

Business Briefing on Engineering Headquarters

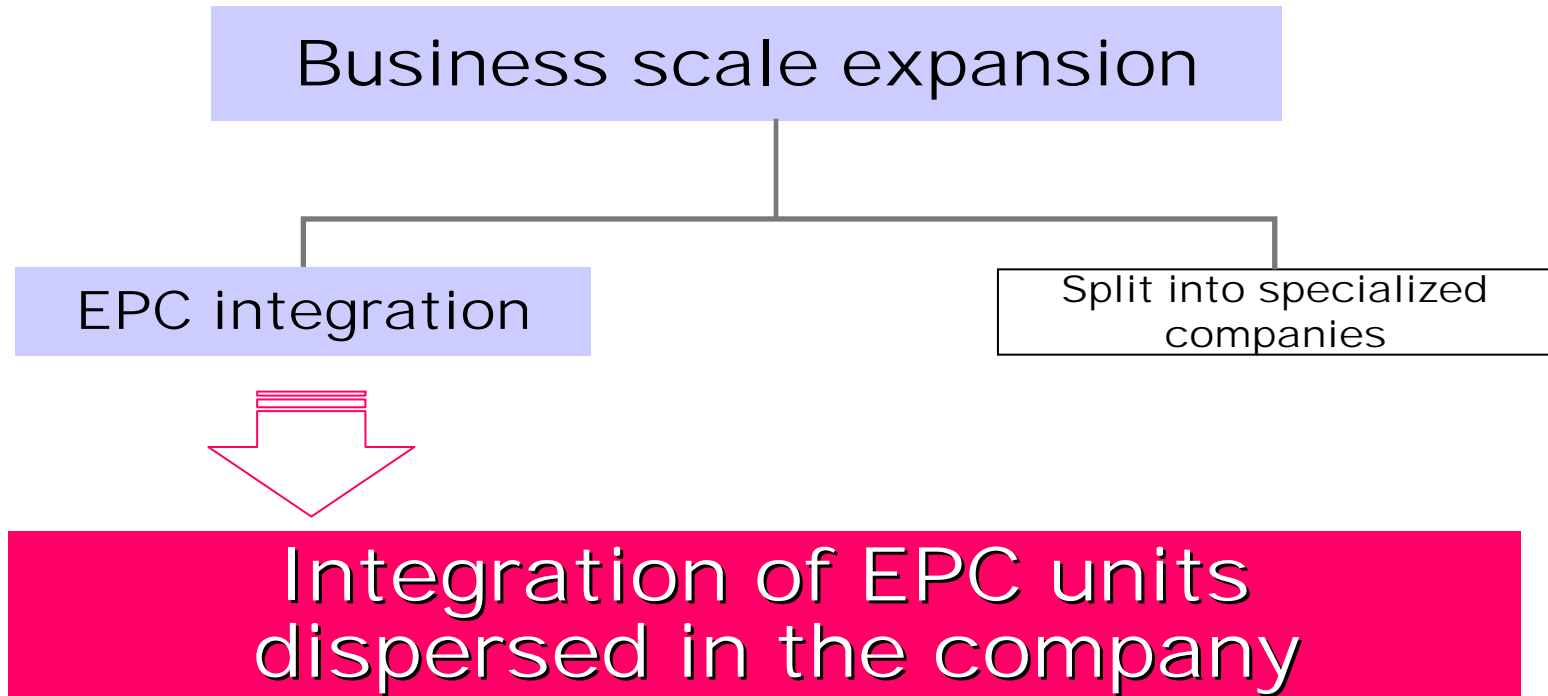
Takato Nishizawa
Head of Engineering Headquarters

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MITSUBISHI HEAVY INDUSTRIES, LTD.

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1. Establishing the Engineering Headquarters:
Background and Objectives
2. What is Engineering?
3. Business Overview of the Engineering
Headquarters
4. Enlarging Existing Businesses
5. Expanding into New Fields and Businesses
6. Summary

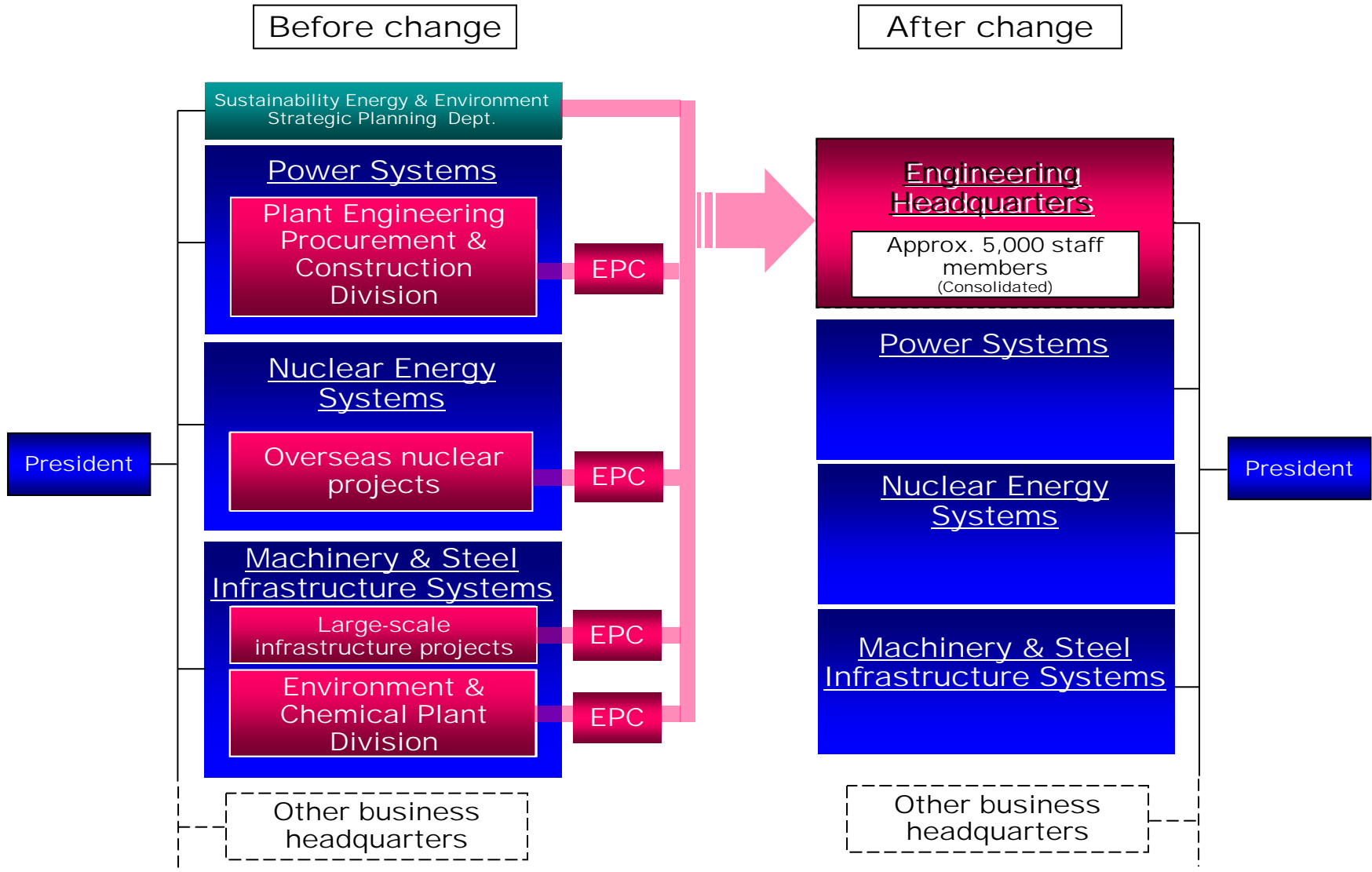


Background

External Environment	Needs from society <ul style="list-style-type: none">- Increase in large-scale infrastructure projects- Emergence of solution businesses
Internal Environment	Limitations on growth of the business scale under the conventional style of management (with business headquarters and works)

1. Establishing the Engineering Headquarters: Background and Objectives
 (2) Setup of the Engineering Headquarters

Integration of EPC units from three business headquarters



Objectives (Vision)

- Become a globally recognized engineering group with world-leading EPC capabilities.
- Build a low-risk, high-return business structure to boost the receipt of orders and earnings.

1. Establishing the Engineering Headquarters: Background and Objectives
 - (4) MHI's advantages: (i) Strengths of the EPC units backed by manufacturing

Strengths of EPC units backed by manufacturing

Differentiation with technologies unique to manufacturers

Apply the core product technical capabilities developed through the design and production of power plant-related equipment to the engineering of equipment and machinery constituting various plants.

Active use of in-house R&D functions

Make effective use of extensive basic and applied technologies owned by six research and development centers to develop new technologies and to swiftly resolve emerging problems.

Advantage through cross-sectional expansion of control technologies

Apply the technologies embodied in power plant monitoring and control systems to environment and chemical plants and large-scale transportation systems to differentiate control technologies for plants and systems.

Enhanced constructing quality with advanced production technologies developed through manufacturing

Apply advanced welding, assembly, and other manufacturing technologies and production management approaches to on-site construction work to improve work quality.

Synergy enjoyed from organizational unification and economies of scale

Business growth through united efforts on companywide cross-sectional projects

Expand solution businesses that involve multiple business headquarters, such as total energy management for factories, water solutions and smart community.

Enhancement in project operation capacity through integration of common resources

Integrate resources common to different businesses, such as those for sales, design, procurement, construction and quality control, to bolster the capacity to implement projects.

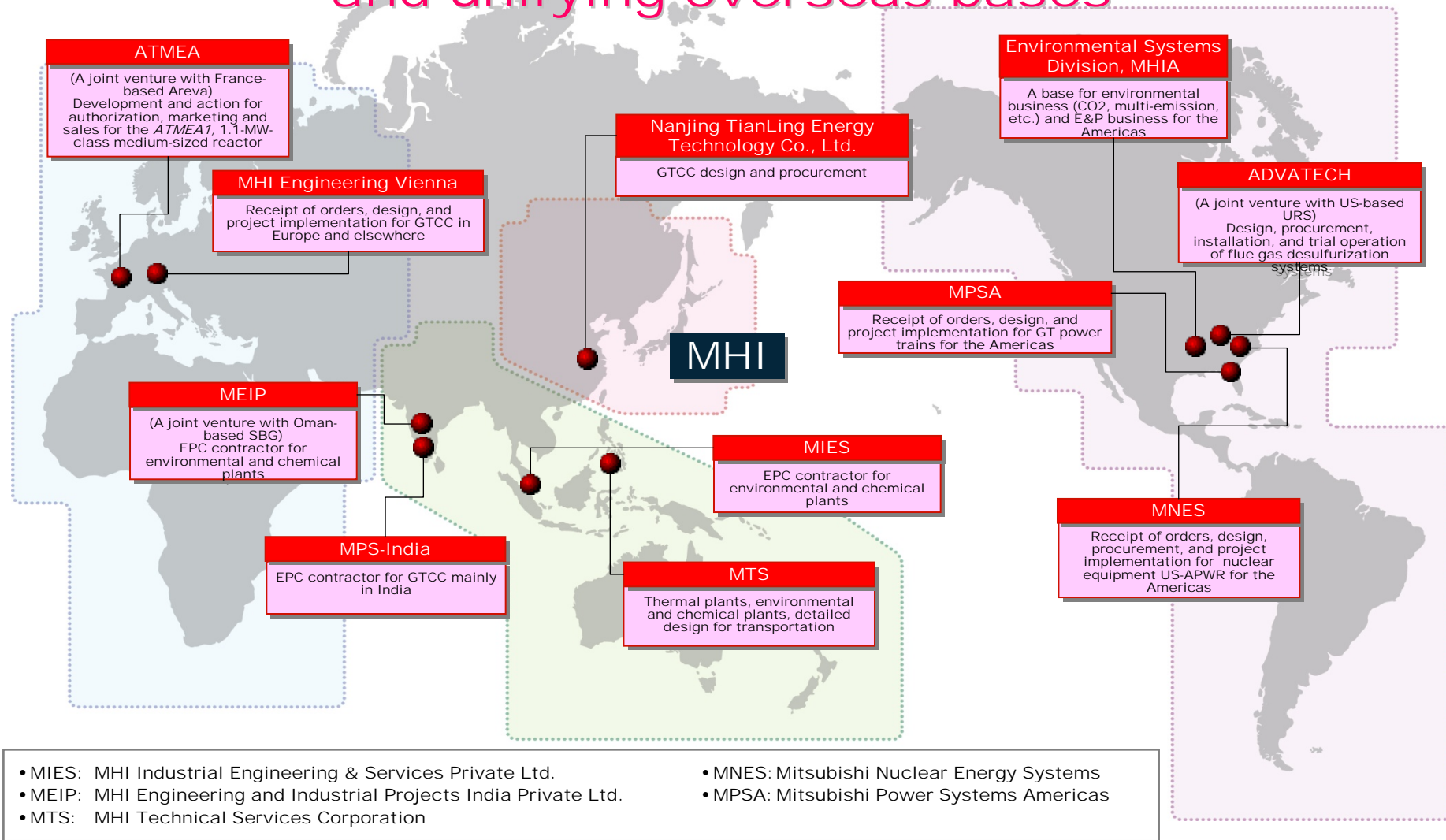
Deriving economies of scale in material procurement

Derive economies of scale in cross-sectional material procurement for power plants, environmental and chemical plants, overseas nuclear plants, and large-scale infrastructure.

Cross-sectional expansion of best practices in project implementation

Share advanced project management techniques, risk management, and design tools based on extensive experience to meet the increasingly advanced, diversified, and complex needs of customers.

Acceleration of global expansion through sharing and unifying overseas bases



2. What is Engineering?

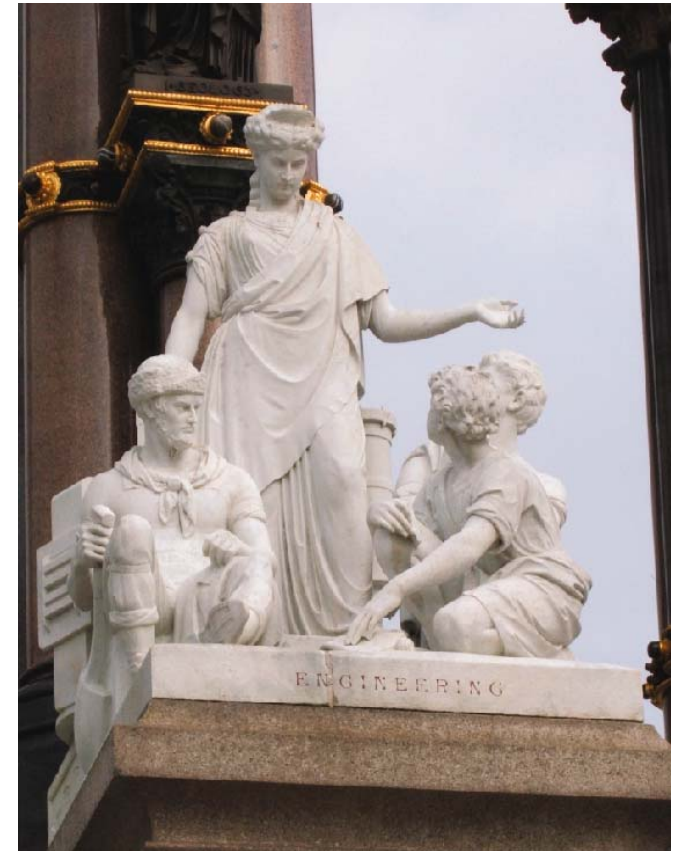
(1) A close look at engineering

Engravings on the Albert Memorial

Albert Memorial was constructed by Queen Victoria in the 19th century in memory of her husband, Prince Albert. On the four plinths, four industries that supported British prosperity in those days are engraved.

- Agriculture
- Commerce
- Manufactures
- **Engineering**

This implies that engineering was literally a **pillar of industry** in those days.



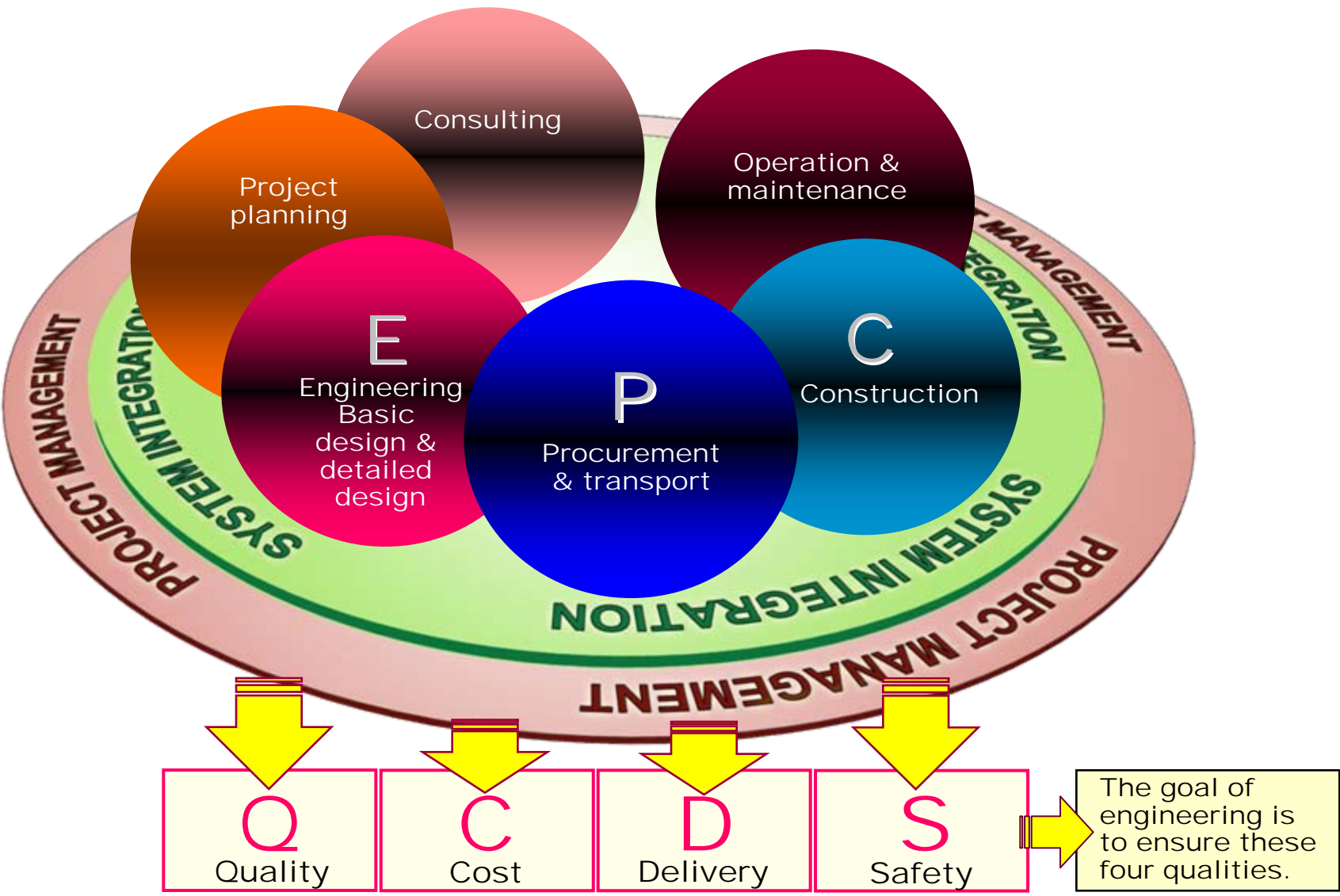
Source: Engineering Advanced Association of Japan's website: What's Engineering

What is engineering?

- Engineering is an approach of designing and constructing facilities and systems that meet social needs with the use of the knowledge and techniques (human potential) of the project team.
(e.g., the Pyramids in Egypt, the Great Wall of China, and the Roman aqueducts)

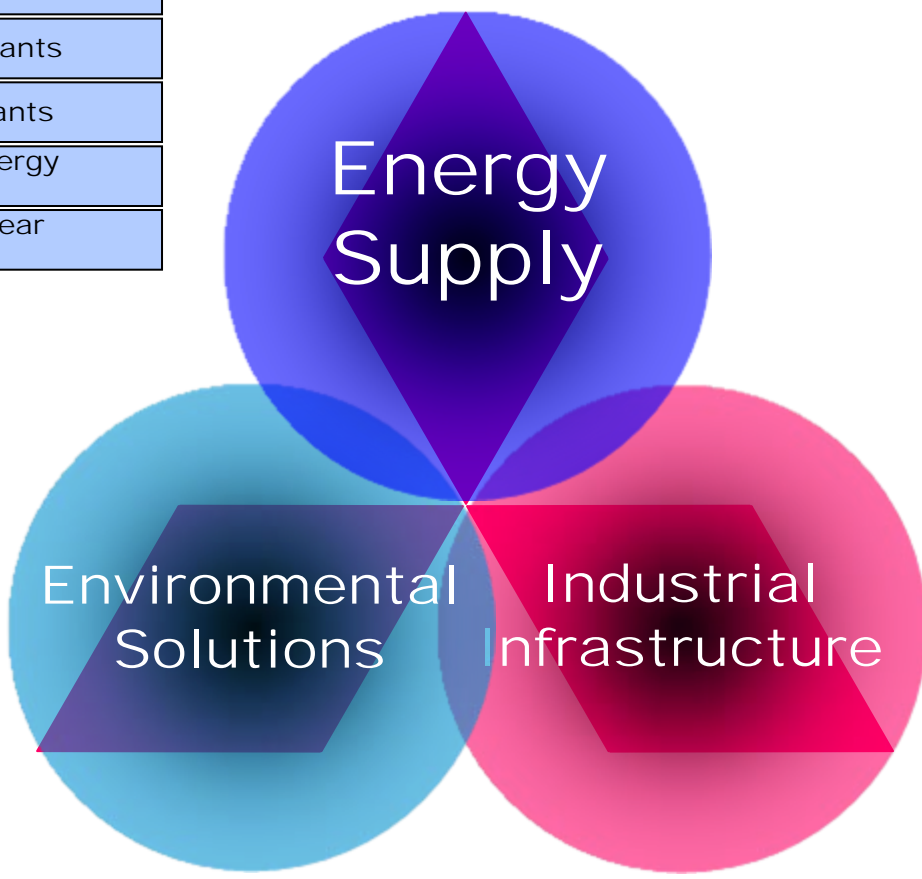
2. What is Engineering?

(2) Engineering and "Project Management & System Integration"



Energy, environmental solutions, and industrial infrastructure

- GTCC power plants
- IGCC power plants
- Coal power plants
- Renewable energy plants
- Overseas nuclear power plants

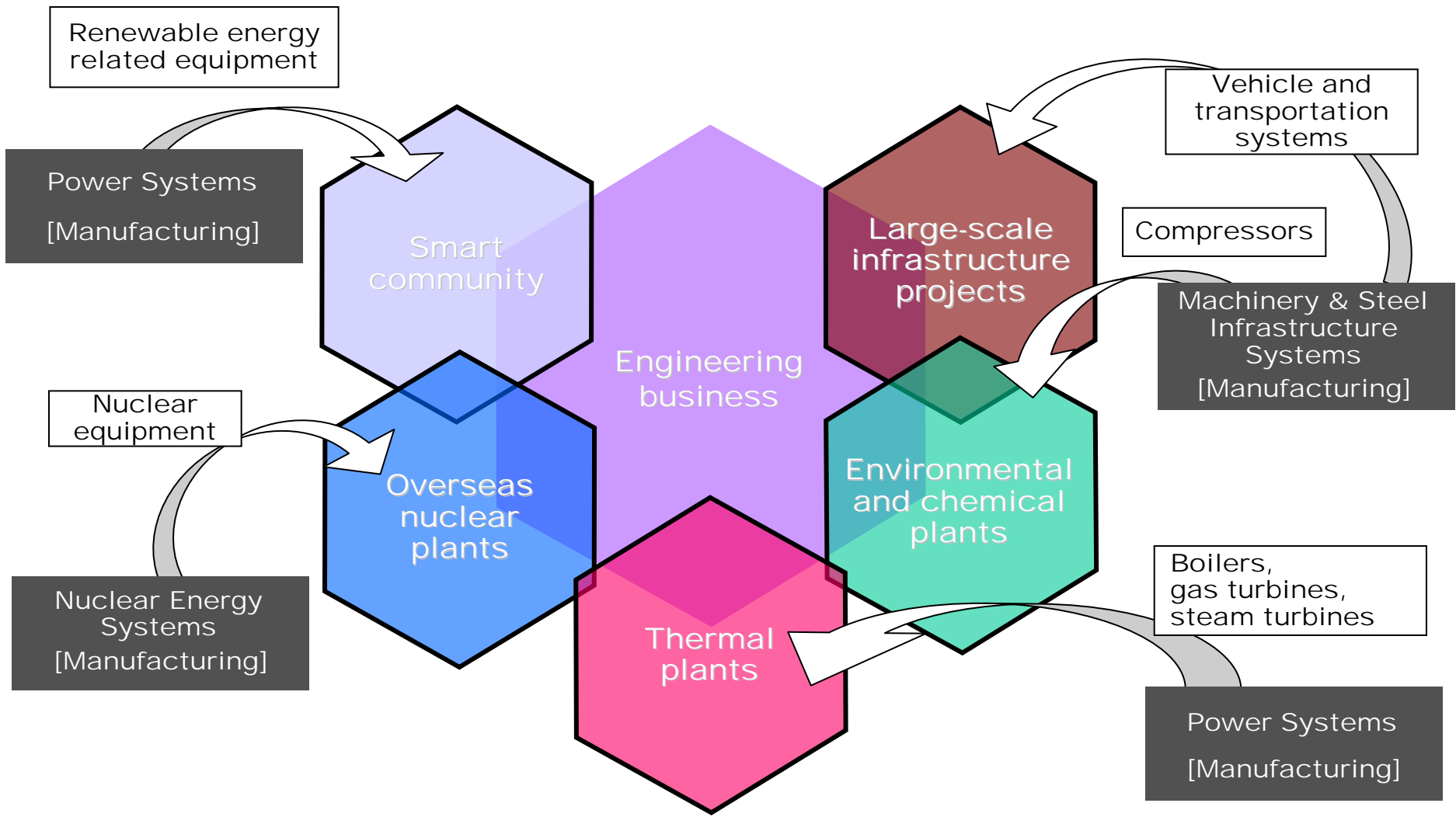


- Desalination plants
- CO₂ recovery plants
- Flue gas desulfurization plants

- Fertilizer plants
- Methanol plants
- Purified terephthalic acid plants
- Polyethylene plants
- Large-scale transportation systems

- Water solutions
- Smart community

Engineering and Manufacturing



Energy (thermal plants and nuclear plants)

Thermal plants

Kawasaki Thermal Power Station
of Tokyo Electric Power
Company Inc.



GTCC (Indonesia)



Overseas nuclear plants



US-APWR
(Advanced PWR for the United States)

Coal fired thermal plant in Chile



Renewable energy

Introducing renewable energy tailored to local conditions



Fertilizer plants

Fertilizers such as ammonia and urea are essential to agricultural or food production.



3. Business Overview of the Engineering Headquarters (3) Examples of the engineering business (iv)

Desalination plants

Producing freshwater from seawater to supply water to regions short in water resources

Rabigh Sea Water Reverse Osmosis Plant, Saudi Arabia
Water production capacity:
192,000 tons a day



Water molecules contained in seawater are passed through semi-permeable membranes to remove salt and hazardous substances and produce fresh water.



3. Business Overview of the Engineering Headquarters (3) Examples of the engineering business (v)

CO₂ recovery plants

Recover CO₂ in flue gas and inject it into oil field to increase oil production.
The injected CO₂ is immobilized in the ground.



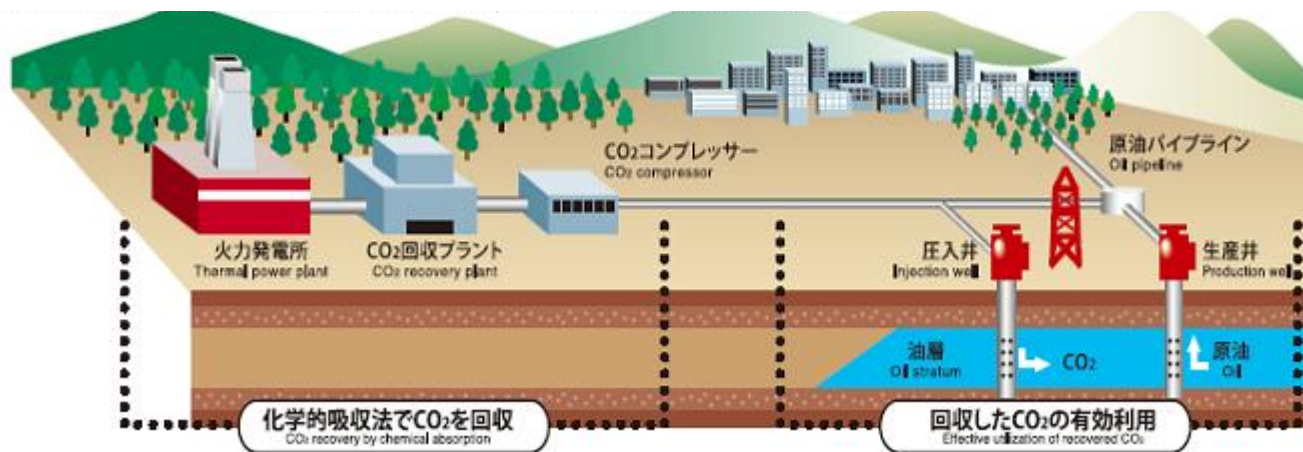
Bahrain:
450 tons per day



United States:
500 tons per day

Schematic Diagram of CO₂ Recovery and Enhanced Oil Recovery (EOR)

A chemical absorption technique is used to recover CO₂ from the flue gas emitted from power plants and factories. The CO₂ is then conveyed through pipelines to oil fields and used for EOR.



Large-scale transportation systems

Contribution to modal shift



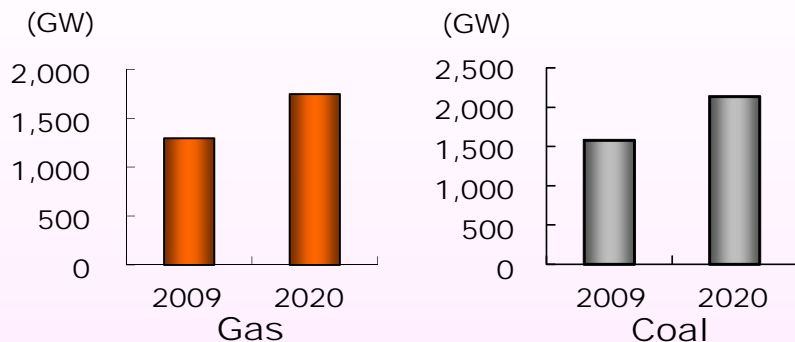
4. Enlarging Existing Businesses

(1) Market scales

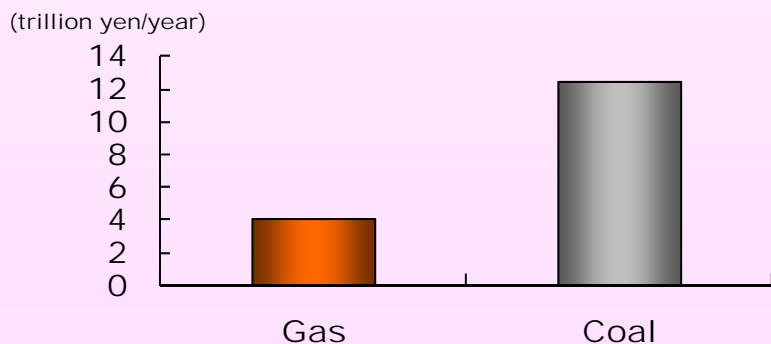
Power plants

Thermal plants (gas-/coal-fired)

Power plant capacity



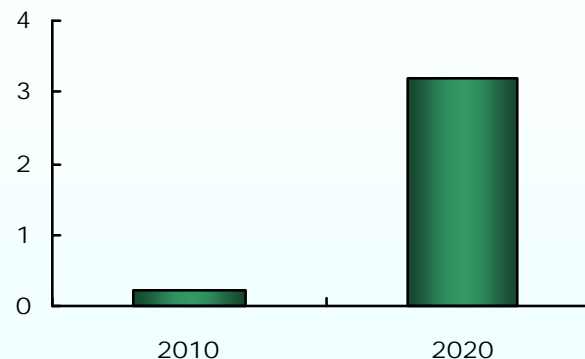
Infrastructure investments in 2010-2020



Environmental and chemical plants

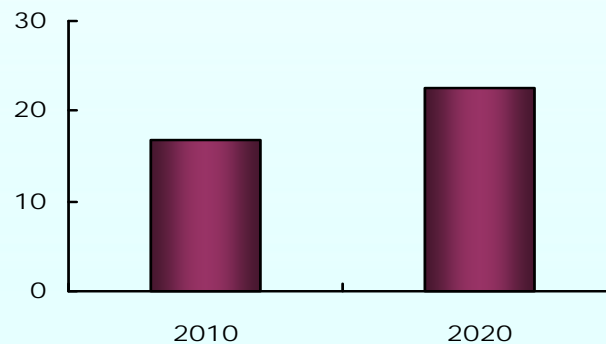
Environmental plants (CCS and others)

(trillion yen)



Chemical plants

(trillion yen)



Source: Created by MHI on the basis of UDI, Mccoy, IEA WEO2011, IEA CCS Road Map and Engineering News Record

4. Enlarging Existing Businesses

(2) Chemical plants (i)

Recent circumstances

- ◆ Major projects
 - Fertilizer plant
 - Methanol plant
 - Purified terephthalic acid (PTA) plant
 - Polyethylene plant
- ◆ Fertilizer plants experiencing medium- and long-term growth



Fertilizer plant

Actions for growth

- ◆ Positive actions centered on fertilizer and methanol plants in emerging countries in the CIS (ex-USSR) zone, in Africa, and elsewhere
- ◆ Boosting actions for effective use of natural gas
- ◆ Increasing competitiveness and accelerating global expansion with EPC implementation at overseas bases such as MIES in Singapore and MEIP in India

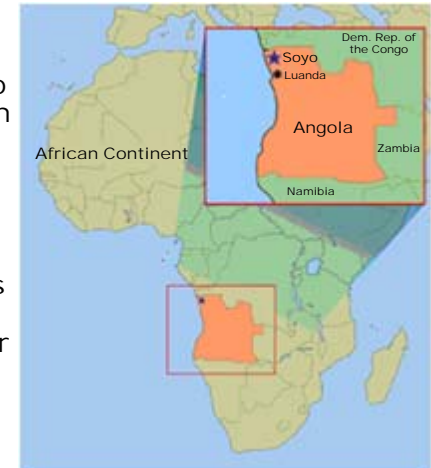
MHI received an order for a large-scale fertilizer plant to produce ammonia and urea in Malaysia in October 2011.

MHI signed an early work agreement for a fertilizer plant in Angola in November 2011.



- The order was jointly received from PETRONAS Chemical Fertilizer Sabah Sdn. Bhd. with APEX Energy Sdn. Bhd. and PT Rekasaya Industri.

- MHI, Toyo Engineering Corporation, Sojitz Corporation, and Sumitomo Corporation entered into an early work agreement covering part of the engineering work (plant basic design, preparation of engineering documents and contracts, site surveys and other work) for an ammonia and urea fertilizer plant with the Ministry of Geology, Mining and Industry (MGMI) of the Republic of Angola.



MHI is among the market share leaders in the worldwide market of fertilizer plants.

- Increasing food production amid population growth and improved living standards is a global issue.

➡ One of the market share leaders with an excellent track record in fertilizer plant construction

➡ A world-leading manufacturer of high efficiency compressors and drive turbines at the heart of plants

- A large-scale ammonia and methanol concurrent production facility for the Rep. of Tatarstan

➡ MHI is the world's only company to have constructed an ammonia and methanol concurrent production facility.

4. Enlarging Existing Businesses

(3) Environmental plants (i)

Recent circumstances

- ◆ Flue gas desulfurization plants:
 - Stepping up efforts to win projects mainly for seawater desulfurization plants in emerging countries
- ◆ CO₂ recovery plants:
 - An industry-leading track record in orders for commercial plants (to construct 11 plants)
 - Working on projects to boost fertilizer production in the Middle East and Asia as well as a verification project in the West

A carbon capture facility at Southern Company's Plant Barry came into operation in June 2011 to capture 500 ton/day CO₂.

- The carbon capture facility came into operation in June 2011.
- A total CO₂ recovery volume reached 57,580 tons as of April 12, 2012, after 3,044 hours of operation.
- Underground storage is set to start around summer 2012.



Actions for growth

- ◆ Flue gas desulfurization plants:
 - U.S. environmental regulations tightened
 - Focusing energy on seawater desulfurization plants in Asia
- ◆ CO₂ recovery plants:
 - Action for large-scale CCS/EOR(*) projects
 - Projects at MIES, MEIP and other overseas bases underway

(*) CCS: Carbon capture and storage, EOR: Enhanced oil recovery

MHI received the first order for a large-scale CO₂ recovery plant for increasing methanol production from a petrochemical company in Qatar in March 2012.

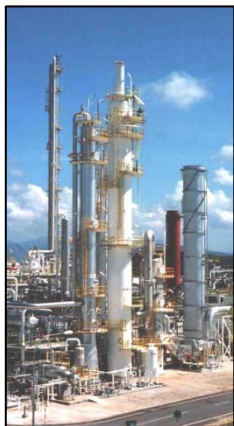
- It is the first order received for a CO₂ recovery plant for increasing methanol production. It will have a world-class CO₂ recovery capacity for commercial systems for chemical purposes, at 500 ton/day.
- It is the first EPC order received by MIES.



4. Enlarging Existing Businesses

(3) Environmental plants (ii)

CO2 recovery plants (commercial and demonstration facilities) delivered or under construction



1999:
200 ton/day
Malaysia
<Urea>



2005:
330 ton/day
Japan
<General>



CO₂ Recovery (CDR) Plant -
IFFCO Aonla Unit (India)

2006:
450 ton/day
India
<Urea>



CO₂ Recovery (CDR) Plant -
IFFCO Phulpur Unit (India)

2006:
450 ton/day
India
<Urea>



2009:
450 ton/day
India
<Urea>



2009:
400 ton/day
Abu Dhabi
<Urea>



2009:
450 ton/day
Bahrain
<Urea>



2010:
240 ton/day
Vietnam
<Urea>



2011:
340 ton/day
Pakistan
<Urea>



2011: 500 ton/day
United States
<CCS demonstration
at coal-fired power plant>



Q2 2012:
450 ton/day
India
<Urea>



Q2 2014:
500 ton/day
Qatar
<Methanol>

MHI is the world leader in flue gas CO₂ recovery technology.

- The large-scale CO₂ recovery demonstration plant (with CO₂ recovery capacity of 500 ton/day) at Southern Company's Plant Barry in the United States

→ A CCS demonstration facility among the world's largest at a coal-fired power plant

→ The potential for boosting capacity to 3,000 ton/day or more

- A track record of delivering 12 commercial and demonstration facilities (with the KS-1™ process jointly developed with Kansai Electric Power Co., Inc.)

→ An overwhelming market share in commercial facilities

→ Commercialization achieved earlier than the competition to lead in energy-saving technologies

MHI is the world leader in flue gas desulfurization technology.

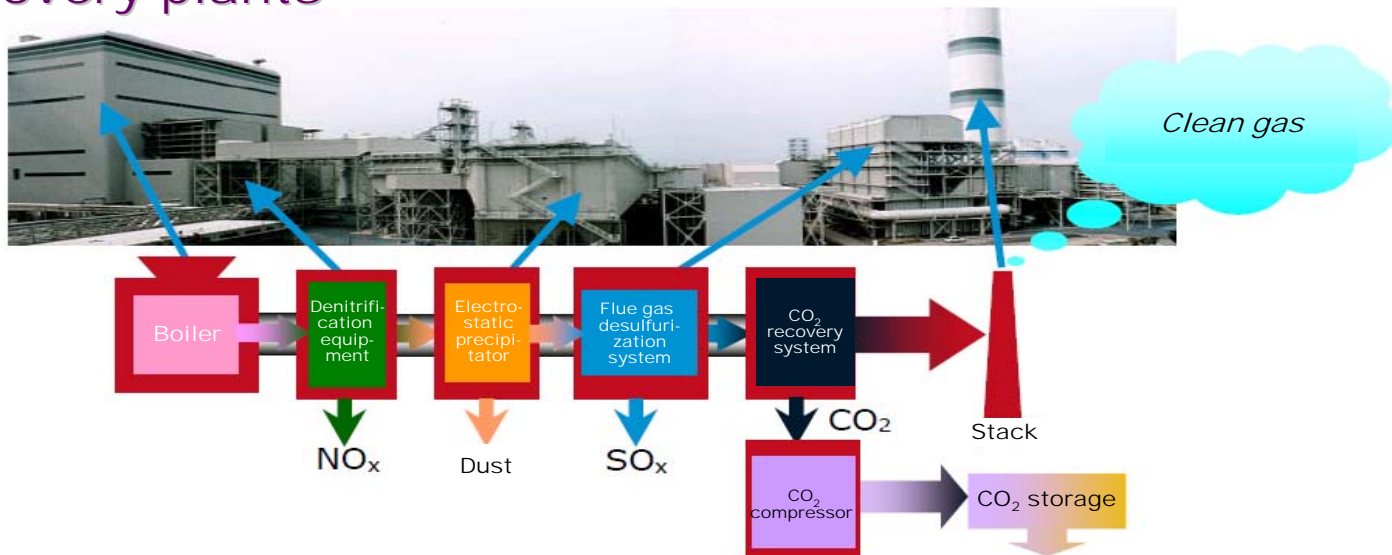
- Market share: 43% in Japan, 14% in the world (on MW basis)

- World-leading market share with flue gas desulfurization technology

- A track record that includes delivering more than 200 plants around the world

- Mitsubishi Flue Gas Treatment System

- MHI as a one-stop provider of boilers, denitrification equipment, electrostatic precipitators, desulfurization plants, and CO₂ recovery plants



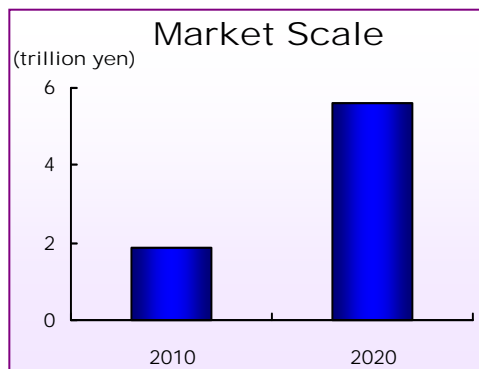
5. Expanding into New Fields and Businesses

(1) Market scale of the large-scale infrastructure and solution business

Large-scale infrastructure

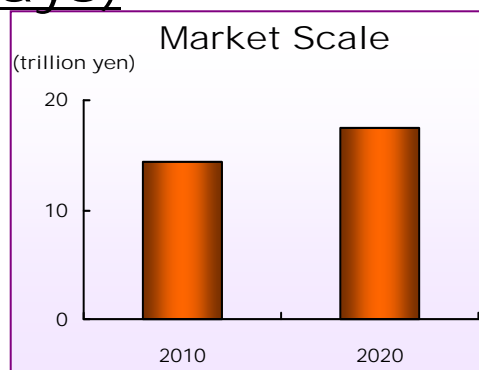
Overseas nuclear plants

- Full-scale launch in this market after gathering EPC knowledge in the whole company



Large-scale transportation system (railways)

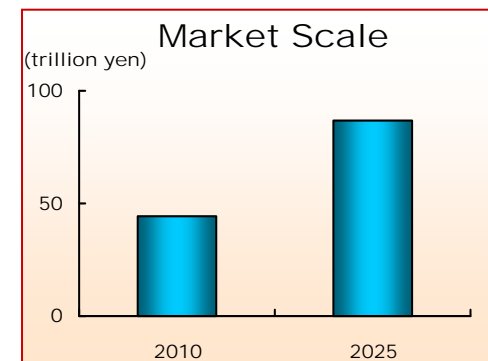
- Overseas high speed railway projects and other large-scale railway projects



Solutions

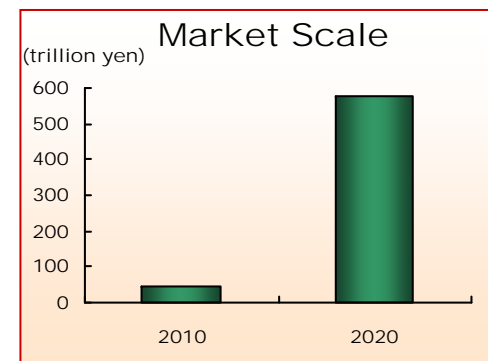
Water solutions

- Desalination
- Industrial water
- Industrial sewage
- Recycled water



Smart community

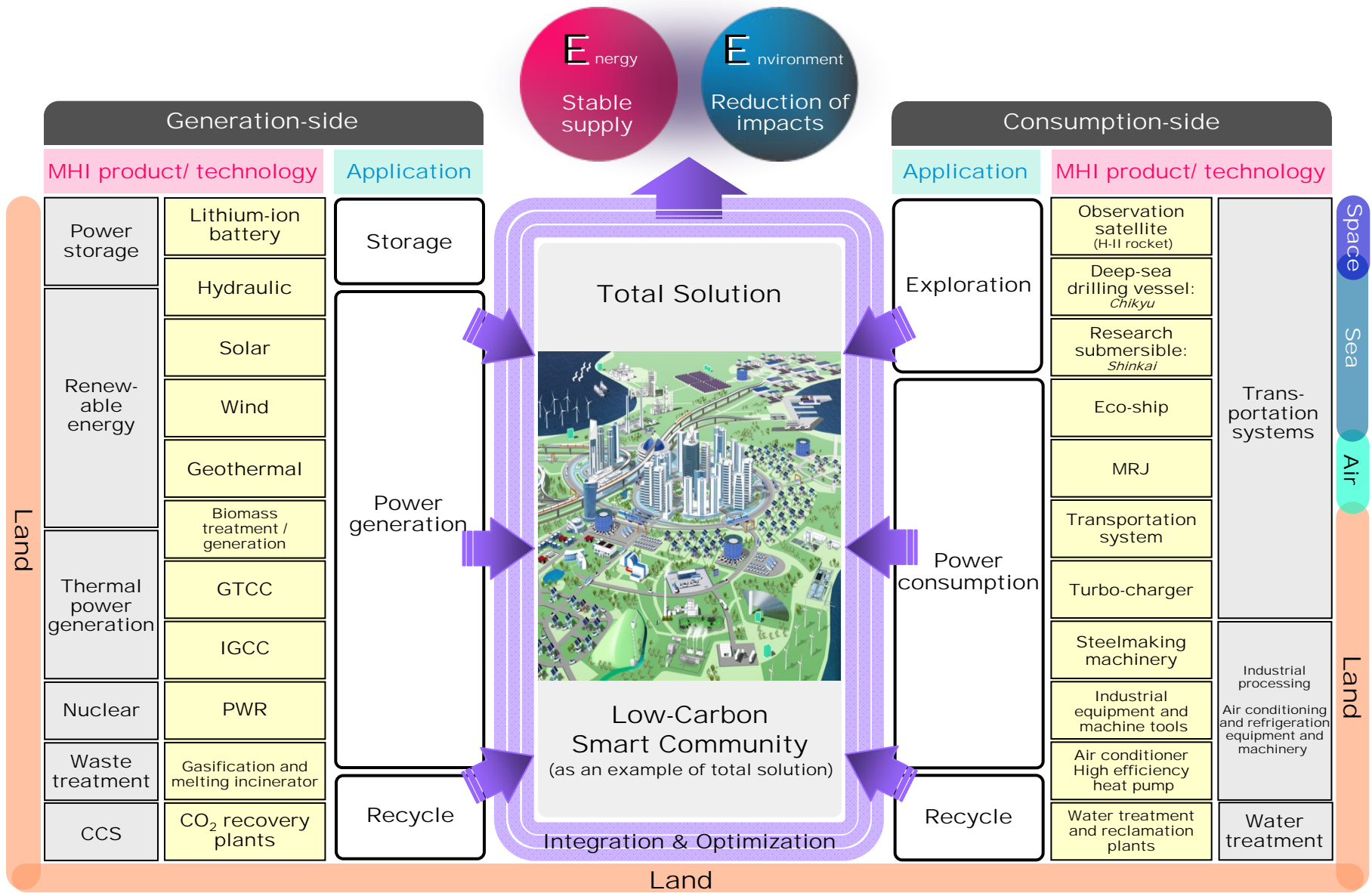
- Renewable energy
- Power storage systems
- Energy management (except in North America and Europe)



Source: Created by MHI on the basis of materials from the Ministry of Economy, Trade and Industry, the Ministry of Land, Infrastructure, Transport and Tourism, Japan Atomic Industrial Forum, Inc. and Mitsubishi Research Institute, Inc. and *Sekai Smart City Soran* (Comprehensive Guide to Smart Cities of the World)

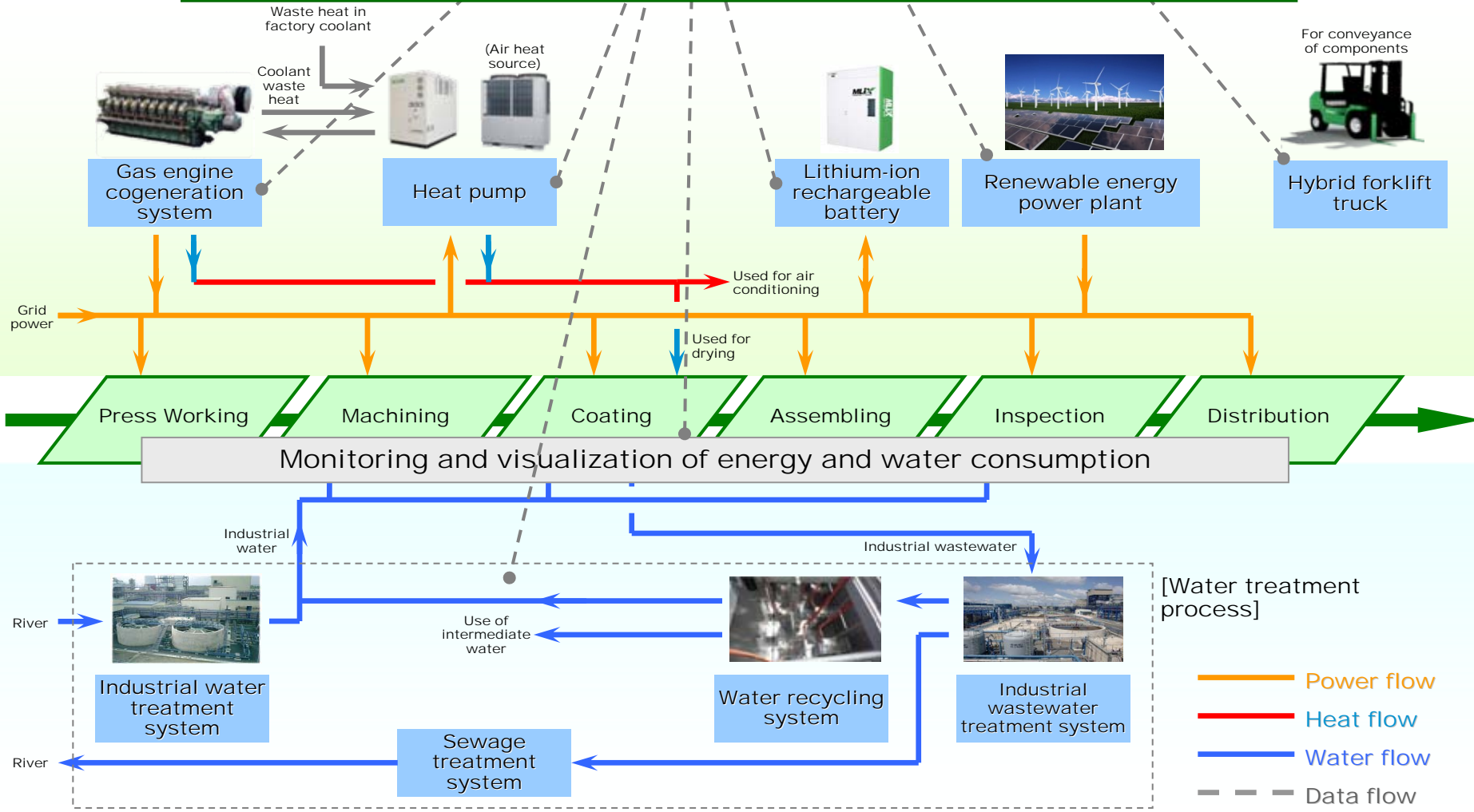
5. Expanding into New Fields and Businesses

(2) Total solutions in energy and the environment



5. Expanding into New Fields and Businesses
 (3) Total energy solutions in factories (an example of energy demand-supply optimization)

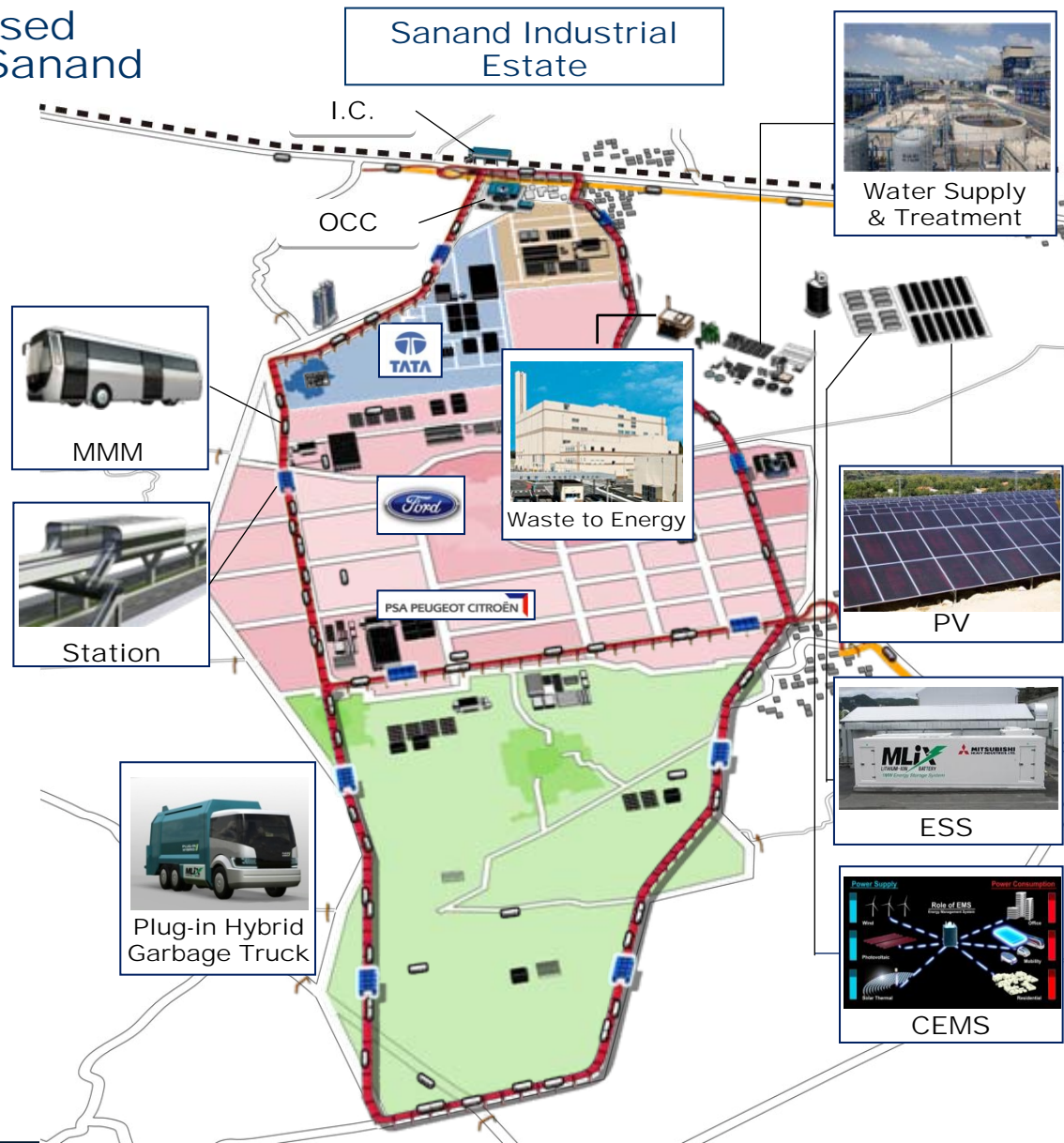
Energy and environmental management



Operation and control in light of demand from processes and the characteristics of equipment introduced for optimization as a comprehensive system.

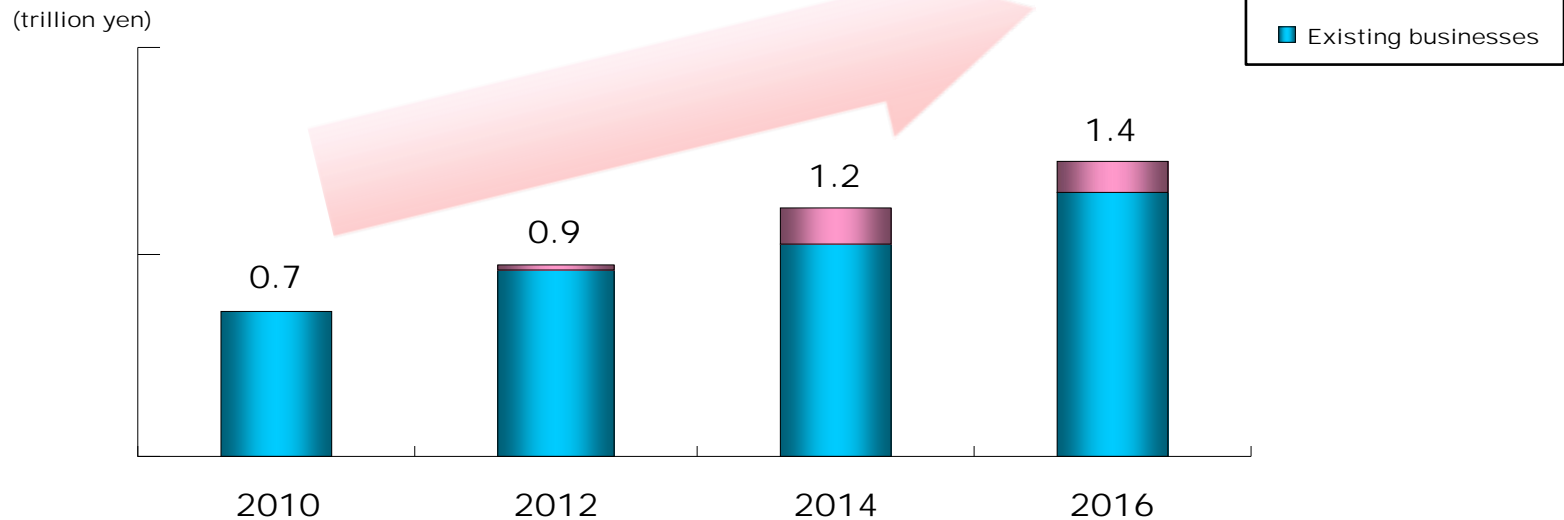
5. Expanding into New Fields and Businesses
(4) Smart community: DMIC in India - Sanand District in the State of Gujarat

Four core infrastructures proposed for the industrial estate in the Sanand District in the state of Gujarat



Business Target of the Engineering Headquarters

Targeting a two-fold increase in orders compared to 2010 in 2016



Note: The figures include portions of relevant business headquarters (Power Systems, Nuclear Energy Systems, and Machinery & Steel Infrastructure Systems) as well as the Engineering Headquarters.

Missions to achieve the target

- Expand the orders for large-scale infrastructure projects including the existing EPC business.
- Contribute to the expansion of the internal core technology and product business.
- Work on the solution business, including the smart community and general water business.
- Further business development of next-generation businesses.



Our Technologies, Your Tomorrow

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

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