

# 2021 Medium-Term Business Plan Progress (FY2021-2023)

May 12, 2022

Seiji Izumisawa, President & CEO

Mitsubishi Heavy Industries, Ltd.

## **I. 2021 MTBP Overview**

## **II. Strengthening Profitability**

## **III. MHI Sustainability Initiatives & Carbon Neutrality**

### **III-1. Energy Supply**

### **III-2. Energy Use**

## **IV. Key Takeaways**

## **V. Appendix**

# I. 2021 MTBP Overview



## 2021 MTBP (FY21-23)

**Strengthen profitability**

**Develop growth areas**

### **Profitability**

Business profit margin 7%  
ROE 12%

### **Financial Stability**

Total assets turnover 0.9  
Maintain FY20 level of  
interest-bearing debt

**Growth** -New business revenue-  
100 billion yen by FY23  
1 trillion yen by FY30

### **Dividends**

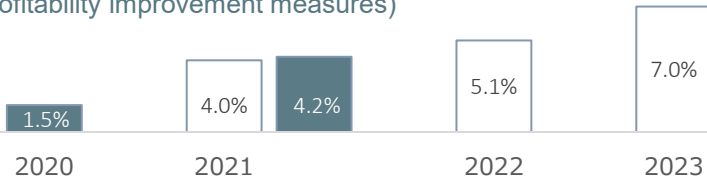
Record-high dividend per  
share

- Overcame negative impact from delayed COVID-19 recovery in Aero Structures as well as semiconductor shortages and materials cost inflation with successful profitability improvement measures to achieve all KPI targets
- Impact from Russia/Ukraine conflict currently limited. Will continue to closely monitor situation.

## Profitability

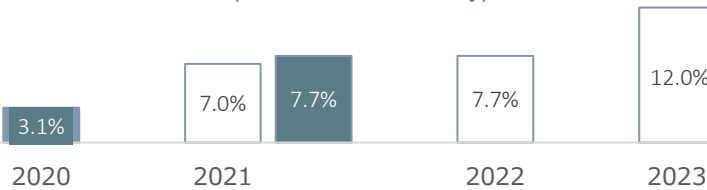
**Business Profit Margin: ✓**

(Contribution from progress in revenue scale recovery and profitability improvement measures)



**ROE: ✓✓**

(Same as Profitability)



## Financial Stability

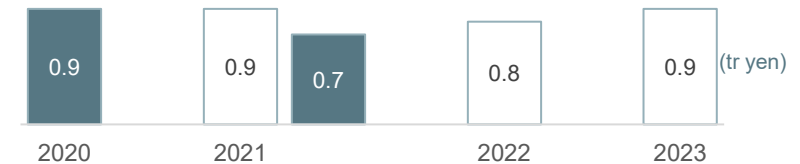
✓✓ Exceeded plan ✓ Achieved Plan

**Total Asset Turnover: ✓**



**Interest-Bearing Debt: ✓✓**

(Contribution from increased cash flow due to profit increases and working capital management)



## Growth

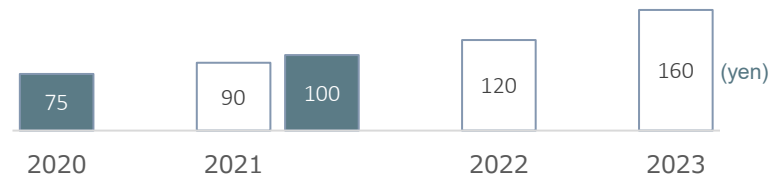
**Good progress toward meeting FY23 targets**

See III. MHI Group Sustainability Initiatives for details

## Shareholder Return

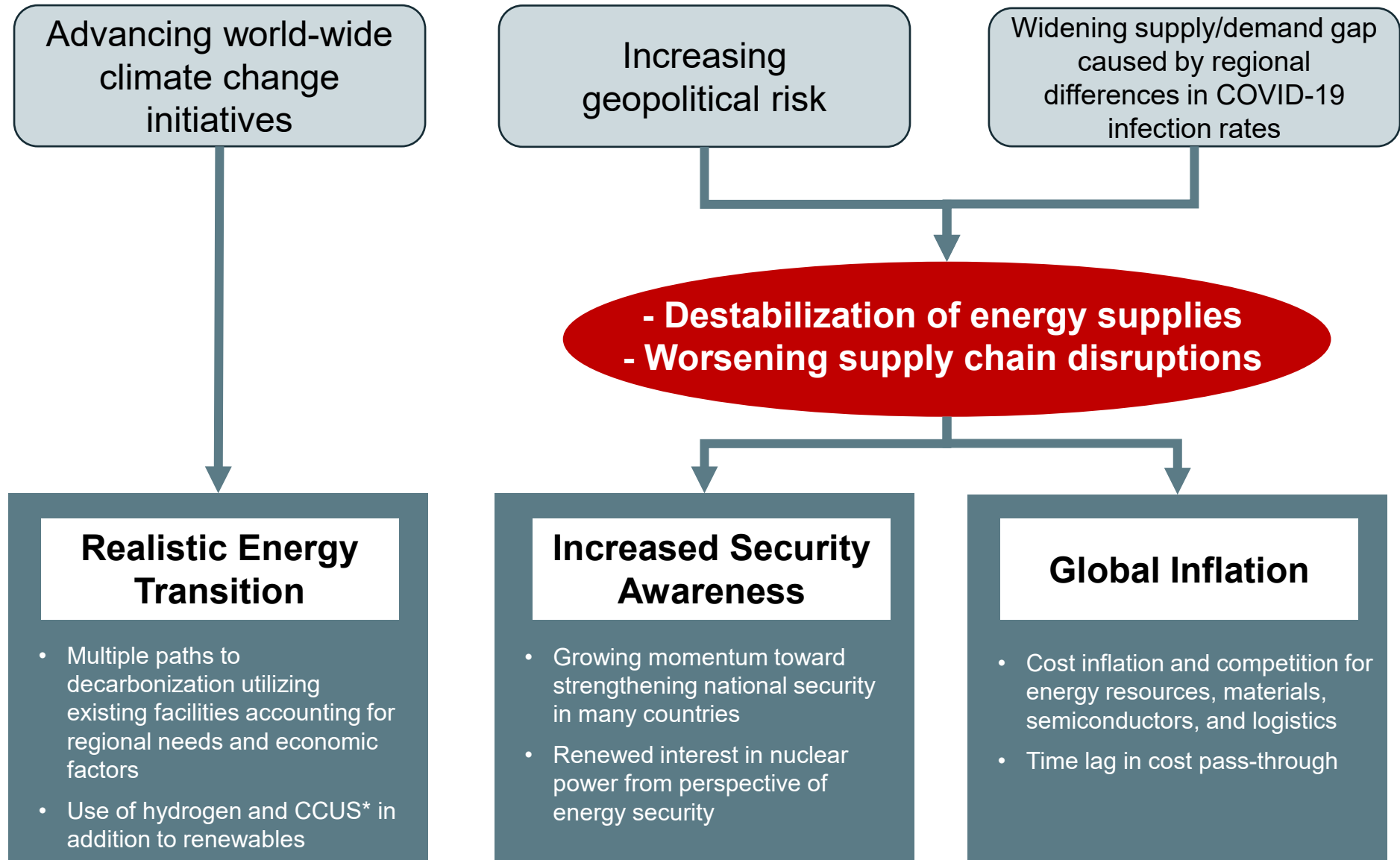
**Dividends per Share: ✓✓**

(Contribution from Profitability and Financial Stability results exceeding plan)





## II. Strengthening Profitability



# Path to FY23 Target Achievement

- Continue timely response to changes in business environment and position FY22 as a springboard for further profit improvement
- Determined to achieve 7% business profit margin in FY23, the final year of the 2021 MTBP period, as the culmination of our key initiatives

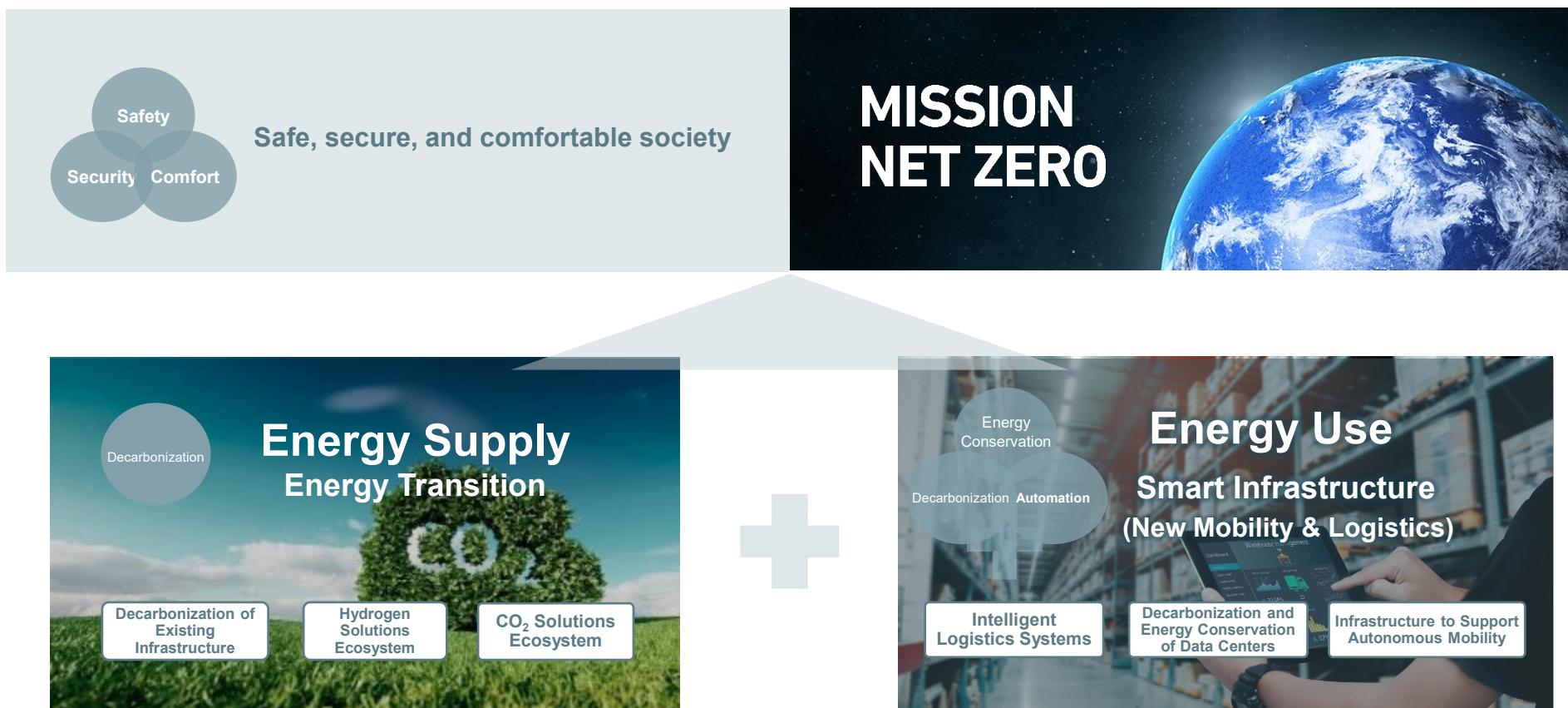
		FY21 Results	Actions to Achieve FY22-23 Targets
2021 MTBP Initiatives	COVID-19 Recovery	<ul style="list-style-type: none"> <li>• Logistics, Thermal &amp; Drive Systems and Aero Engines recovered as forecasted</li> <li>• Aero Structures recovery delayed</li> </ul>	<ul style="list-style-type: none"> <li>• Aero Engines to strengthen internal manufacturing capabilities by opening new Nagasaki Plant</li> <li>• Further fixed cost reductions in Aero Structures</li> </ul>
	Existing Business Growth	<ul style="list-style-type: none"> <li>• Strengthened sales networks and service organizations in anticipation of market recovery</li> </ul>	<ul style="list-style-type: none"> <li>• Grow businesses with improved sales networks and service bases (Europe, Asia [incl. China], and Australia)</li> </ul>
	Profitability Improvements & Organizational Transformation	<ul style="list-style-type: none"> <li>• Pivoted to services</li> <li>• Consolidated organization and locations. Continued pursuing business divestments.</li> </ul>	<ul style="list-style-type: none"> <li>• Grow services by strengthening DX organization</li> <li>• Continue business portfolio optimization</li> </ul>
	Fixed Cost Reductions	<ul style="list-style-type: none"> <li>• Cut SG&amp;A (excl. innovation investments)</li> <li>• Increased corporate function efficiency by integrating with Mitsubishi Power</li> </ul>	<ul style="list-style-type: none"> <li>• Further optimization through DX and other initiatives. Shift human resources.</li> <li>• Continue underutilized asset sales</li> </ul>
Adapt to Changing Business Environments	Realistic Energy Transition	( Little direct impact in FY21, but recognized as important medium-term trend )	<ul style="list-style-type: none"> <li>• Increase business opportunities by proposing Energy Transition initiatives tailored to each region's needs</li> </ul>
	Increasing Security Awareness		<ul style="list-style-type: none"> <li>• Contribute to Japan's national security</li> <li>• Strengthen support for both Japan domestic and international new nuclear power plant installations (next-generation reactors, component export)</li> </ul>
	Global Inflation		<ul style="list-style-type: none"> <li>• Began appropriate cost pass-throughs in response to negative impact of materials cost inflation and semiconductor shortages</li> </ul>
		<ul style="list-style-type: none"> <li>• Pursue appropriate cost pass-throughs. Revisit contract terms.</li> </ul>	





### III. MHI Group Sustainability Initiatives & Carbon Neutrality

- Achievement of Carbon Neutrality is essential to realizing a sustainable society that is safe, secure, and comfortable
- MHI Group will promote decarbonization of energy supplies through the Energy Transition together with energy conservation, automation, and decarbonization of energy use with Smart Infrastructure



## Energy Transition

- Carbon Neutrality commitments, which began in Europe, **spread** to U.S., China, and **rest of world**
- In response to this, the consideration of **specific measures** for a variety of regions and industries is **accelerating**
  - Awareness level of the **importance of diverse paths to Carbon Neutrality** is rising as a reflection of recent urgency of energy security concerns. Multiple paths should be developed **with a view to S + 3Es<sup>1</sup>**, without limiting to a renewables-only approach
  - **Interest took off in specific projects in the CCUS space**, which will enable Carbon Neutrality in hard-to-abate industries<sup>2</sup>, such as steelmaking, cement, and chemicals

## Smart Infrastructure (New Mobility & Logistics)

- Due to prolongation of COVID-19 pandemic, e-commerce experienced explosive growth driven by consumer demand during lockdowns. **Labor shortages in the logistics industry are becoming more severe**, and the trend toward automation in logistics and manufacturing is accelerating
- **Demand for data centers is booming** as the digitalization of society accelerates
- Further demand for **decarbonization and energy conservation** of energy use

<sup>1</sup> Safety + Energy Security, Economic Efficiency, and Environment, the basis of Japan's energy policy since 2014

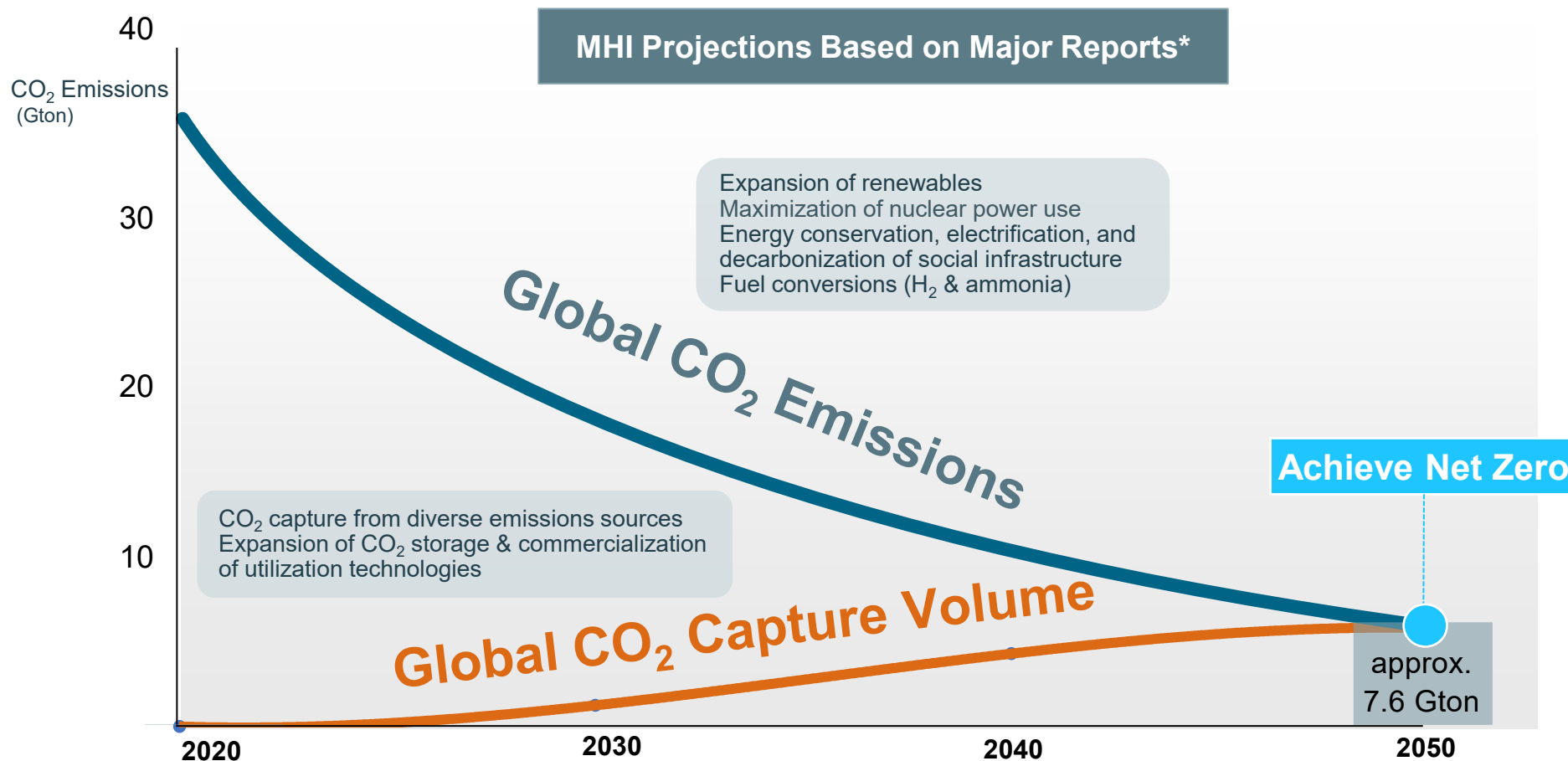
<sup>2</sup> Industrial or energy sectors which are considered difficult to decarbonize

# III-1. Energy Supply Energy Transition



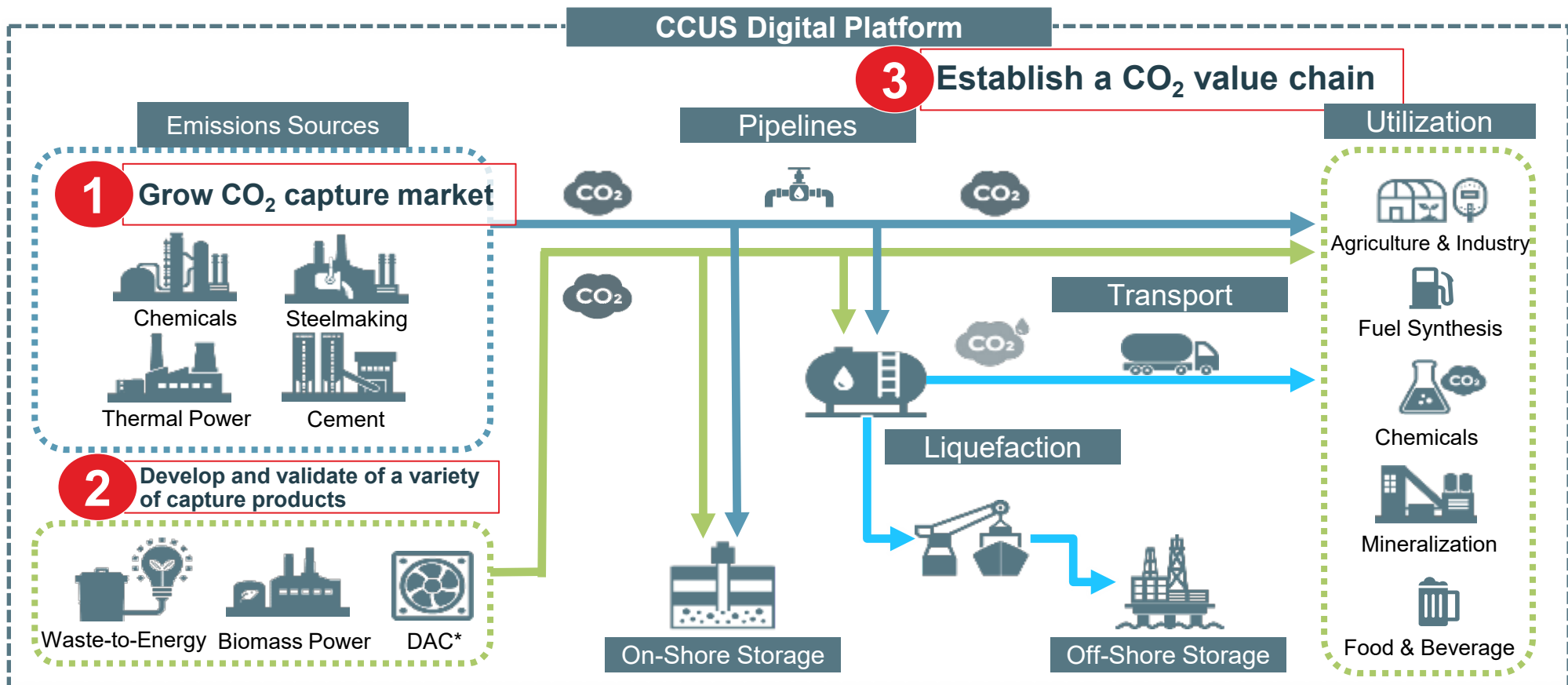
# Realizing a CO<sub>2</sub> Solutions Ecosystem

- CO<sub>2</sub> capture (1/4 of current emissions) combined with emissions cuts is essential to achieve Carbon Neutrality
- Need increasing for compact CO<sub>2</sub> capture systems for industrial plants in addition to large scale capture systems for energy and chemical sectors
- Initiatives in capture, transport, storage, and utilization are gaining momentum



# Realizing a CO<sub>2</sub> Solutions Ecosystem

- Need to build a CO<sub>2</sub> solutions ecosystem to connect diverse emissions sources with storage and utilization providers
- MHI Group will respond to the CO<sub>2</sub> capture needs of diverse industries by leveraging our long track record with this technology
- Invest in technological innovation to grow the utilization market
- Proposing a digital platform (CO<sub>2</sub>NNEX) to help build a value chain

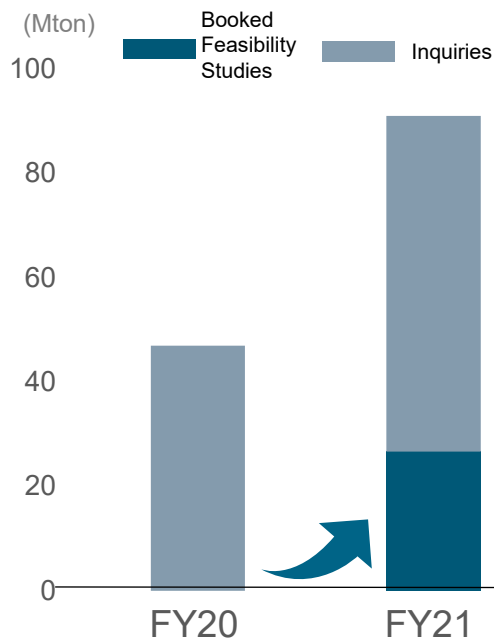


# 1. Grow CO<sub>2</sub> Capture Market

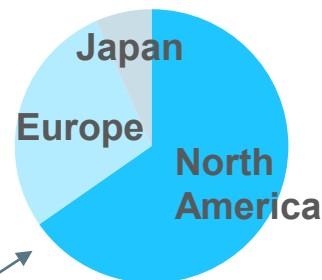
- Inquiries for CO<sub>2</sub> capture increasing in North America, Europe, and Japan
- Booked orders for feasibility studies representing approximately 27 Mton/year of CO<sub>2</sub> leveraging MHI Group's proven track record, unique technologies, and capability to operate across sectors
- Will continue responding to customer inquiries and maintain world's top market share

## Inquiries Increasing

### CO<sub>2</sub> Capture Volume



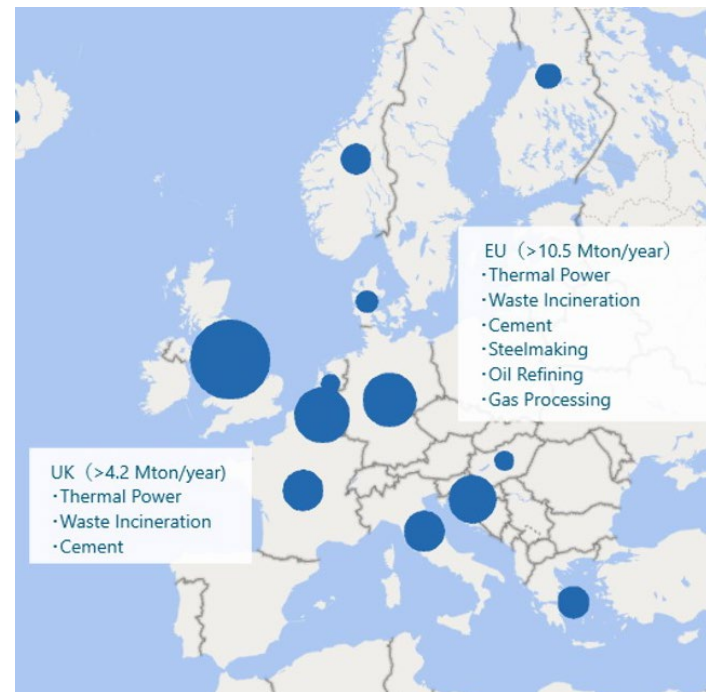
### Breakdown of Booked Feasibility Studies by Region



approx. 27 Mton/year<sup>1</sup>

18x capture volume of the world's largest CO<sub>2</sub> capture project, Petra Nova (a 1.5 Mton/year MHI-supplied CO<sub>2</sub> capture facility in Texas, U.S.)

## Examples of Major Inquiries in Europe



## 2. Develop and Validate a Variety of CO<sub>2</sub> Capture Products

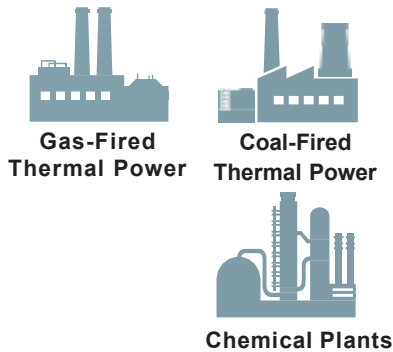
- Expand product lineup by standardizing and modularizing CO<sub>2</sub> capture systems to address projected growth in compact capture systems for diverse industries (including hard-to-abate sectors). Finish validation testing with partners by end FY23.
- Proposing new service businesses, including automated and remote operation as well as CaaS\* and working to build a CO<sub>2</sub> solutions ecosystem. Commercialize starting in FY24.

### CO<sub>2</sub> Emissions Sources

#### Current

##### Large Scale (Build to Order)

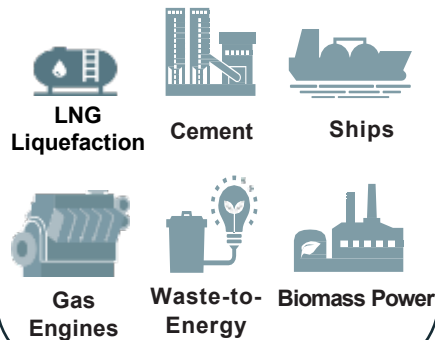
##### Energy & Chemicals



#### Future

##### Compact (Standardized/Modularized)

##### Diverse Industries



### MHI Group Initiatives

#### Expand product lineup

Type	Standard CO <sub>2</sub> Capture Volume	Footprint
A	0.3 tons/day	7 m x 2 m
B	3 tons/day	12 m x 4 m
C	30 tons/day	15 m x 15 m
D	100 tons/day	25 m x 20 m
E	200 tons/day	35 m x 25 m

**Standardize & Modularize**

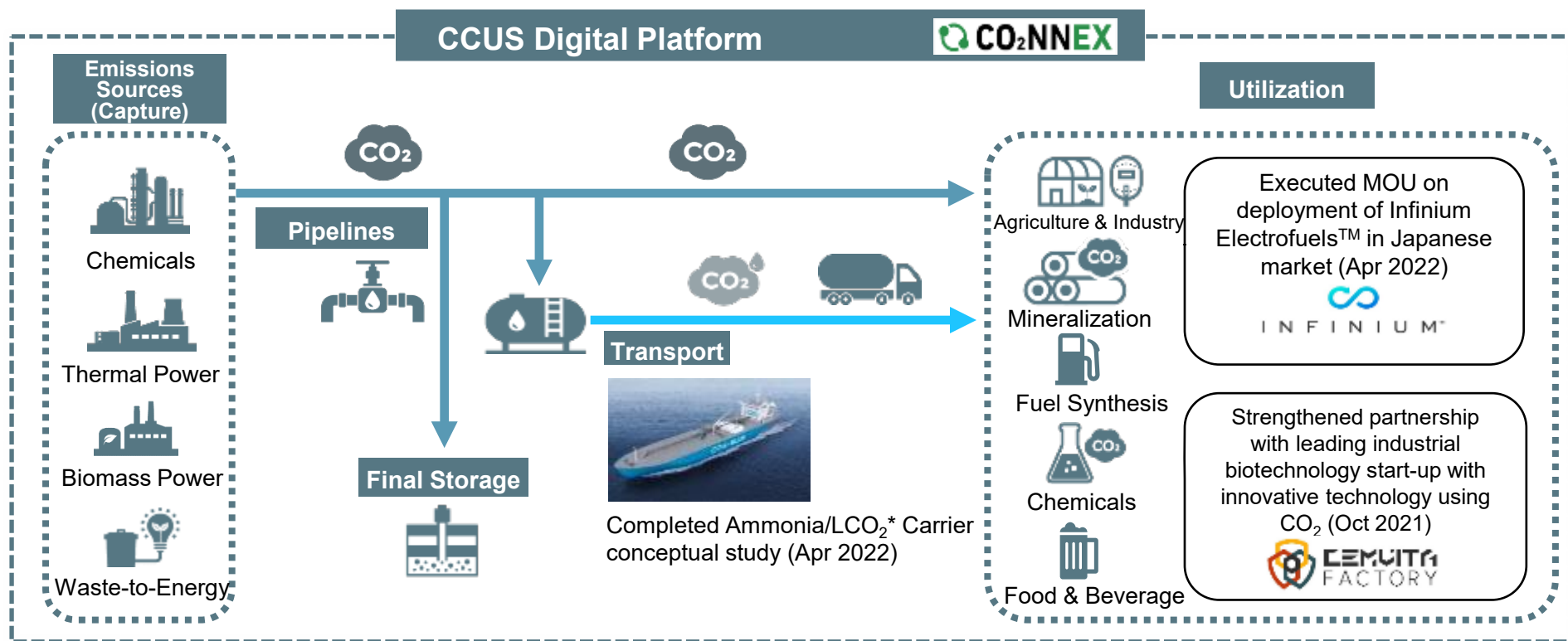
#### Validation Partners





### 3. Establish a CO<sub>2</sub> Value Chain

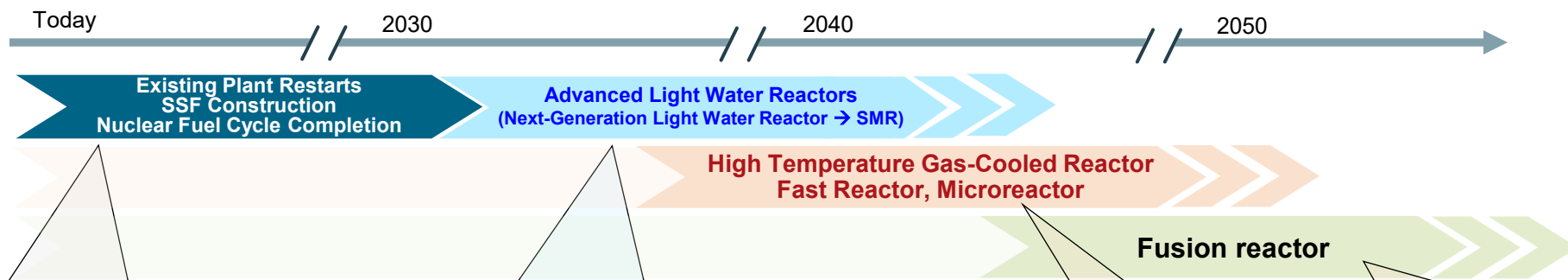
- Need to utilize and store CO<sub>2</sub> in order to drive growth in CO<sub>2</sub> capture. Exploring and applying technological innovation through open innovation.
- Need to connect capture, transport, storage, and utilization to build a complete value chain
- MHI proposes the CO<sub>2</sub>NNEX digital platform as a way to achieve this and is planning several Proofs of Concept (PoC) mainly in Japan
- Executing feasibility study on commercialization of transport portion of value chain



# Decarbonizing Existing Infrastructure

## Nuclear Power's Contributions to Decarbonization (1/2)

- Renewed interest in nuclear power from decarbonization and energy security perspective has led several countries to announce plans for new installations
- Within Japan, the latest Strategic Energy Plan aims to increase percentage of national power generation from nuclear to 20-22% by 2030
- As a leader in the nuclear power technology space, MHI Group will pursue the following initiatives:
  - Continue existing plant restarts and construction of SSFs<sup>1</sup>. Complete the nuclear fuel cycle.
  - Design a next-generation light water reactor with further safety improvements
  - Other initiatives including development of a high temperature gas-cooled reactor for hydrogen production and collaboration with U.S. start-up TerraPower on fast reactor development



### Existing Plants

- PWR restarts and SSF construction (10 plants restarted with 16 more slated for restart)
- Expand support for BWRs

### Fuel Cycle

- Working to complete construction of nuclear fuel reprocessing facility and MOX processing plant. Will provide maximum support for maintenance after completion.

### Next-Generation Light Water Reactor

(high output, stable power)

- Further improve safety with innovative technologies (incl. core catcher and radiation leak prevention system)
- Improve compatibility with renewables by increasing output adjustment capability

### Small Modular Light Water Reactor

(distributed power)

- Improve safety with innovative technologies such as integrated reactor vessel design

### High Temperature Gas-Cooled Reactor

(high volume, stable hydrogen production)

- Began demonstration program for hydrogen production using High Temperature Engineering Test Reactor (HTTR) with JAEA<sup>2</sup> (Apr 2022)

### Fast Reactor

(efficient resource usage, reduction of radioactive waste volume)

- Executed MOU with U.S. start-up TerraPower for development collaboration (Jan 2022)

### Microreactor (for remote islands/emergency power supply)

- Pursuing development with new concept (all-solid-state reactor)

### Fusion reactor (perpetual energy source)

- Manufacturing main equipment for ITER<sup>3</sup>. Developing plan for prototype reactor.

### Advanced Light Water Reactor Series

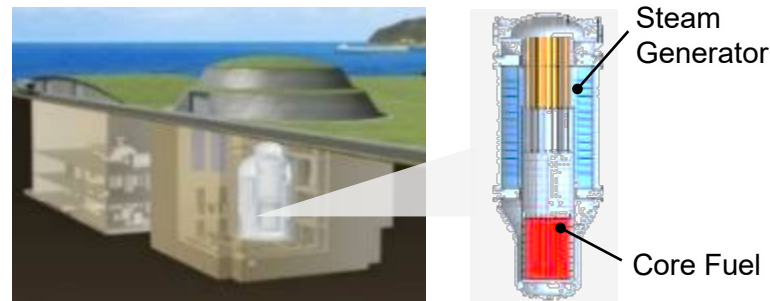
#### Next-Generation Light Water Reactor

- ✓ Power generation for existing grids (power output: max 1.2 GW)
- ✓ Targeting commercialization in mid-2030s. In addition to great economics, will realize the world's safest nuclear reactor with innovative technologies



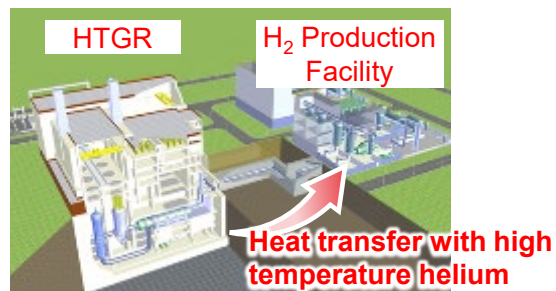
#### Small Modular Reactor (SMR)

- ✓ Power generation for distributed, small-scale grids (power output: 300 MW)
- ✓ Fully passive safety systems and integrated reactor vessel design



#### High Temperature Gas-Cooled Reactor

- ✓ Achieve high volume, stable hydrogen production using high core temperature (over 900°C)
- ✓ Contribute to decarbonization of steelmaking and other industries



#### Fast Reactor \*

- ✓ By completing the nuclear fuel cycle, fast reactors can be used to efficiently utilize nuclear resources and reduce the volume and hazard level of high-level radioactive waste



#### Microreactor

- ✓ Portable nuclear reactor which can be used as a power source for isolated islands and remote areas as well as after natural disasters
- ✓ MHI proprietary all-solid-state reactor design

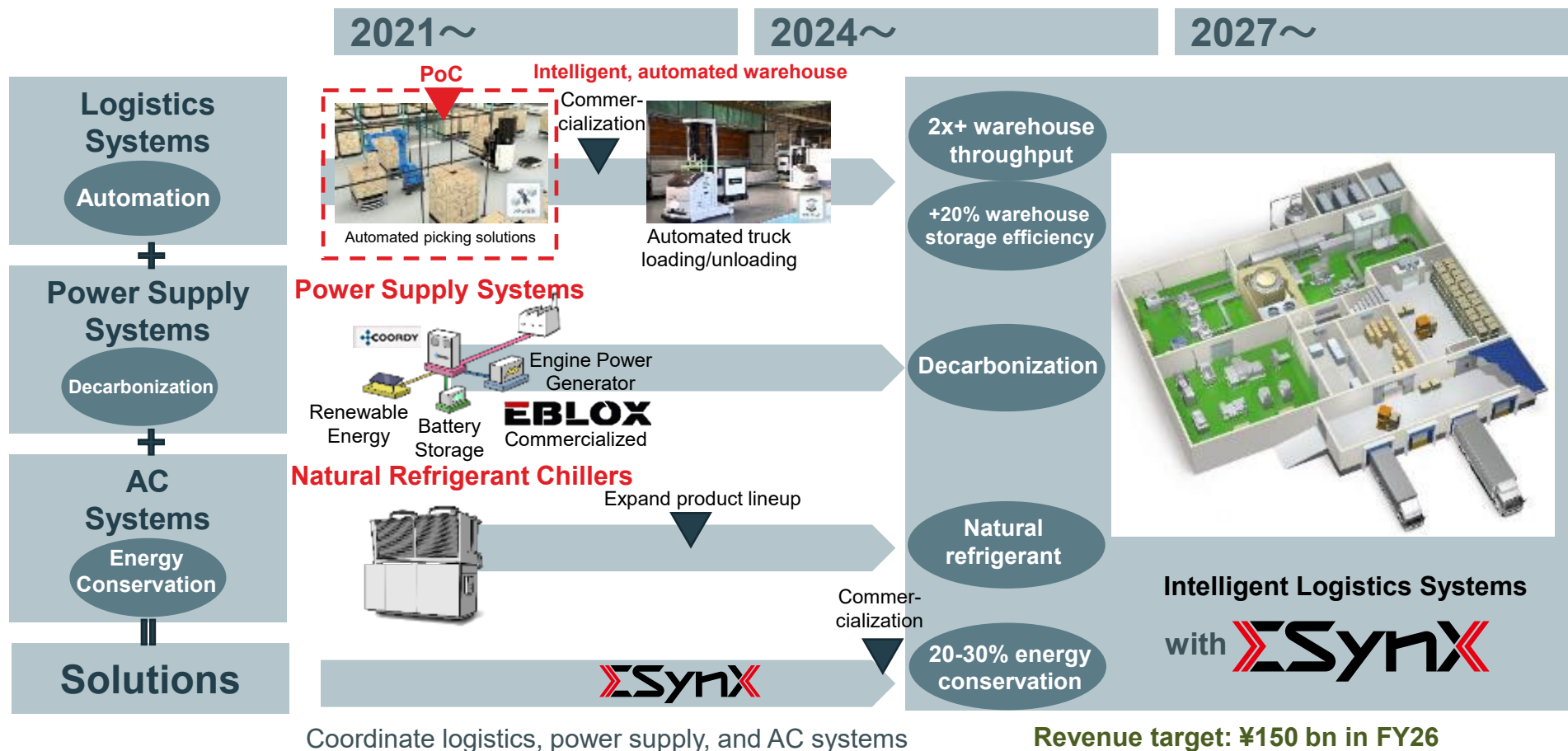


## III-2. Energy Use Smart Infrastructure (New Mobility & Logistics)



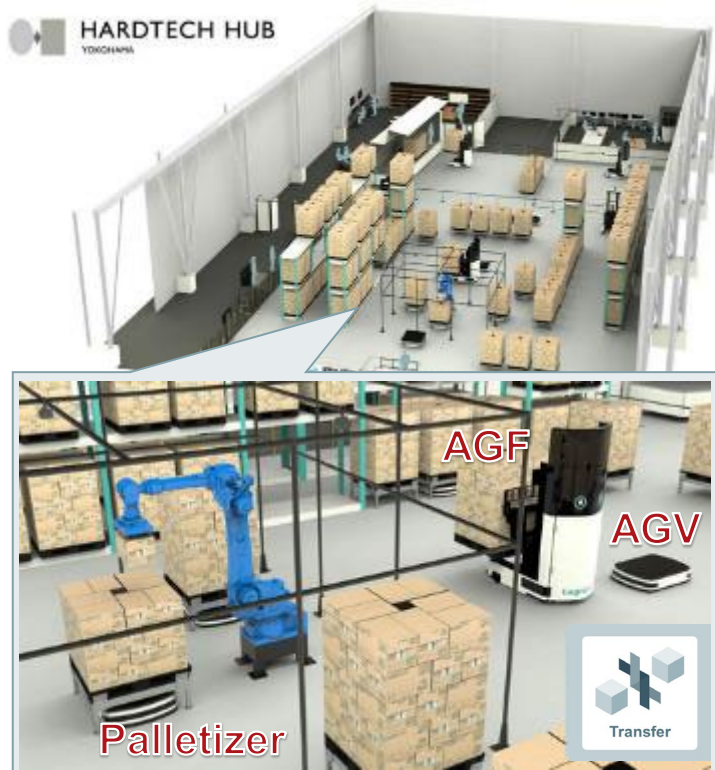
# Intelligent Logistics Systems

- Commercialized highly maneuverable Automated Guided Forklift (AGF) and natural refrigerant chiller to meet market needs for automation and decarbonization
- Developing intelligent logistics to achieve smooth coordination among humans and multiple logistics systems
- Achieve large-scale energy conservation and decarbonization by optimizing operation of logistics, power supply, and air-conditioning (AC) systems



- Developing automated picking solutions, which will coordinate highly maneuverable AGF, Automated Guided Vehicles (AGV), and palletizers in beverage or refrigerated warehouses. Will begin validation at Yokohama Hard Hub (YHH) in FY22.
- Increase throughput by efficient swarm control of multiple systems and optimized picking plans using  $\Sigma$ SynX core technology

## Validate at YHH



Connect Intelligently



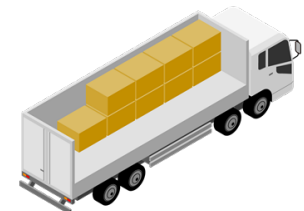
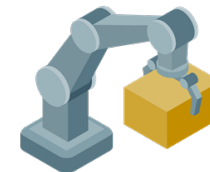
Carry



Transfer



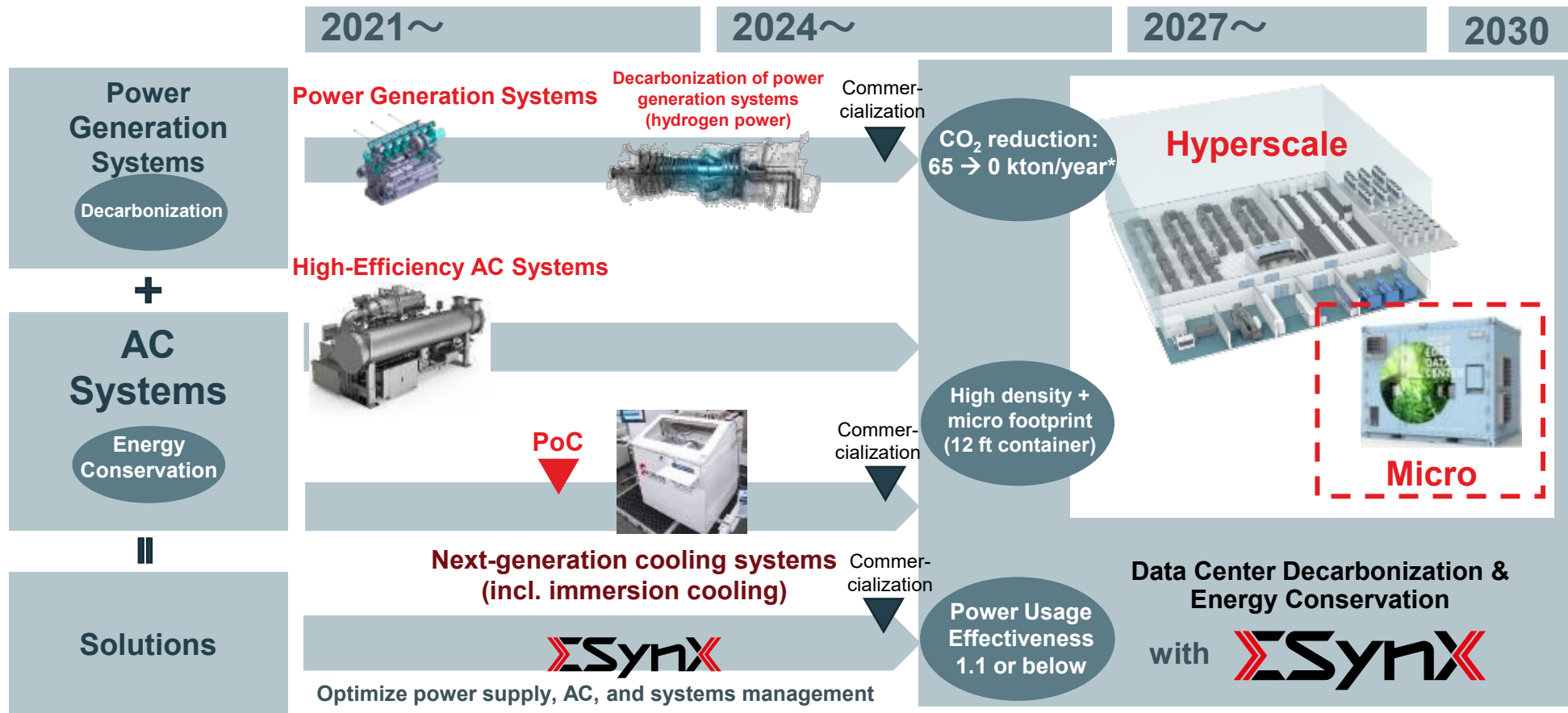
Load & Unload



$\Sigma$ SynX: MHI's common platform designed to synchronize and coordinate between a variety of machinery components, transforming them into a single, intelligent system

# Data Center Decarbonization and Energy Conservation

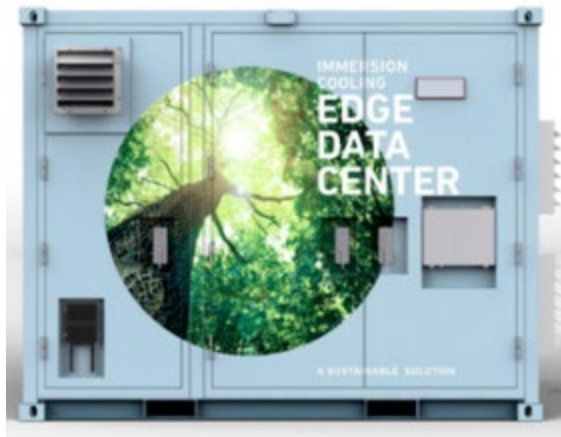
- Providing high-efficiency AC and power generation systems for hyperscale data centers
- Working on proof of concept for micro data center using next-generation systems
- Will contribute to building of power supply and AC systems infrastructure for micro data centers



Revenue target: ¥40 bn in FY26

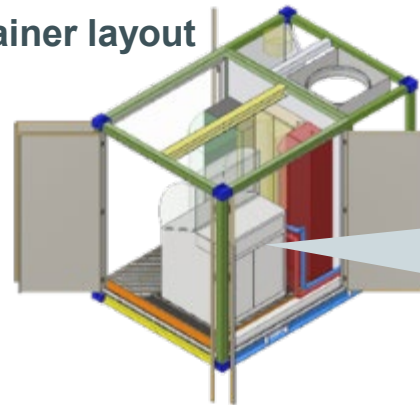
\*For 1 standard hyperscale data center

- Achieve data center miniaturization and energy conservation with immersion cooling systems
- Demonstrated 43% decrease in micro data center energy consumption during tests at YHH in FY21
- Will begin testing at Japanese telecommunications company KDDI's Oyama Technical Center in FY22, aiming to contribute to decarbonization by commercializing the technology in FY24



Container Type Micro Data Center

Container layout



Immersion cooling system

Validation testing ongoing since June 21, 2021 at MHI YHH with 50 kVA equivalent IT equipment (incl. servers) and an immersion cooling system in a 12 ft container. (Joint effort with KDDI and NEC Networks & System Integration)

## ■ Increase cooling efficiency

Achieved 43% decrease\* in server cooling system energy use and PUE of 1.07 with immersion cooling

## ■ Miniaturize the data center

Fit entire data center including an immersion cooling system (immersion cooling unit + radiator) and ventilation equipment into a 12 ft small-size container using innovative package design and miniaturized systems



- Create solutions to intelligently connect multiple machinery systems and new value chains through cooperative development with customers
- Leverage DX platform technologies accumulated during development of diverse product groups to maximize machinery systems' potential

## DX Processes

## MHI Group Digital Transformation Technology Platform

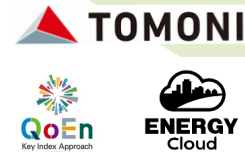
Connect



Intelligently Transform



Optimize



Build Value Chain



**SYNX**  
Intelligently Connect

### Data Analytics Technologies

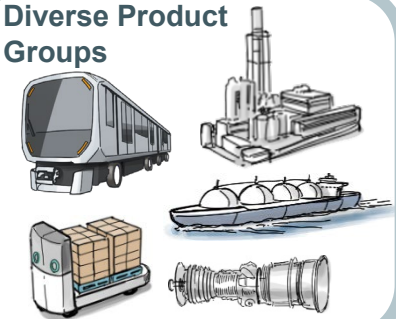
- Integrate data analysis know-how
- Convert to valuable information

Real Data

### AI Technologies

- Voluminous data
- Deep knowledge
- Efficient learning
- Highly reliable testing

Diverse Product Groups



### Modeling & Simulation Technologies

- High fidelity models
- Accurately ascertain system status with Digital Twin

Physical Models

# IV. Key Takeaways



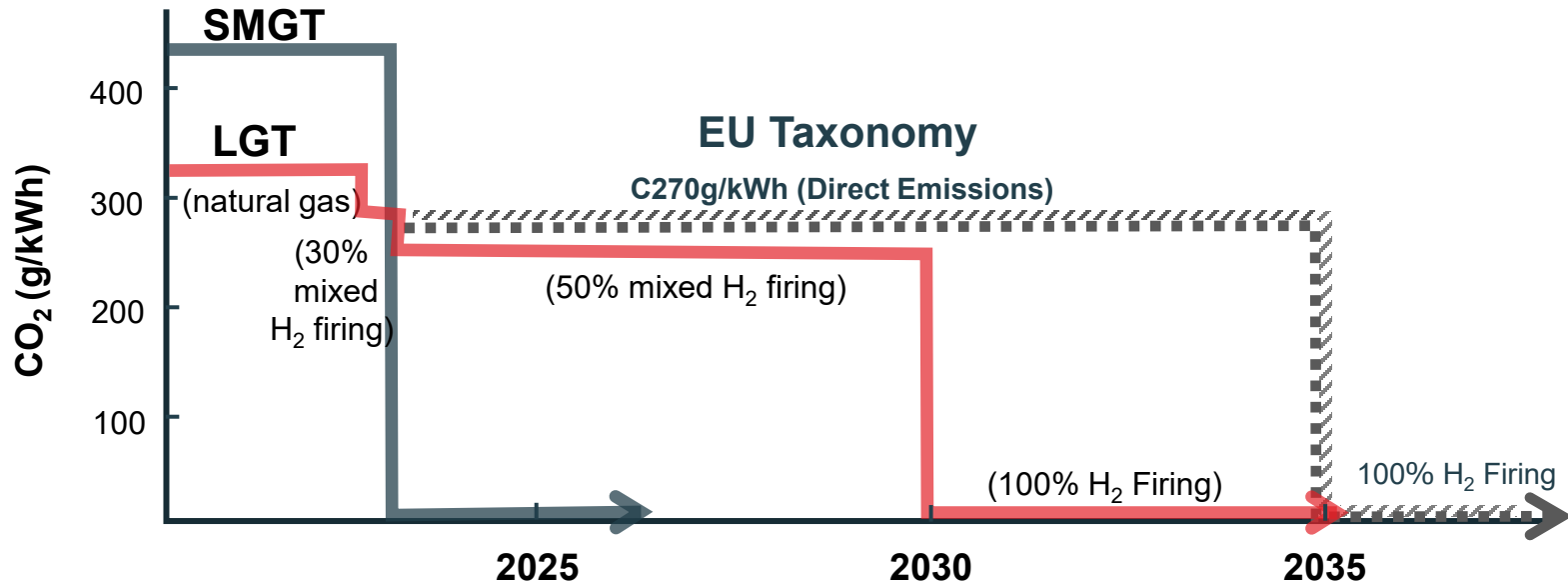
- **Overcame COVID-19 impact with a variety of countermeasures and achieved FY2021 plan. Despite uncertainty in global markets, we will further increase profitability with an adaptive and proactive approach.**
  
- **Carbon Neutrality is an essential step toward attaining a truly sustainable society, and a realistic Energy Transition will be an important tool to help achieve this. MHI Group will make great contributions to this global effort with a variety of products and solutions in both energy supply and use areas.**
  - **In the energy supply area, we will provide a wide range of solutions tailored to the needs of each country and region, including fuel conversions of existing infrastructure, nuclear power, and CCUS.**
  
  - **In the energy use area, we will provide innovative energy conservation, automation, and decarbonization solutions by intelligently connecting systems through our DX technology platform, ΣSynX**
  
- **MHI Group will contribute to the realization of a sustainable society through our Carbon Neutrality initiatives, which balance Energy Security, Economic Efficiency, and Safety**

# V. Appendix

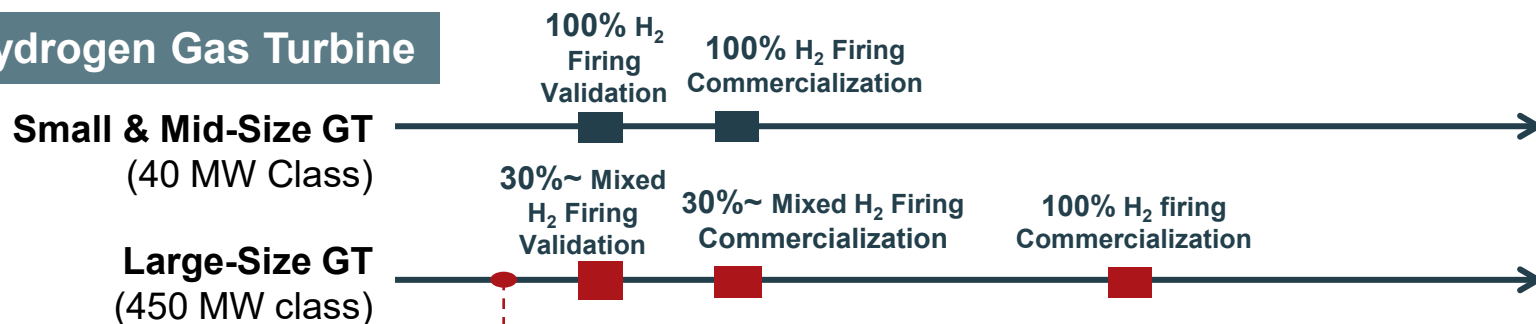
## (Energy Supply)

# Decarbonizing Existing Infrastructure: Thermal Power

- Progressing with validation testing with the goal of commercializing carbon-free power generation using hydrogen
- Achieved 50% mixed hydrogen firing during combustor test, an important step toward achieving commercialization in 2025



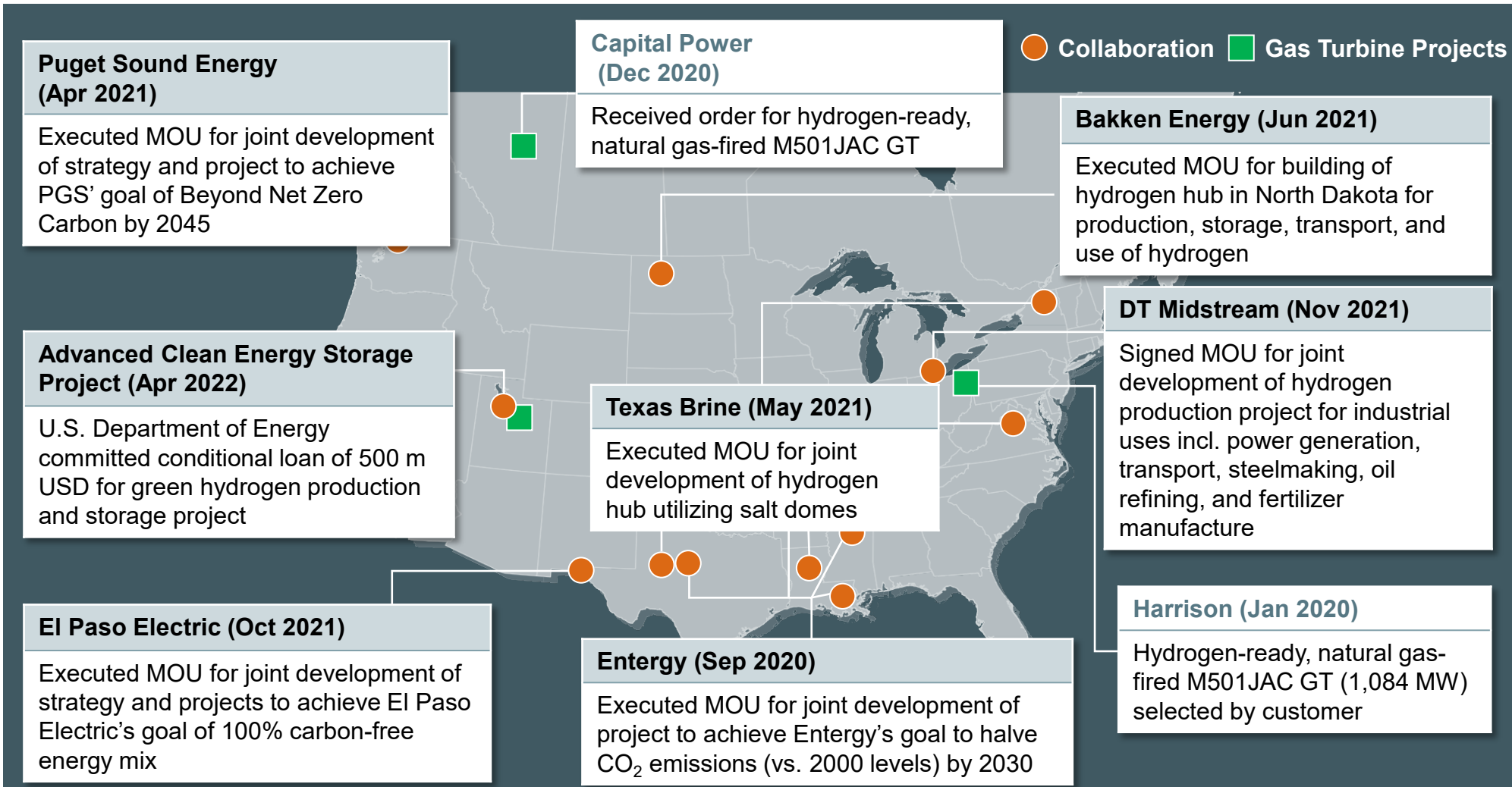
## Hydrogen Gas Turbine



**Achieved 50% mixed hydrogen firing during combustor test, an important step toward achieving commercialization in 2025**

# Building a Hydrogen Solutions Ecosystem: Projects under Development in U.S.

- Marked progress in the Advanced Clean Energy Storage Project in Utah, U.S.
- Progress in order intake and development through strategic partnerships

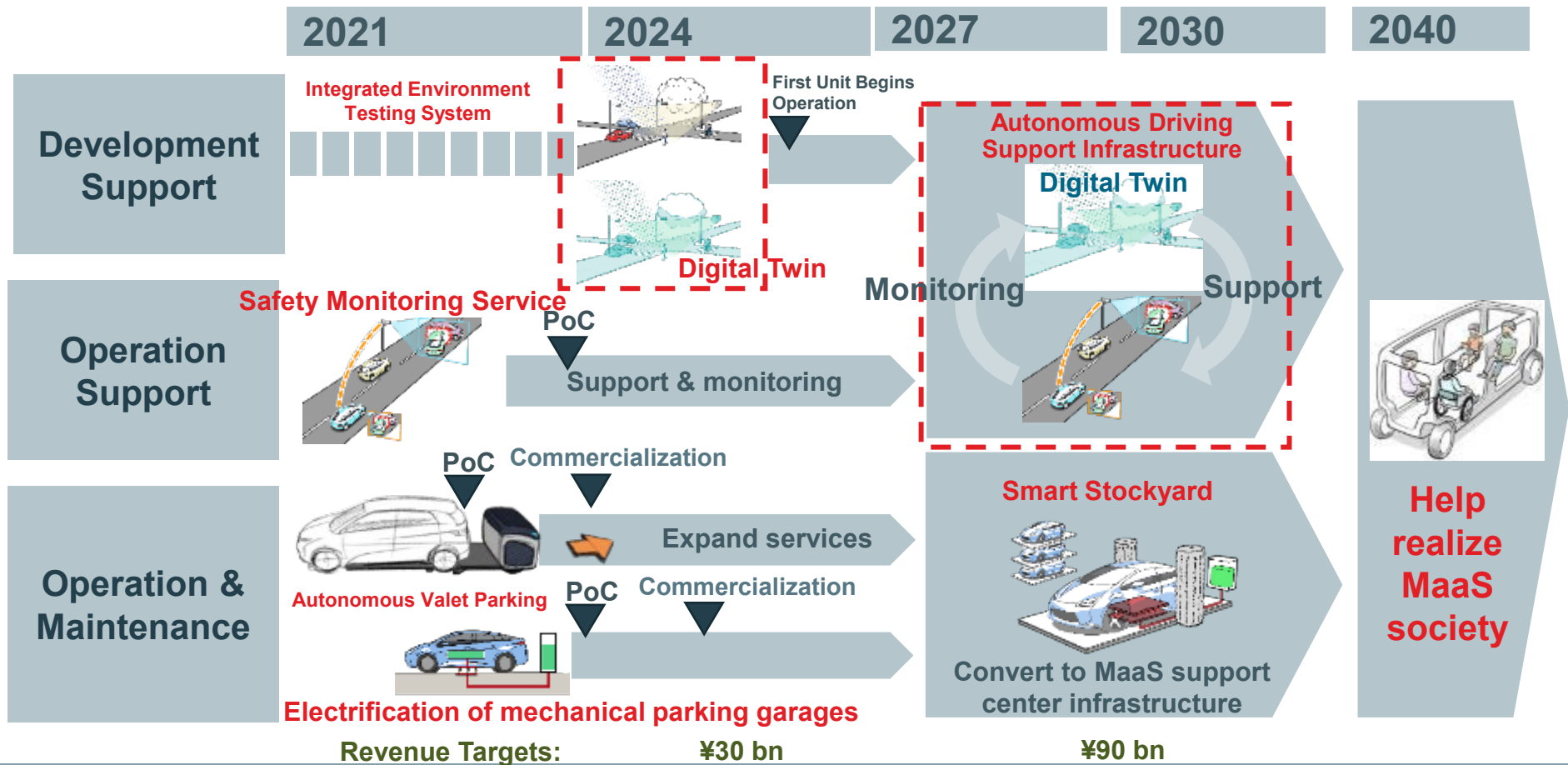


# V. Appendix

## (Energy Use)

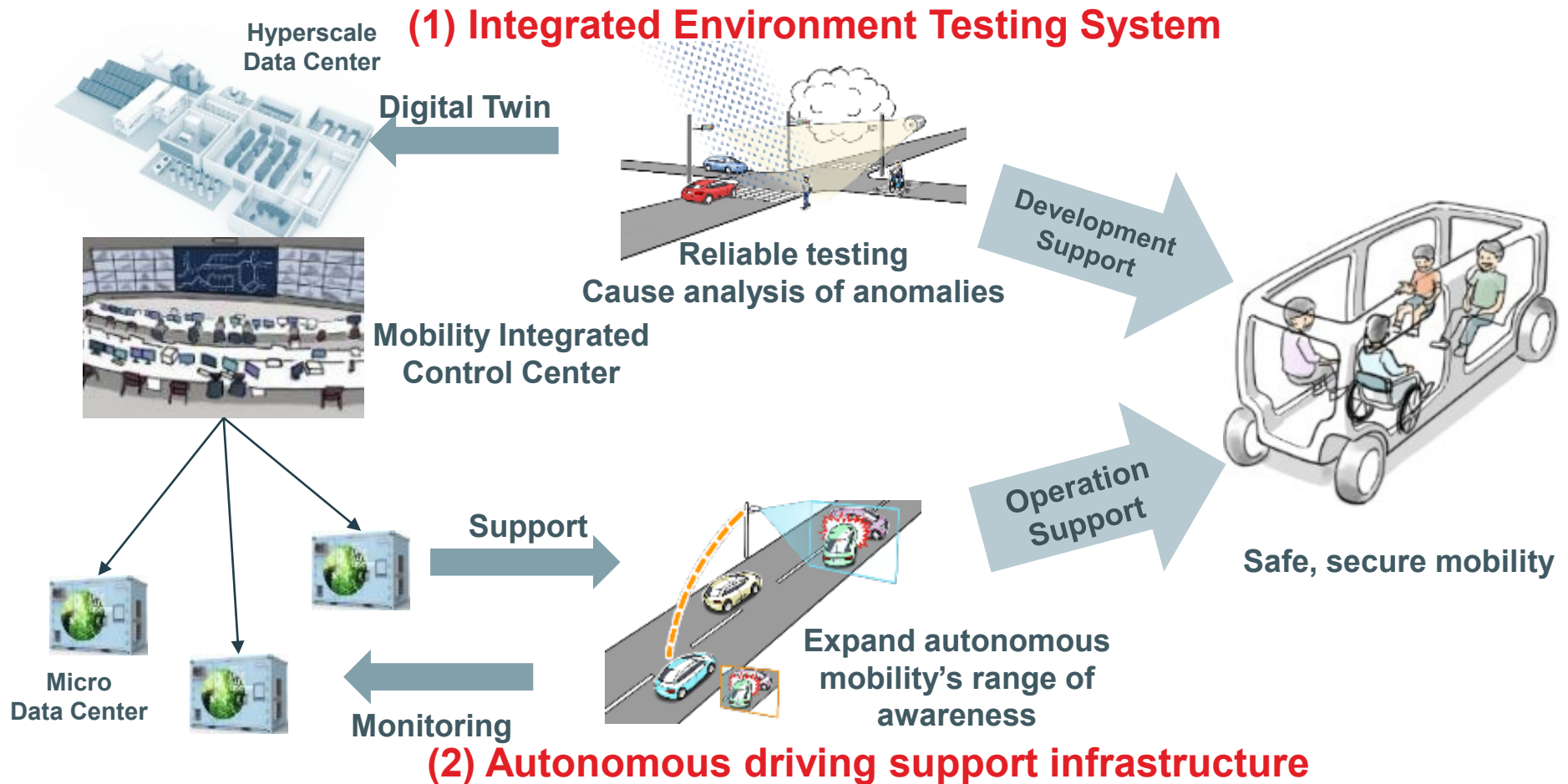
# Infrastructure to Support Autonomous Mobility (1/2)

- Support the development of autonomous mobility with environmental control and digital twin technologies
- Support autonomous mobility with road infrastructure featuring monitoring and communications technologies
- Convert mechanical parking garage technology to operation and maintenance infrastructure able to support Mobility as a Service (MaaS)





- Support efficient development and validation of autonomous mobility using high-level environmental control and digital twin technologies
- Support autonomous mobility with road infrastructure featuring monitoring and communications technologies accumulated during the development of diverse transportation systems





**Reliably operate**

A control system used in various infrastructure products and industrial facilities. Complies with international functional safety standard IEC 61508: 2010 (SIL 3).



**Safely connect**

Cybersecurity technology for critical infrastructure (social infrastructure) control systems. Enables real-time error detection and response to unknown cyber-attacks.



**A proxy for dangerous tasks**

Performs inspections day or night under conditions which could create an explosive atmosphere, contributing to improved worker safety, operational efficiency, and facility utilization

**SynX-Vehicle**

**Coordinate humans and machines**

Automated logistics equipment featuring action planning technology for swarm control and non-verbal human interface technology for human-machine coordination



**Intelligently operate**

Provides services utilizing remote monitoring and high-precision analysis functions to monitor signs of trouble and propose necessary corrective measures at an early stage, improving plant reliability and profitability



**Efficiently supply energy**

Forecasts energy demand with high accuracy and ascertains facility conditions to support improvements in energy procurement and power generation efficiency using data measurement and analysis from facility operation monitoring



**Evaluate with diverse criteria**

Supports sustainable growth in energy infrastructure with quantitative evaluation from the perspectives of societal impact, economics, and the environment



**Build a new economy in cyberspace**

A digital platform to visualize the distribution of CO<sub>2</sub> within the value chain and enable a new kind of society that utilizes this CO<sub>2</sub> as a valuable resource. Its ultimate goal is to realize Carbon Neutrality.



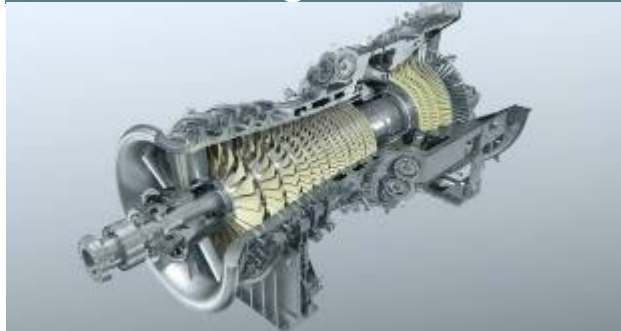
**Coordinate humans and machines**

- A solutions concept aiming to automate and intelligently transform all MHI Group products, ΣSynX will become a standard platform that integrates our digital technologies by synchronizing and coordinating among diverse machinery systems
- We believe strongly in developing human-centric technologies to enable collaboration between operators and machines. This is based on the assumption that, even in our modern world, where the pace of automation and intelligent transformation of technology with AI and machine learning is accelerating, humans must remain at the center of society.

# V. Appendix

## (FY2021 Highlights by Segment)

## GTCC Business Grew with Strong Orders



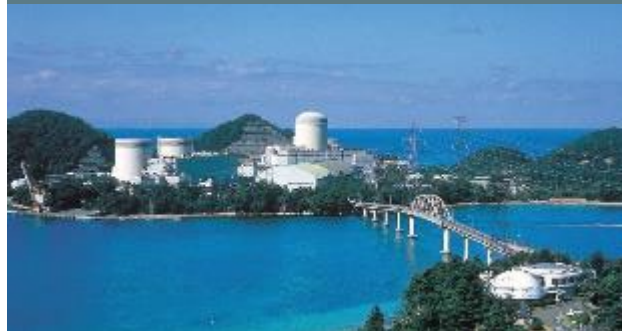
- Orders increased for new installations of large gas turbines incl. latest model J-class as well as small and mid-sized turbines incl. H-25 and aero-derivative gas turbines
- Won orders for upgrades and after-sales services for existing GTCC facilities in Japan and around the world

## MHIAEL Nagasaki Plant for Manufacture of Aero Engine Combustors to be Expanded



- Announced plans to build new Building 2 to expand current plant due to projected increase in demand for aero engine parts for short- and medium- haul commercial aircraft
- While strengthening internal manufacturing capabilities and cost competitiveness, we will meet the needs of the aviation industry, which is expected to resume growth in the post-COVID period

## Mihama Unit 3 Restart



- Improved safety of KEPCO Mihama Nuclear Power Plant Unit 3 in accordance with new safety standards
- Contributed to safe operation of Japan's first nuclear reactor to remain in service for over 40 years (Jun '21)

## Ikata Unit 3 SSF Completed



(reference image)

- Construction of a Specialized Security Facility for Shikoku Electric Power Company's Ikata Nuclear Power Plant Unit 3 completed (Oct 21)

## TOMONI Intelligent Solutions Network Growth



- The fifth TOMONI Hub began operation in Duisburg, Germany. Other operating hubs: Takasago, Nagasaki, U.S., and Philippines
- TOMONI supports O&M of diverse energy systems, from thermal power plants to distributed power sources

## Established Takasago Hydrogen Park



- Established Takasago Hydrogen Park within Takasago Machinery Works. It will be the first facility in the world where the integrated validation of hydrogen power from hydrogen production to power generation can be achieved.
- Will increase reliability of MHI products by validating at in-house facilities with the aim of early commercialization of hydrogen gas turbine technology

### Strengthened Transportation Systems After-Service Sales Business



- Booked order to enhance capacity of Singapore's Sengkang-Punggol Light Rapid Transit (LRT) system
- Began providing high added-value services meeting the needs of customers in Asia through the MHI-AP Technical Service Center

### LCO<sub>2</sub> Carrier



- Executed agreement for construction of the world's first validation test ship for LCO<sub>2</sub> transportation
- Rallied all liquid gas handling technologies in anticipation of future long-distance, high-volume transportation needs

### Contributed to Decreasing CO<sub>2</sub> Emissions from Steelmaking



- Environmentally conscious miniaturized steel mill combining a new electric arc furnace EAF Quantum and Arvedi ESP began operation in China
- CO<sub>2</sub> emissions are 85% of those of traditional manufacturing methods  
EAF: Electric Arc Furnace    ESP: Endless Strip Production

### Expanded CO<sub>2</sub> Capture Sources



- Received order for compact CO<sub>2</sub> capture system for biomass power plant in Hiroshima, Japan
- Contributing to the realization of a Carbon Neutral society by meeting CO<sub>2</sub> emissions reduction needs in a wide variety of industries

### Began Sale of New Model of Antiseptic Beverage Filling Machine



- Began sale of a new model of antiseptic filling machine for beverages (preform sterilization), which excels in the areas of running costs, production efficiency, and footprint
- Promoting both within Japan and internationally together with new market entry by various beverage manufacturers

### Received Order to Refurbish Municipal Solid Waste Incineration Plant



- Received order from Sendai City (Miyagi Pref., Japan) to refurbish its Matsumori Waste-to-Energy Plant, an incineration plant for municipal solid waste
- Will reduce CO<sub>2</sub> emissions by 8%/year by extending the plant's life and enhancing its energy efficiency

### Began Sale of New Engine-Powered Forklift ERSIS



- Began sales of the first new integrated model forklift since the battery powered ALESIS was introduced in Nov 2019 after the founding of Mitsubishi Logisnext
- This marked the completion of the integration of all domestic Japanese models. Going forward, there will be a phased integration with this model in international markets as well

### Aquifer Thermal Energy Storage System

Awarded The Energy Conservation Center Japan Chairman's Award in the Best Practices Category at the 2021 Energy Conservation Grand Prize



- Focused on unutilized geothermal energy, the system cycles heat throughout the year for effective energy utilization
- Reduces atmospheric heat emissions and attains underground heat balance of zero for the full year period, which helps to protect the global environment

### Triple Hybrid Stand-Alone Power System EBLOX Demo Plant to be Constructed in Turkey



- Promoting mainly in the Middle East and Africa, where electric grids are still developing
- Able to optimize use of renewables in accordance with power demand within a region

### Intelligent, Automated Warehouse Project Enabled by ΣSynX Kicked Off



- Developing automated picking solutions coordinating AGF, AGV, and palletizers. Aiming for validation in FY2022
- Will contribute to solving logistics operator shortages by installing in multi-tenant warehouses

### Heat Pump Chiller Q-ton Circulation Won 2021 Minister of the Environment Award for Climate Action



- By utilizing a low-GWP refrigerant, the product contributes to reduction of environmental impact, energy usage, and CO<sub>2</sub> emissions arising from hot water supply
- This is the latest in a series of awards received by the product, including the Technology Award from the Japan Society of Refrigerating and Air Conditioning Engineers in 2019 as well as the Japan Association of Refrigeration and Air-Conditioning Contractors' Excellent Energy Saving Equipment Award and a Grand Prize at the Nikkan Kogyo Shimbun's Protect the Ozone Layer, Prevent Global Warming Awards, both in 2021

### Jointly Developed High-Efficiency Gas Cogeneration System



- Jointly developed a gas cogeneration system with output of 850 kW which achieves a world top-class efficiency of 41.9%
- Increased both output and efficiency from the existing 815 kW model while maintaining BCP functionality and footprint

### Launched Frigate “Mikuma”



- Launched new 3,900-ton-class frigate at Nagasaki Shipyard on contract from the Japan Ministry of Defense

### H-IIA Launch Vehicle



- Successfully launched with H-IIA Launch Vehicle No. 45, which carried the first satellite in Inmarsat’s (UK) Inmarsat-6 series

### Handover of First Taigei-Class Submarine



- Held handover ceremony for the first Taigei-class submarine on contract from the Japan Ministry of Defense at MHI Kobe Shipyard

### Mitsubishi Heavy Industries Maritime Systems Began Full-Scale Operations



- Mitsubishi Heavy Industries Maritime Systems, which continues the former Mitsui E&S Holding naval & governmental ships businesses, began full-scale operations on Oct 1, 2021
- Handed over multi-purpose training ship “Kaijinmaru” to Kobe University at the university’s Fukae Campus



- Held handover ceremony of new 3,900-ton-class frigate “Kumano” at Tamano Shipyard on contract from the Japan Ministry of Defense

### Announced Collaboration with Regional Jet Hydrogen Propulsion Technology Start-Up



- CRJ business announced collaboration with ZeroAvia, a start-up developing a propulsion system for regional jets using hydrogen fuel cells

**MOVE THE WORLD FORWARD**

**MITSUBISHI  
HEAVY  
INDUSTRIES  
GROUP**