japan, shorten commercial flows, and reduce production lead times.



MACO located in Thailand

### Establish a light, nimble business structure (1): Overseas expansion (iii)

#### Overseas expansion

##### ◇ CAC

- A third overseas CAC base was built in Thailand in October 2011 in a bid to increase overseas production.

Construction of a new plant in Thailand



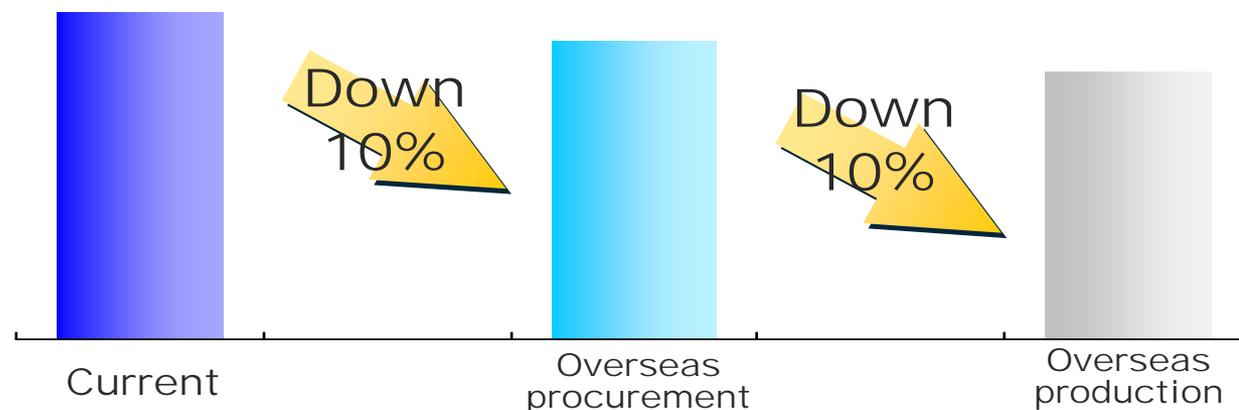
## Establish a light, nimble business structure (1): Overseas expansion (iv)

### Overseas expansion

#### ◇ TRU & CALC

- For TRU and CALC, step up procurement of components outside Japan and begin preparing for overseas production.

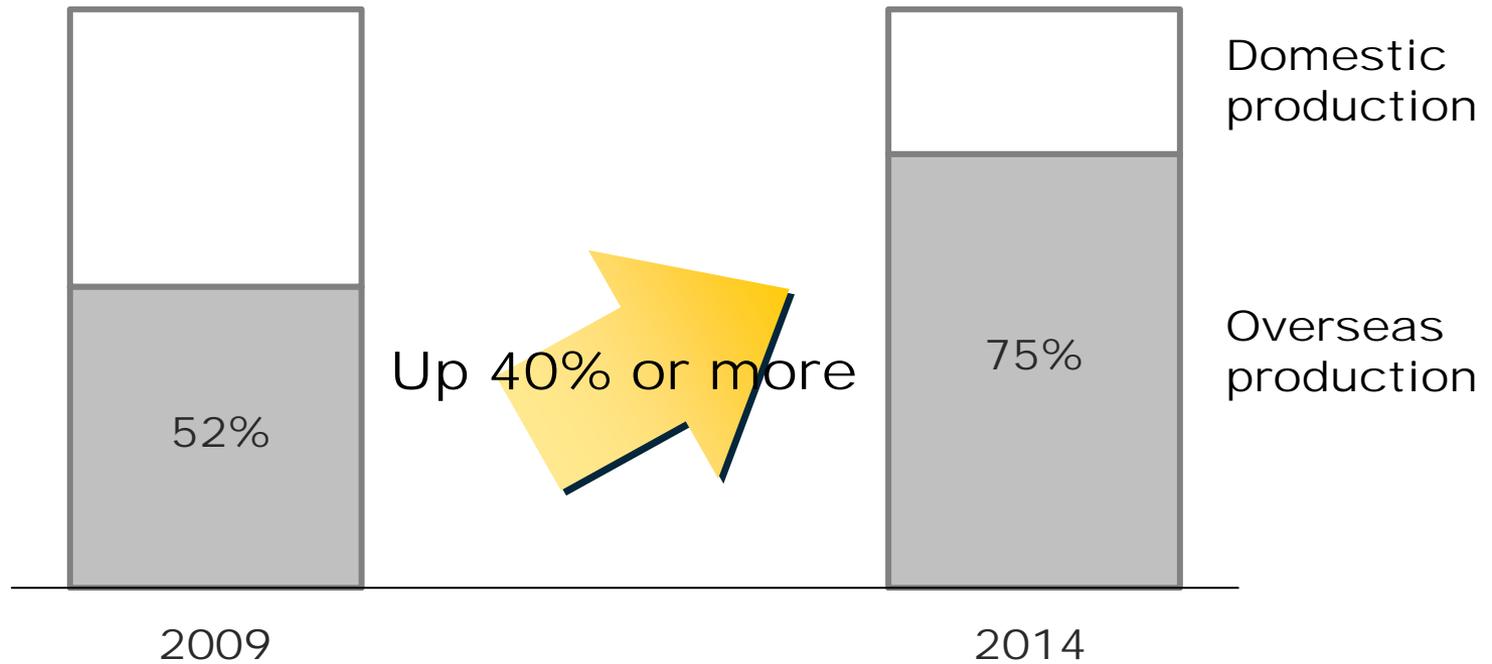
Schematic of cost cutting through overseas procurement and production for TRU



## Establish a light, nimble business structure (1): Overseas expansion (v)

### Overseas expansion

### Overseas production share



## Establish a light, nimble business structure (2): Funds efficiency (i)

### Funds efficiency

#### ◇ Inventories

- Introduce the *Yatai* system for production at MACO in Thailand to domestic production of refrigeration units so that land transporters can cut production lead times.



The iPad is introduced to provide process support using electronic process manuals and to achieve enhanced process quality.



Production of refrigeration units for land transporters in the *Yatai* system

### Establish a light, nimble business structure (2): Funds efficiency (ii)

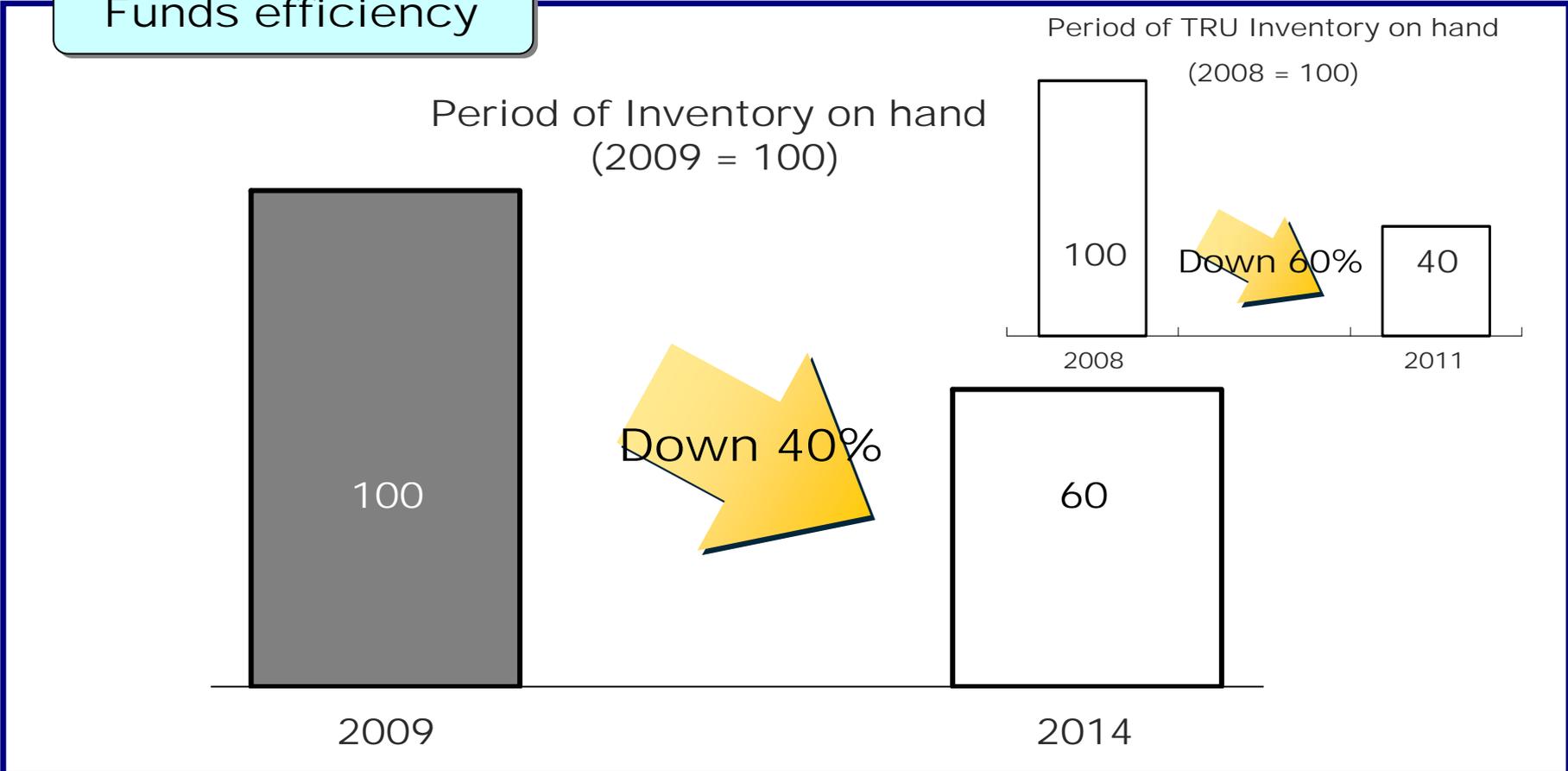
#### Funds efficiency

##### ◇ Inventories

- Introduce a system for centralized control of global sales, inventories, and the production of air-conditioners to minimize the inventories.
- Eliminate wasteful inventory overlaps, such as spare goods for MHI and group companies and finished product stock.

Establish a light, nimble business structure (2):  
Funds efficiency (iii)

Funds efficiency



### Establish a light, nimble business structure (2): Funds efficiency (iv)

#### Funds efficiency

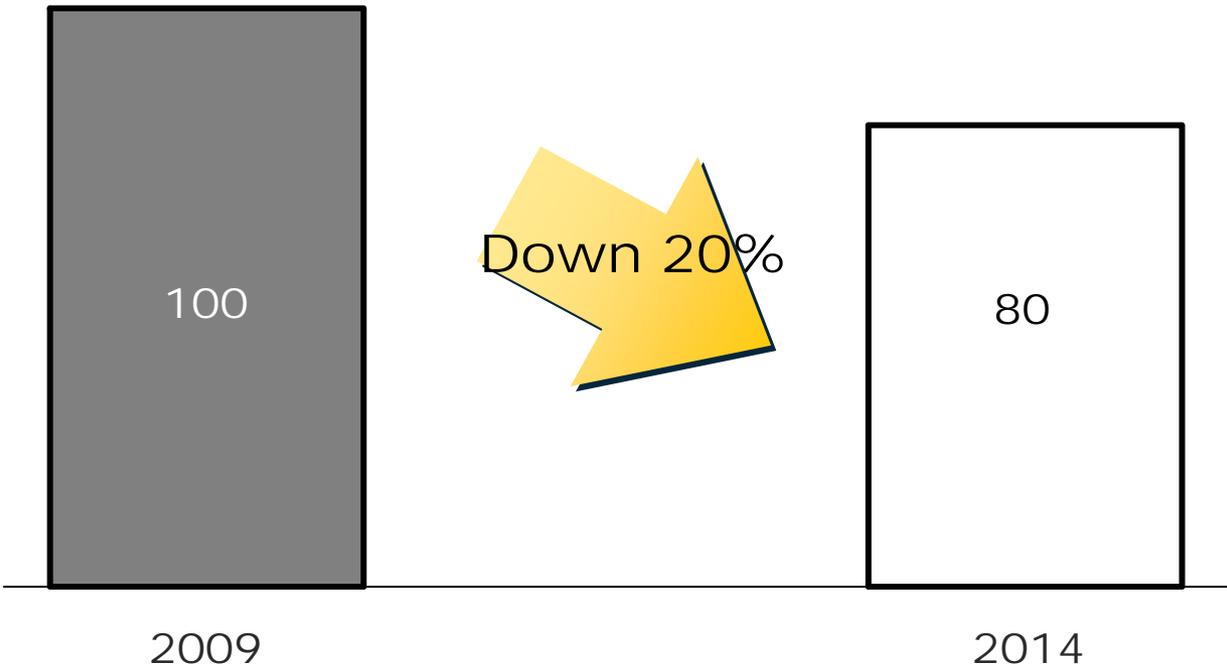
##### ◇ Trade receivables

- Reduce trade receivables through direct transactions between Thailand-based MACO and overseas bases that lead to shorter commercial flows and curtailed production lead times.
- Also incorporate financial scheme such as liquidizing, and negotiate with customers for shorter payment terms.

Establish a light, nimble business structure (2):  
Funds efficiency (v)

Funds efficiency

Period of Trade Receivables on Hand  
(2009 = 100)



## Establish a light, nimble business structure (3): CAC business (i)

### CAC business

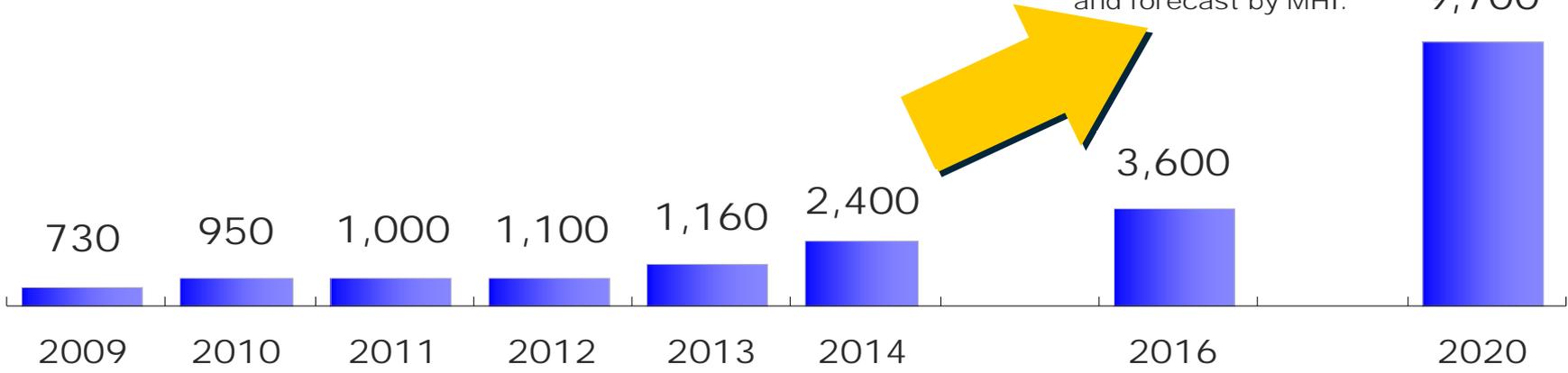


◇ Current state

- In the automotive market, environmentally benign vehicles, such as compact cars, electric vehicles, and hybrid vehicles, will become more prevalent.

Forecast demand for hybrid vehicles and electric vehicles

Unit: thousand vehicles  
The figures are estimated and forecast by MHI.



## Establish a light, nimble business structure (3): CAC business (ii)

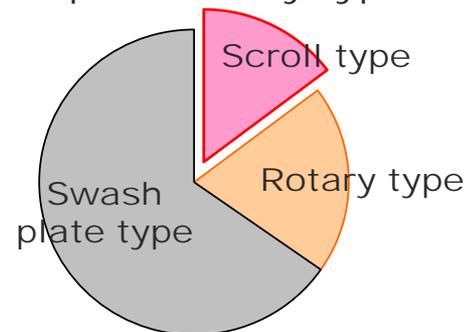
### CAC business

#### ◇ Current state

- MHI is one of the world's few manufacturers capable of covering both the belt drive system and the electric drive system.
- MHI is the leading manufacturer of scroll compressors, although the market is small.



Share of CAC compressors by type



### Establish a light, nimble business structure (3): CAC business (iii)

#### CAC business

##### ◇ Initiatives

- Establish a third overseas base in Thailand for the purpose of cutting costs and incurring costs in foreign currencies.
- Focus on efforts to attract new customers and win new projects in Japan and abroad by taking advantage of cost competitiveness generated from production in Thailand.
- Strive to introduce electric compressors and electric heaters for electric and hybrid vehicles, among other products, to new overseas customers.



### Establish a light, nimble business structure (3): CAC business (iv)

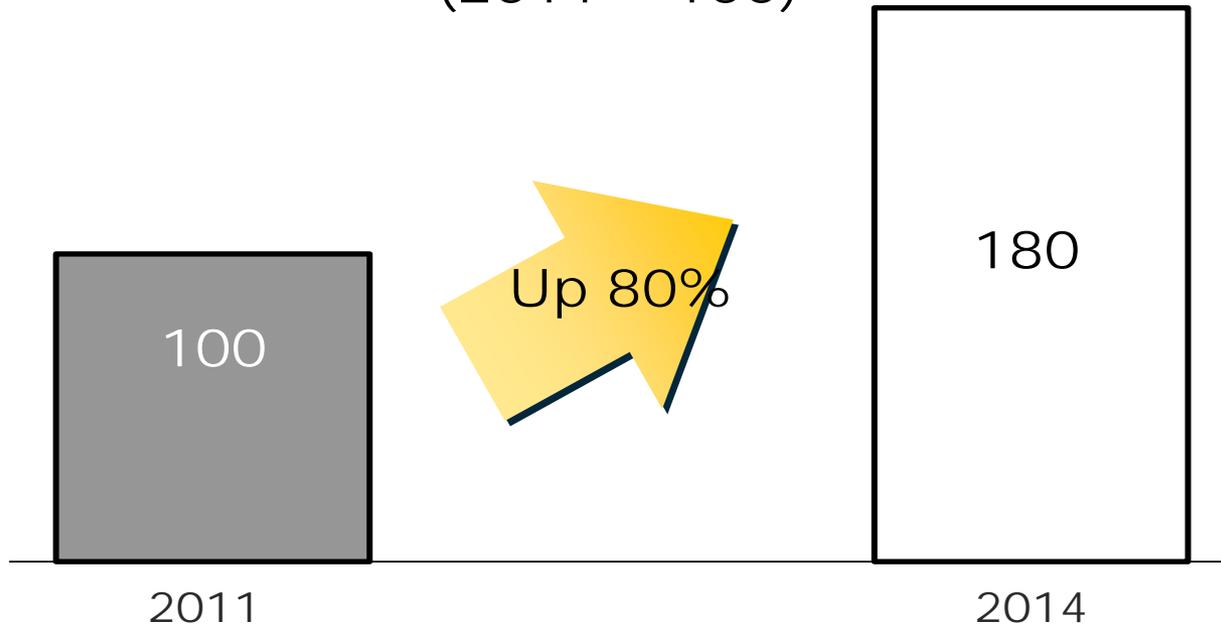
#### CAC business

- ◇ Reorganization into an operating company
  - Meanwhile, competitors specialize in vehicle parts manufacturing. Operated as part of the general manufacturer, the business has difficulty in responding swiftly to radically changing business circumstances.
  - Given that, MHI will set up a new wholly owned company that takes over its CAC business in a bid to construct an agile and robust business structure that can quickly respond to changes in harsh market conditions and thereby to rival its competition.

## Establish a light, nimble business structure (3): CAC business (v)

CAC business

CAC Sales Plan  
(2011 = 100)



## Operate as a dominant niche player (1): Heat pump water heaters (i)

### Heat pump water heaters

◇ Offering an array of products with unrivalled performance mainly for niche business and industrial applications

*Q-ton ESA30: EcoCute water heater for business use*



*ETW: waste heat recovery heat pump*

- Winning
- An ECCJ Chairman Prize in the Energy Conservation Grand Prize run by the Energy Conservation Center, Japan (ECCJ)
  - A Chairman Prize from the Heat Pump & Thermal Storage Center of Japan
  - A Technology Award from the Japan Society of Refrigerating and Air Conditioning Engineers
  - A New Product Prize in the MHI Internal Best Innovation 2011



Using **heat** in the **air** to boil water

**High Power**  
**-25°C → 90°C**  
 Supplying hot water at 90 deg. C under cold conditions at the minimum temperature of -25 deg. C

**Ecology**  
**COP 4.3!**  
 The industry's top-class efficiency with the COP value of 4.3 in the middle phase

With the heat pump, it is lower than boilers in:

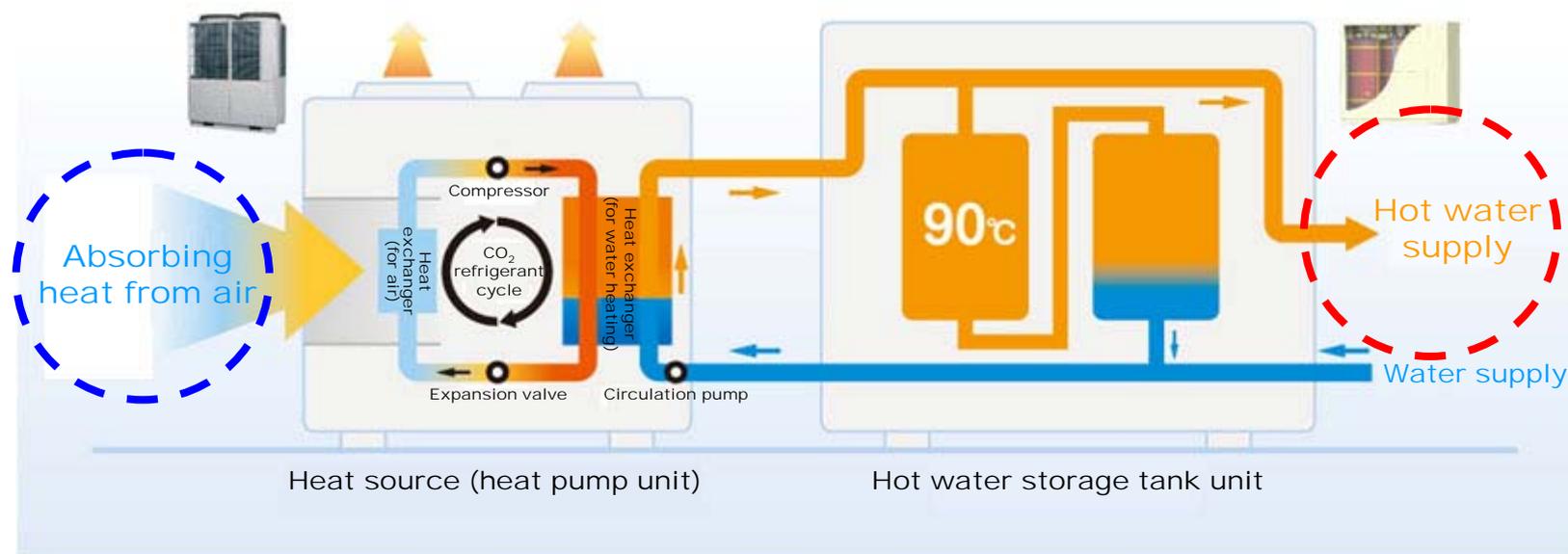
**CO<sub>2</sub> emissions by costs by 70% and 40%**

Continuous hot water supply at a maximum of **90 deg. C**

## Operate as a dominant niche player (1): Heat pump water heaters (ii)

### Heat pump water heaters

- ◇ Heat pump water heaters are renewable energy systems that produce hot water with the use of heat in the air.



# 4. Priority Measures Under the 2012 Mid-Term Business Plan

## Operate as a dominant niche player (1): Heat pump water heaters (iii)

### Heat pump water heaters

#### ◆ Developed in pursuit of high performance under cold conditions and high efficiency

- Competitors have their performance decline at outdoor temperature of 5 deg. C and below. MHI's product maintains its rated performance until the outdoor temperature falls to -7 deg. C. It has thus massively broadened the region of applications of heat pump water heaters.

Conventional heat pump water supply systems have a drawback in that their performance is poor in cold environments.

Problem with conventional CO<sub>2</sub> heat pump water supply systems for business use

- Heating capacity and
- Efficiency (COP) decline significantly.



**Q-ton** Air to Water has been developed!

Unrivalled in performance and efficiency

- Supplies hot water at 90 deg. C under outdoor temperature as low as -25 deg. C at the minimum
- Achieves the industry's highest COP value of up to 4.3

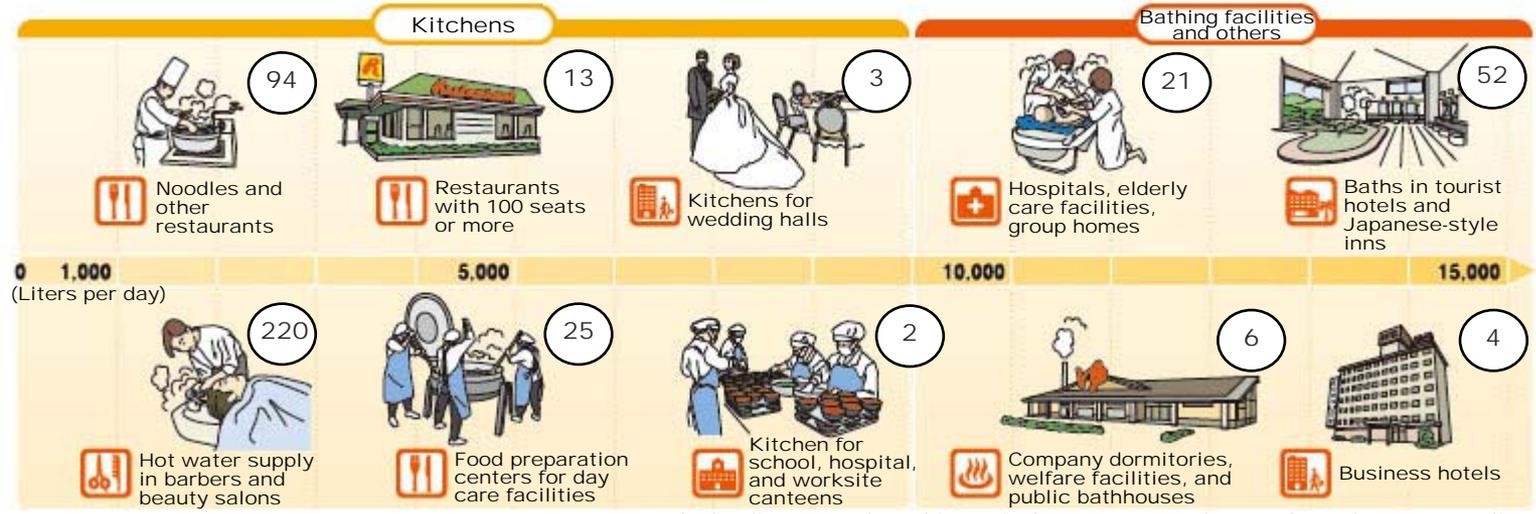


# 4. Priority Measures Under the 2012 Mid-Term Business Plan

## Operate as a dominant niche player (1): Heat pump water heaters (iv)

### Heat pump water heaters

◇ The Q-ton is used by many different customers for different purposes.



\* The figure enclosed in a circle represents the number of corresponding facilities estimated by MHI. The value is expressed in thousands.

- **Kitchens**  
Restaurants, wedding halls, barbers, beauty salons, food preparation centers, school/hospital/ worksite canteens, etc.
- **Bathing facilities and others**  
Hospitals, elderly care facilities, baths in tourist hotels and Japanese-style inns, company dormitories and welfare facilities, public bathhouses, business hotels, etc.

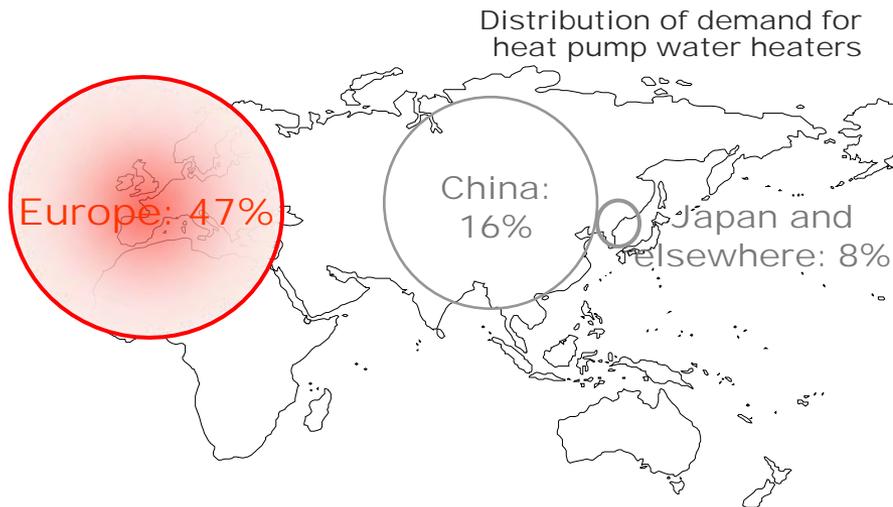
## Operate as a dominant niche player (1): Heat pump water heaters (v)

### Heat pump water heaters

[Sales Expansion]

#### ● Europe

- Released in June 2012 after concentrating resources in the U.K., Italy and France. In the U.K., a field test was commenced.
- Rapid market growth is expected in Italy, where legislation imposing obligations to use heat pumps has come into force.



A hotel in the U.K. where the field test takes place

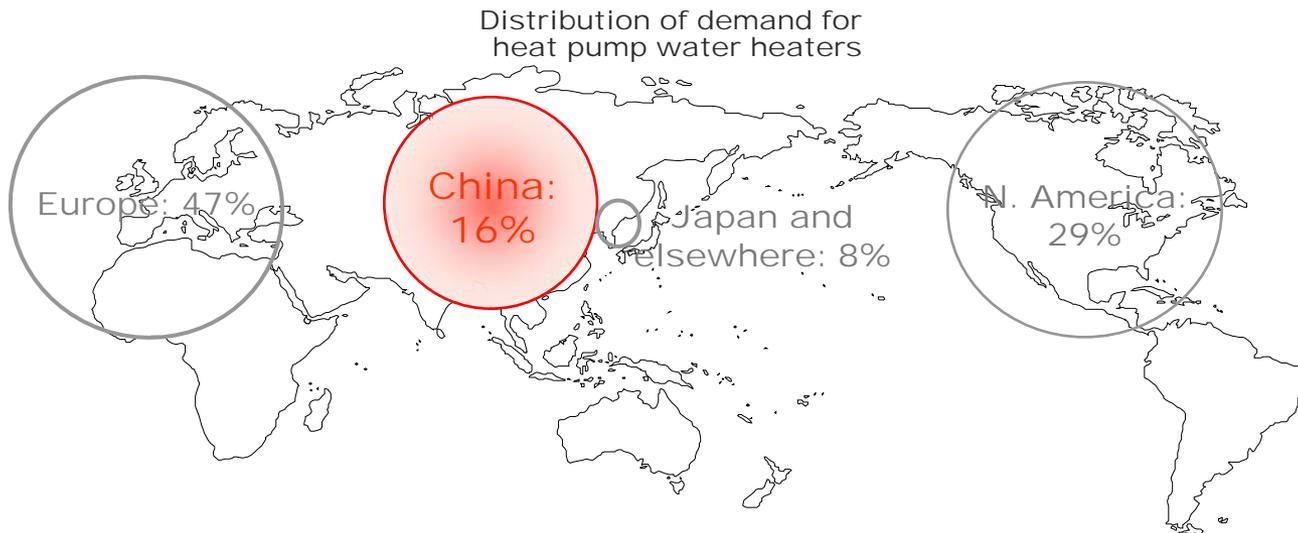
### Operate as a dominant niche player (1): Heat pump water heaters (vi)

#### Heat pump water heaters

[Sales Expansion]

#### ● China

- There is potentially a large market as late-night power rates are available.
- The local base (MHIAS) is accelerating its effort to cultivate the market and to expand sales.



## Operate as a dominant niche player (2): Sales operations in China (i)

### Sales operation in China

◇ A company for selling room air-conditioners was established jointly with Suning Appliance Co., Ltd. which is China's largest mass retailer of home electric appliances.



● MHI and Suning Appliance made a joint investment to set up a company that exclusively sells MHI-branded room air-conditioners in China.

## Operate as a dominant niche player (2): Sales operations in China (ii)

### Sales operation in China

◇ Suning Appliance will provide each of its stores with a booth dedicated to MHI room air-conditioners. Front-line sales information supplied from the booths will be incorporated into product development.



Schematic of a booth dedicated to MHI room air-conditioners

Beijing Chaoyang Road Store



Ningbo Tianyi Store



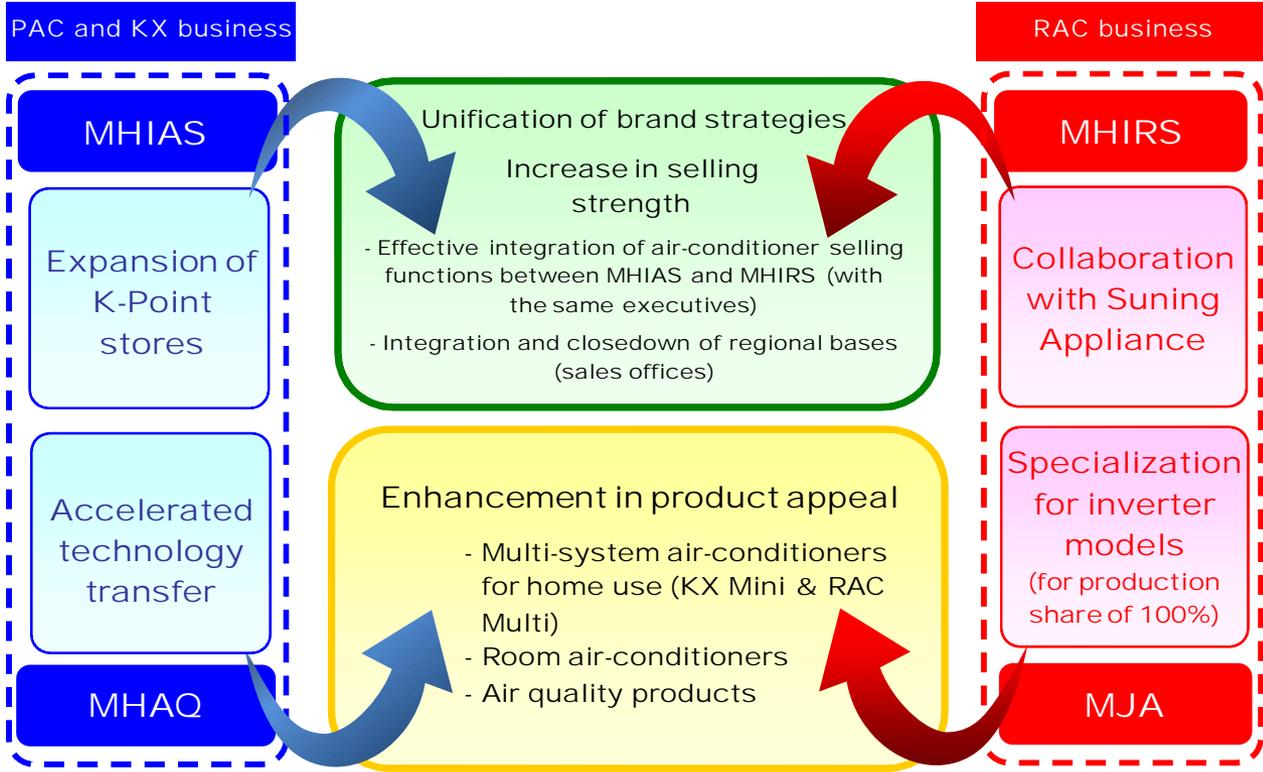
Nanjing Jiangpu Road Store



# Operate as a dominant niche player (2): Sales operations in China (iii)

## Sales operation in China

◇ Sales functions are integrated under the MHI brand in view of individual optimization of MJA and MHAQ.



## Operate as a dominant niche player (2): Sales operations in China (iv)

### Sales operation in China

◇ Expand the sales network of K-Point stores dealing exclusively with MHI's commercial air-conditioners. As part of the brand strategy for the K-Standard, a brand for MHI air-conditioning systems, K-Point stores are operated in the Chinese market. These stores deal exclusively in MHI's products. It is planned to increase the number of K-Point stores from 237 as of the end of May 2012 to 400\* in December 2012. \* Including "air +" Stores



Exterior appearance of a K-Point store

Interior appearance of a K-Point store

A conceptual representation of a customer's residence



# 4. Priority Measures Under the 2012 Mid-Term Business Plan

## Operate as a dominant niche player (2): Sales operations in China (v)

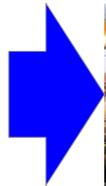
- Unify the images of selling spaces, products, technologies and quality to clarify the appeal to consumers. → Implement the “air +” brand strategy.

- Concept of the “air +” brand  
To quickly implement below message and image by using simple words:
  - MHI’s air conditioning products are based on its comprehensive technical capabilities;
  - MHI is a one-stop provider of the brand, products, services and others; and
  - The products are designed to improve air-related quality of life.



### ◇ Design unification for sales sections

Before the change:  
Selling spaces looking disorganized



After the change:  
Selling spaces well coordinated



### ◇ Increasing recognition of the “air +” brand



## Operate as a dominant niche player (2): Sales operations in China (vi)

### Sales operation in China

- ◇ Positively and consistently working to enhance quality and increase brand recognition

To improve installation and servicing quality for air conditioning systems, Nanjing Mitsubishi Funded Course has been established within Jiangsu Economy & Trade Polytechnic College located in the city of Nanjing in an effort to provide education on air-conditioning technologies.

Jiangsu Economy & Trade Polytechnic College



Education is given with the use of MHI's air conditioning system.



### Operate as a dominant niche player (3): Sponsoring a sporting professional

◇ Supporting an attempt to enter the world stage



- MHI sponsors pro golfer Li-Ying Ye.
  - Plays in the LPGA tour. She had her first win in Japan in September 2011.
  - Helps to boost publicity for MHI's air conditioning systems through Chinese media.



The MHI logo displayed on her cap and shoulder

# Thank you very much for your attention.



# Our Technologies, Your Tomorrow



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