

for 9th Cloud Computing Day Tokyo

Carbon Neutral Strategy

18 November 2022
Carbon Neutral Strategy Office

Mitsubishi Heavy Industries, Ltd.



- **About us MHI Group**
- **MISSION NET ZERO**
- **MHI Group's Carbon Neutral Strategy**
- **Carbon Neutrality in MIHARA WORKS**

About MHI Group

MHI Group at a glance



1884 Foundation
over 130 years history



78,486 Employees
(Consolidated)



256 Group Companies
(Consolidated)



¥3.9TN (\$35BN*) Revenue
(FY2021, consolidated)



Diverse products
On land, at sea, in the sky, in space

Note: The U.S. dollar revenue figure was converted from Japanese yen using the FY2021 average exchange rate, JPY 111.6/USD.



Gas turbines



Compressors



Aero engines



CO₂ capture plants



Metals machinery



Chemical plants



Transportation



Waste-to-energy



Turbochargers



Aerospace



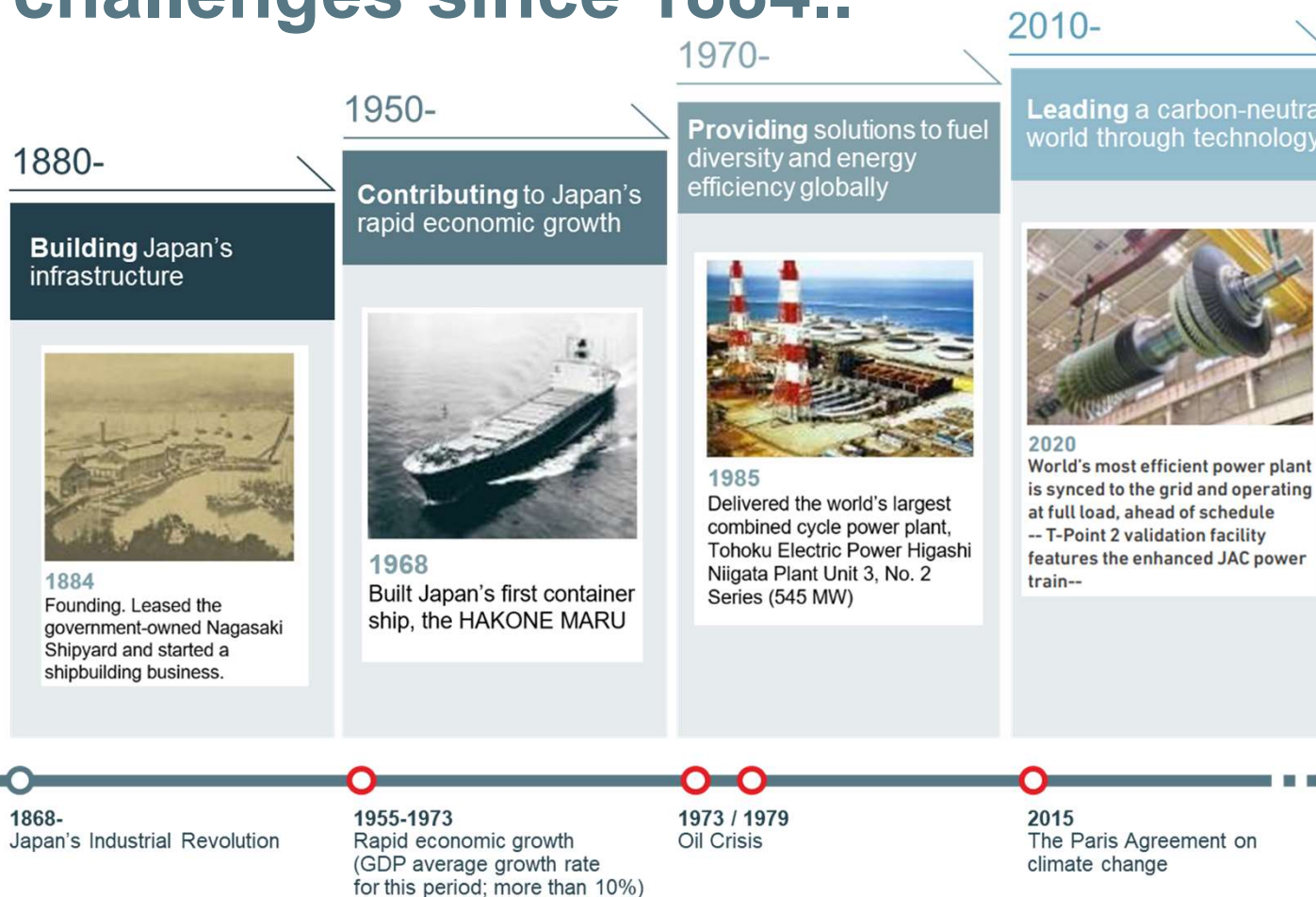
Rocket engines



Defense

Various solutions in response to social challenges since 1884..

Present & Future



Low-carbonization and Decarbonization

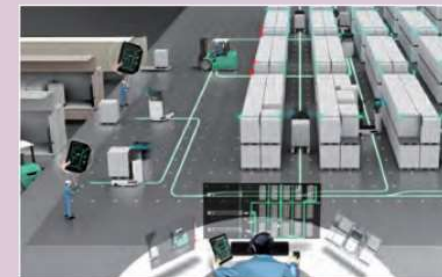


Hydrogen co-firing/100% hydrogen firing gas turbine



CCS/CCUS (Carbon capture and its effective utilization)

Electrification and Intelligent Systems




Σ SynX-powered AGF



MISSION NET ZERO

- MHI Group's carbon footprint, which is mostly Scope 3, has remained around 1.5 billion ton-CO₂/year across our operations
- In October 2021, MHI declared bold targets to achieve carbon neutrality under the banner – MISSION NET ZERO
- MHI aims to achieve carbon neutrality throughout our operations and value chain by 2040

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- **At MHI Group carbon neutrality is integral to our growth strategy**
 - We are proposing proven products and services to help our customers achieve their carbon reduction goals
 - To accelerate development of emerging carbon neutral technologies, first we are deploying new solutions to make our own factories carbon neutral

MISSION NET ZERO

Through our group products, technologies, and services that help reduce CO₂ emissions, as well as new solutions and innovations to be developed with partners around the world, Mitsubishi Heavy Industries Group will contribute to realizing “Net Zero” emissions for the world as a whole.

To this end, each and every one of our employees is embracing and internalizing “Mission Net Zero” and will act to implement a “Net Zero” future.



Target Year	Reduce CO ₂ emissions across MHI Group Scope 1&2	Reduce CO ₂ emissions across MHI's value chain Scope 3 + reductions from CCUS
2030	-50% (compared to 2014)	-50% (compared to 2019)
2040	Net Zero	Net Zero

Scope 1&2: The calculation standard is based on the GHG Protocol.

Scope 3: The calculation standard is based on the GHG Protocol. However, we also account for reductions achieved by CCUS as an MHI original index.

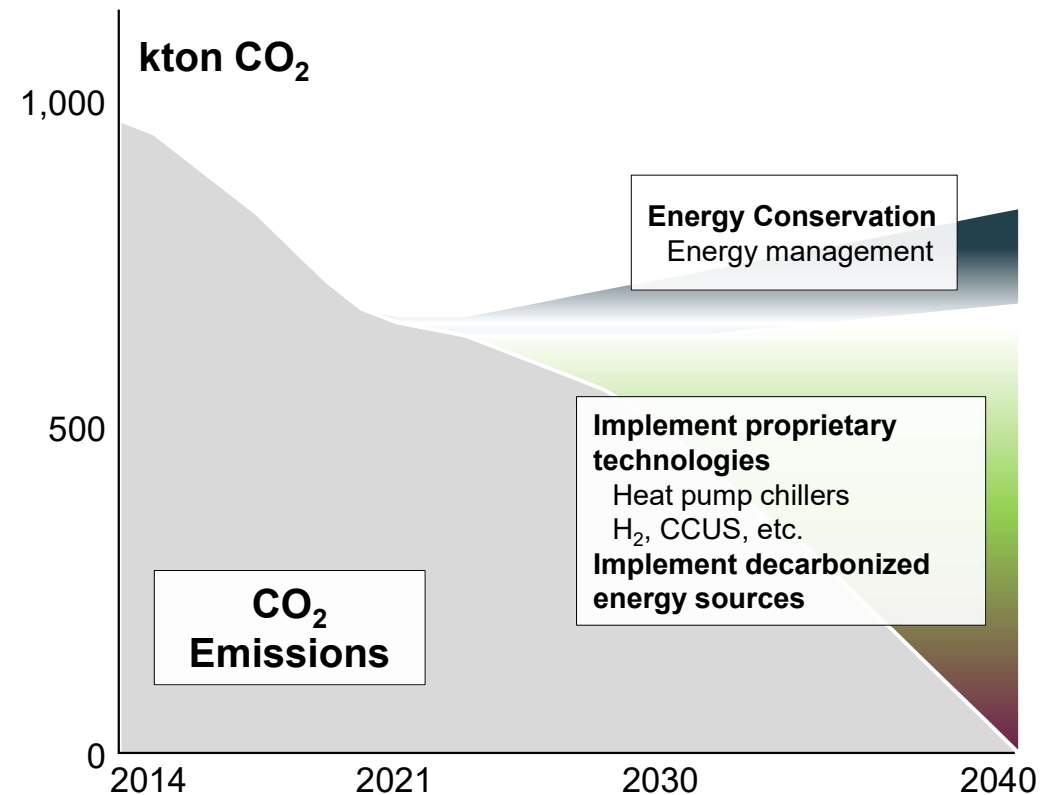
GHG: Greenhouse Gas CCUS: Carbon dioxide Capture, Utilization and Storage

*As CO₂ comprises 99% of MHI Group's GHG emissions, we have focused our targets solely on the reduction of CO₂ in order to simplify our message.

Roadmap to MISSION NET ZERO

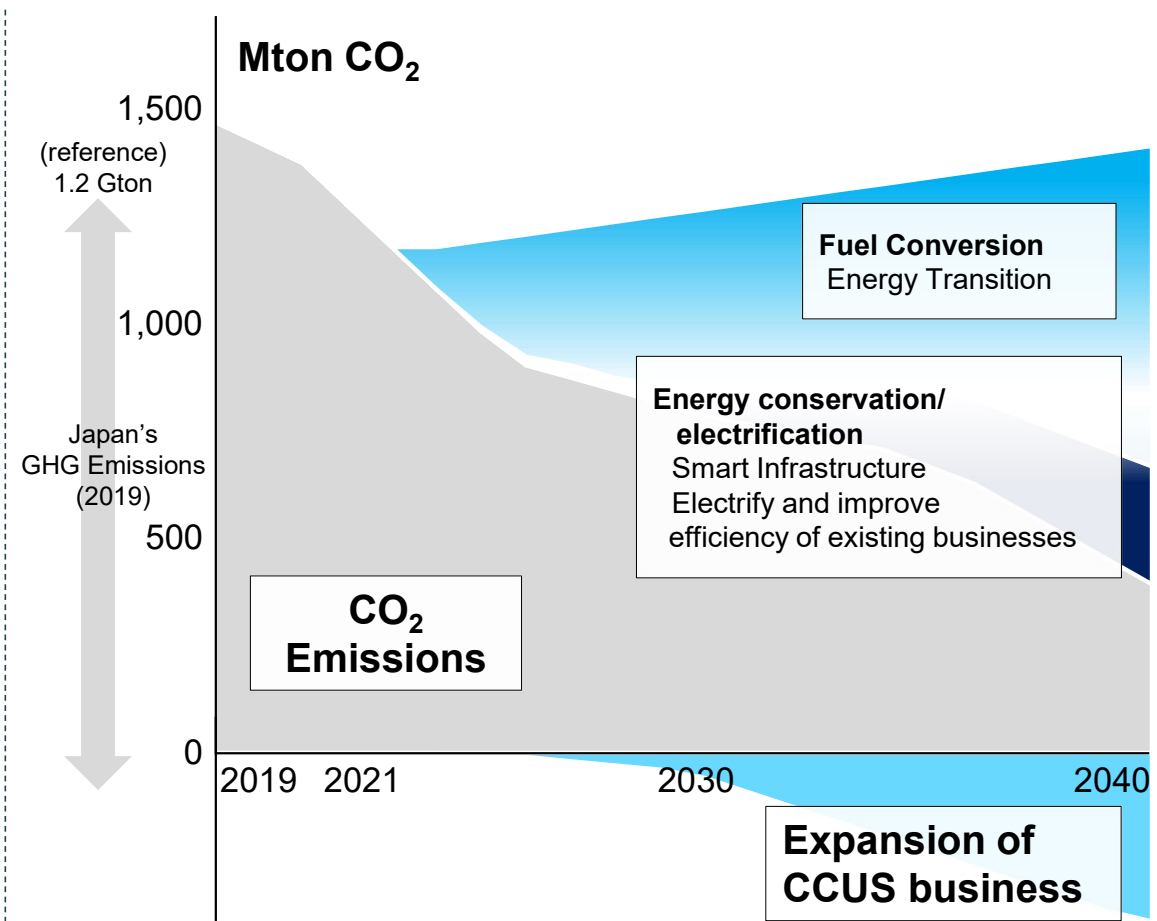
Reduce CO₂ emissions across MHI Group
Scope 1&2

Implement proprietary
technologies at MHI factories



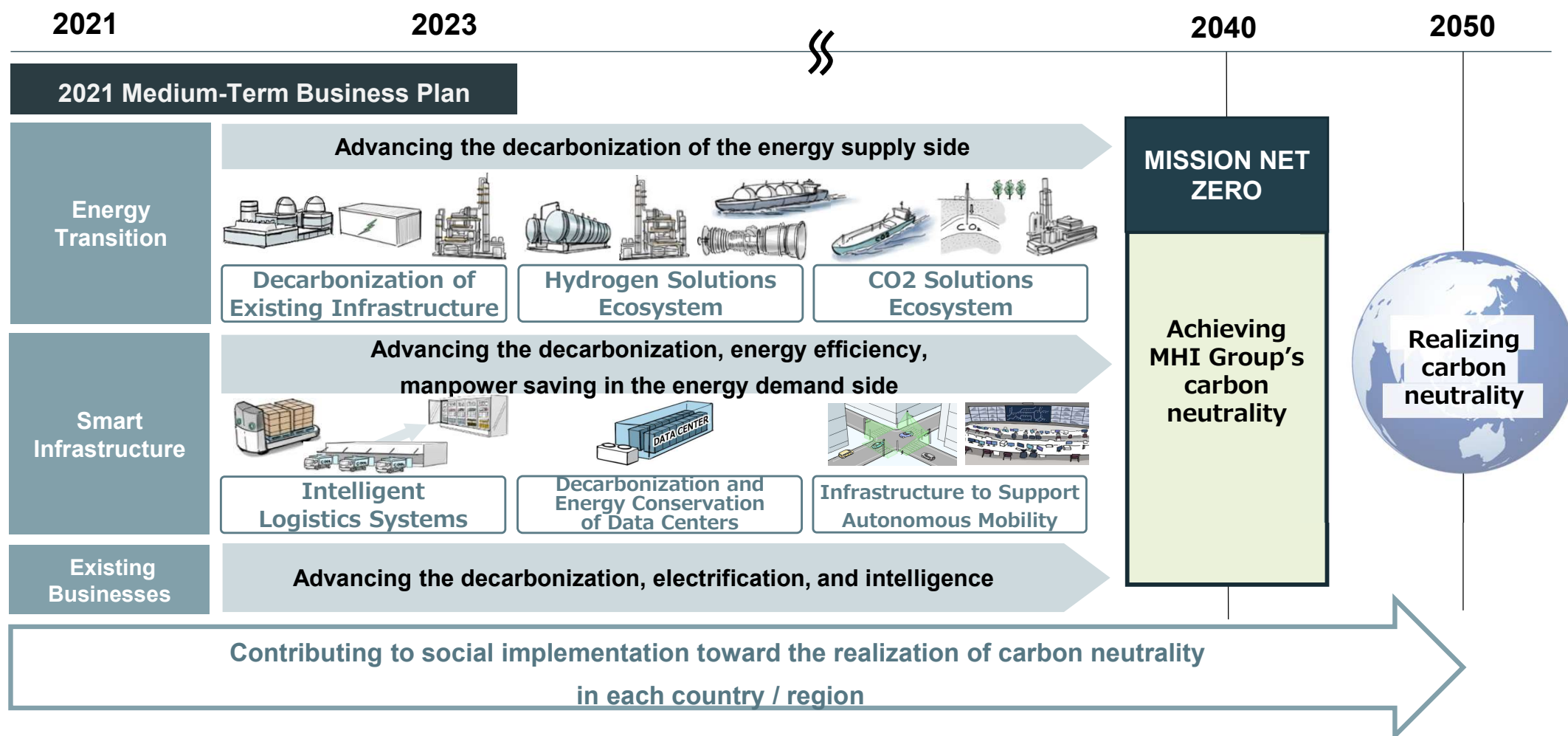
Reduce CO₂ emissions across MHI's value chain
Scope 3 + reductions from CCUS

Rapidly establish decarbonization
technologies and drive commercialization



Roadmap to MISSION NET ZERO Achievement

Achieve Carbon Neutrality within MHI Group by 2040 and deploy decarbonization solutions around the world



MHI Group's Carbon Neutral Strategy

- In June 2022, MHI Group established the Carbon Neutral Strategy Office to develop and implement our strategy for achieving carbon neutrality
- Carbon Neutral Strategy Office is taking a two-step approach
 - The first step is preparation of implementation plan until the end of FY2023
 - The second step will be to start the implementation in earnest from FY2024
- We have defined 4 main activities required to achieve carbon neutrality and the first step for each:

Strategy

- create a basic strategy and roadmap

System

- design and install a new management system

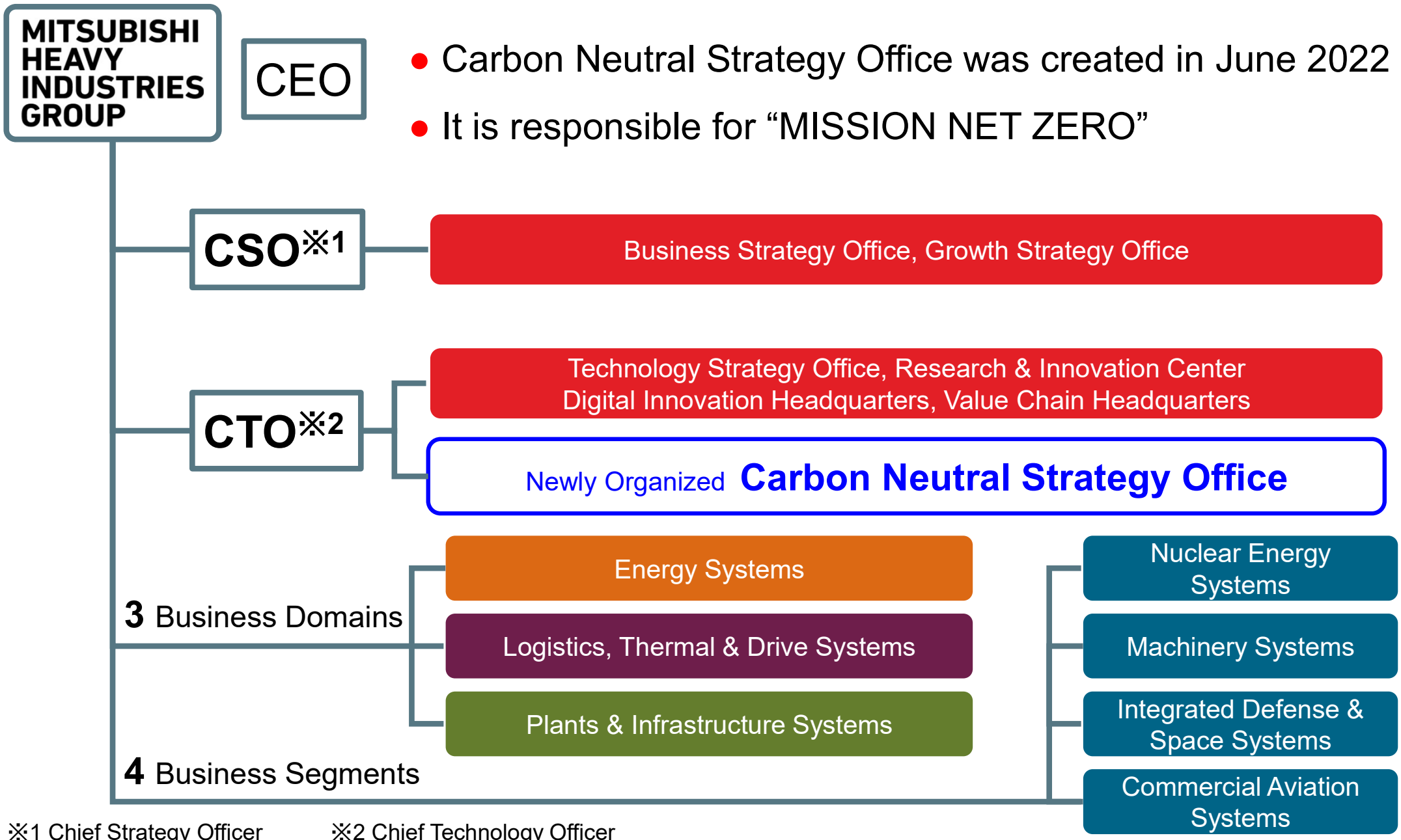
Implementation

- demonstrate technologies at MHI's works as a trial for customer adoption

Communication

- communicate and cooperate with stakeholders

Carbon Neutral Strategy Office

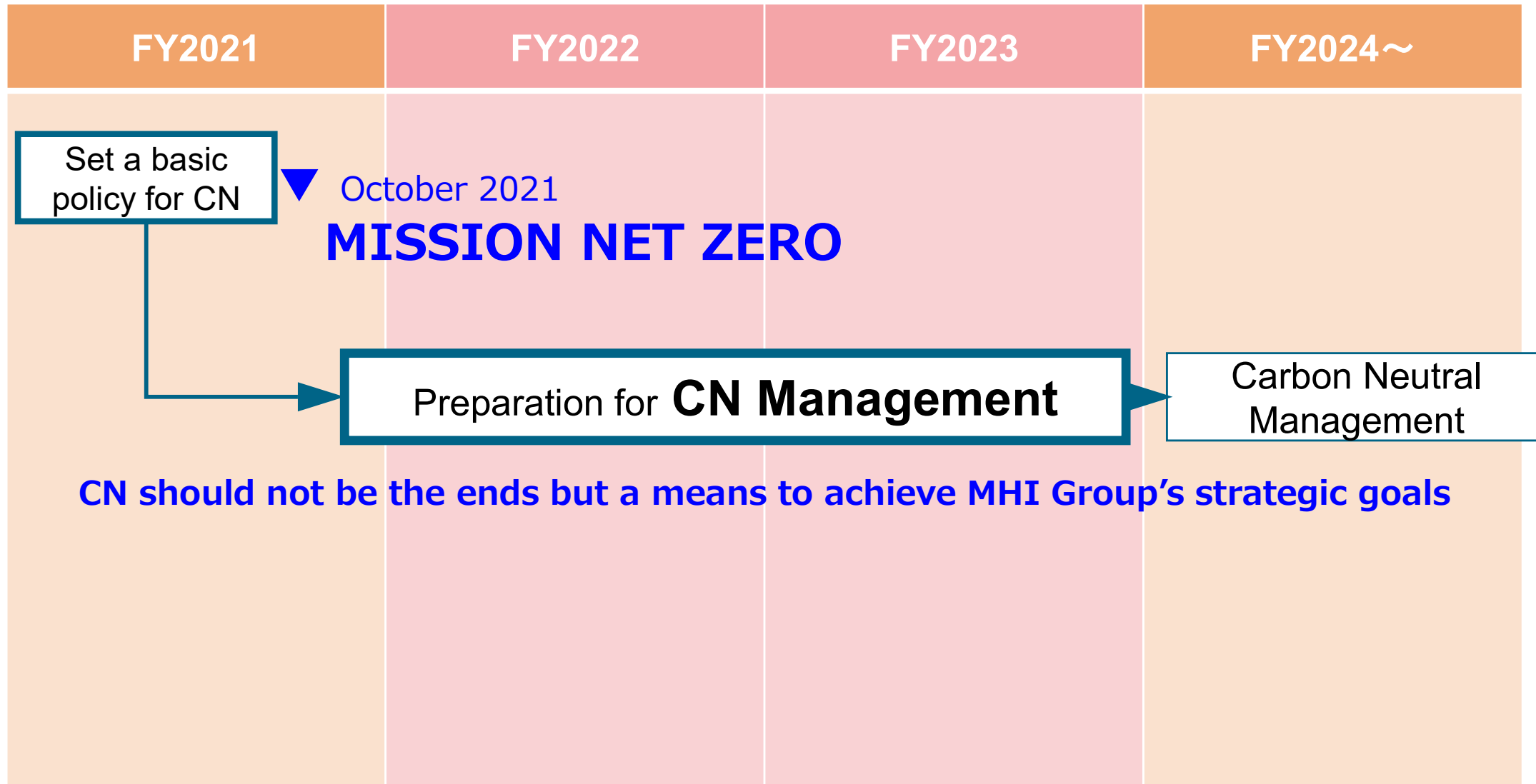


※1 Chief Strategy Officer

※2 Chief Technology Officer

Carbon Neutral Strategy Timeline

All preparation for CN Management should be completed by the end of FY2023 as the first step

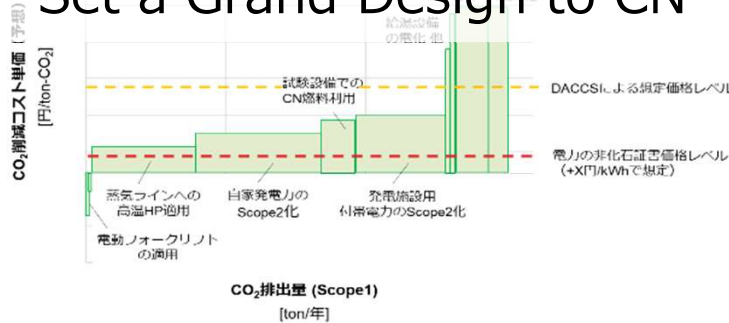


Carbon Neutral Strategy

Our strategy comprises 4 main activities which are required to achieve Carbon Neutrality. ③ Implementation and ④ Communication are especially important to ensure our plan is practical and sustainable.



Set a Grand Design to CN



Implementation & Practice

Innovation : YOKOHAMA HARDTECH HUB

「Energy Management System Development」

Integration : MIHARA Machinery Works

「MIHARA CN Project」

MISSION NET ZERO

三菱重工グループは、CO₂削減に貢献できる当社グループの製品・技術・サービス、世界中のパートナーとの新しいソリューション、イノベーション等により、グローバル社会全体のNet Zero実現に貢献していきます。

そのために、私たちは、グループ一入りの「Mission Net Zero」を期に、NET ZEROの未来に向けて行動していきます。



目標年	当社グループのCO ₂ 排出削減 Scope1,2	バリューチェーン全体を通じた社会への貢献 Scope 3 + CCUS削減貢献
2030年	▲50% (2014年比)	▲50% (2019年比)
2040年	Net Zero	Net Zero

※ Scope1,2 : 排出削減は、GHGプロトコルに準じる。
Scope3 : 買入材料は、GHGプロトコルに準じる。自社工場・施設は、自社工場のCCUSによる削減貢献を認める。

GHG : Greenhouse Gas, CCUS : Carbon dioxide Capture, Utilization and Storage

「Roadmap to CN in Factories」 (3 Plants)

「Study for Heating Process Solutions」 (3 Plants)

2021 Medium Term Business Plan

Next Business Plans

CN Factory Management

2014

2021

2030

2040

MIHARA Works

Carbon Neutral Project

- The Carbon Neutral Strategy Office is tasked with considering how to achieve carbon neutrality in each plant and setting a general strategy and management system
- One example is the “MIHARA Works Carbon Neutral Project” which is the first project that promises to achieve carbon neutrality at a manufacturing plant
- At MHI’s Mihara Machinery Works, we will aim to reduce completely CO2 emissions through the following activities...
 - (1) installing 12MW solar power
 - (2) pursuing energy saving initiatives
 - (3) implementing electrification solutions

Mihara Machinery Works

(Itosaki Kohama plant, Wadaoki plant)

- Products : Transportation Systems, Braking Systems, Printing Machinery etc.
- CO₂-emission : 10,000 ton-CO₂/year
(2% of the MHI's total Scope1 &2 CO₂ emission)



Mihara Works Carbon Neutral Project's goals

- ✓ identify and evaluate specific measures and costs to reduce CO₂ emissions
- ✓ reflect the measures and the costs to our overall Carbon Neutral strategy
- ✓ reach carbon neutrality without using carbon credits like REC to reduce CO₂ emissions

Overview of MIHARA CN Project

Achieve a fully Carbon Neutral factory by the end of FY2023

Demonstrate the achievability of MISSION NET ZERO by offsetting 10,000 tons-CO₂/year

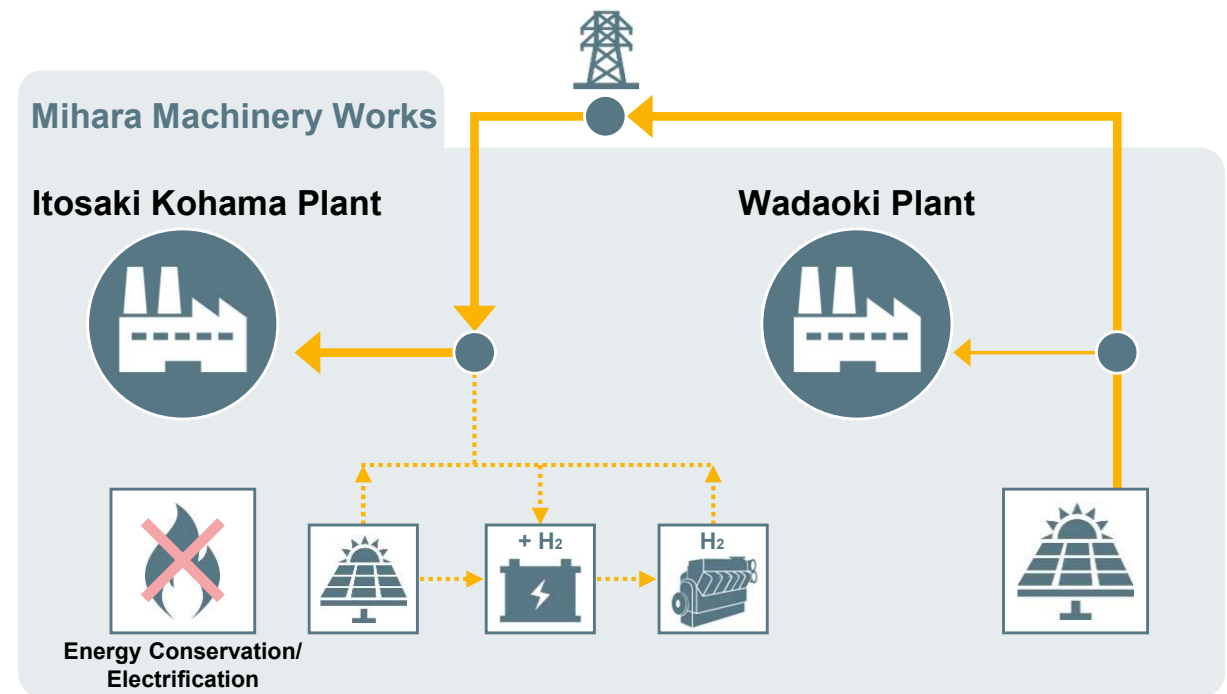
■ Install solar panels

Install an amount of solar panels equivalent to the electricity consumption of Mihara Machinery Works.

Achieve Scope 2 decarbonization with this dedicated renewable energy source.

■ Utilize as R&D proving ground

Execute challenging adoption of energy conservation, electrification, fuel conversion, and renewable energy sources while using as a proving ground for various technologies and carbon neutral solutions



$$\text{CO}_2 = 10,000 \text{ tons} \div \text{Tree Icon} \times 700,000 \text{ trees}$$



**Carbon
Neutrality**

2021 Medium-Term Business Plan

2021

2023

Overview of Energy Management System

Begin use in FY2022

Validation to begin in FY2022 as a core part of the MHI Group Integrated Development Plan

■ Leverage position as equipment manufacturer

Utilize knowledge base regarding core energy supply products such as power plants and HVAC to develop algorithms which account for lifecycle costs and operability

■ Compatible with carbon neutral equipment

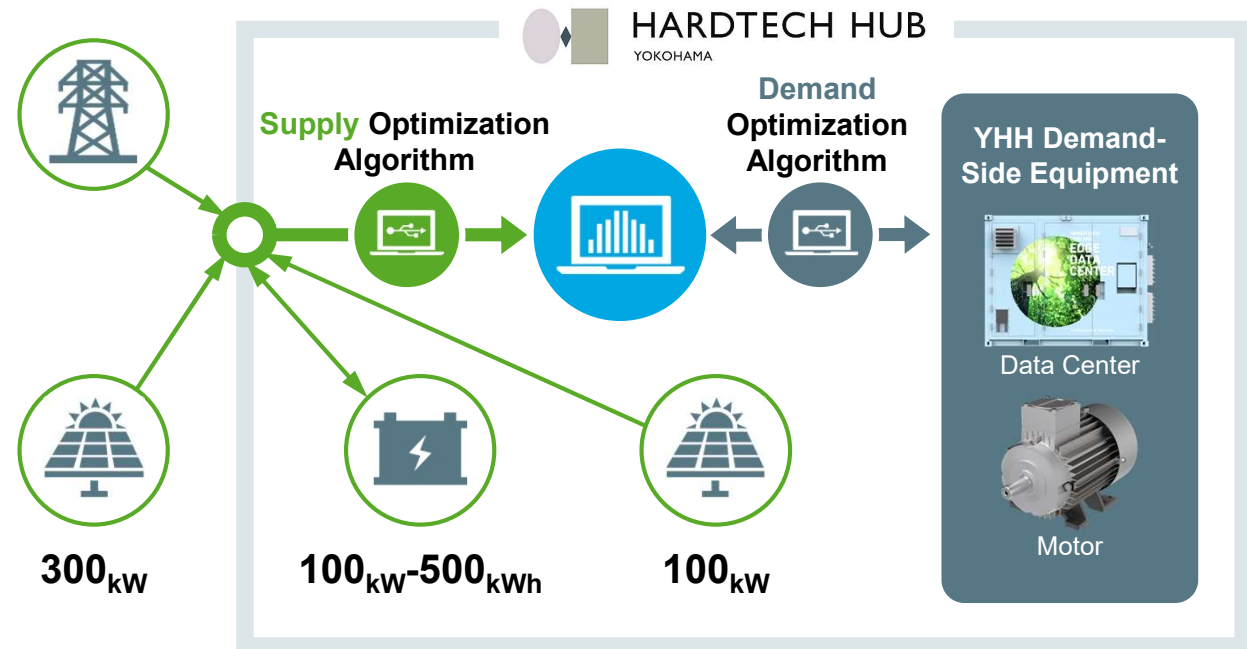
Install solar panels and battery energy storage equipment. Develop carbon neutrality management technologies.

■ Verify effectiveness with simulations

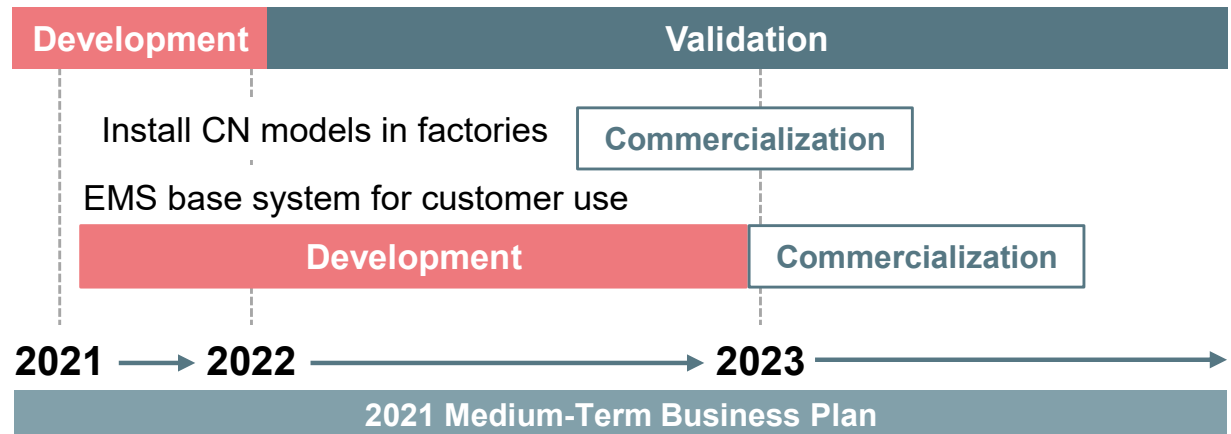
Simulate operational changes and/or installation of new equipment. Quantify cost and decarbonization effectiveness, and increase accuracy of return on investment calculations

■ Use latest evaluation indices

Energy cost and battery charge/discharge cost models using the latest techniques, including levelized lifecycle costing, are included in control algorithms



YHH CN Type EMS Core System Development



【Links】

Web site

<https://www.mhi.com/jp>

MHI Group's Declaration to Achieve Carbon Neutrality by 2040

<https://www.mhi.com/jp/expertise/carbon-neutral>

MHI Group's Carbon Neutrality Briefing

<https://www.mhi.com/jp/finance/library/theme>

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