



Roadmap to a Carbon Neutral Society

Integrated **EX/DX** initiatives to create the future



Towards a Carbon Neutral Society

Climate change is an urgent global issue affecting industries and communities alike.

This Roadmap sets out our steps towards achieving a carbon neutral society; fulfilling our responsibility as an active player in industries including resources and energy by maintaining stable energy supply, such as natural gas, while providing decarbonization solutions.

Roadmap: Three Core Points



Greenhouse Gas Reduction Targets

Halve by FY2030, Net Zero by 2050

(FY2020 baseline)



By FY2030

Approx. 2 trillion yen of EX-related investment

(Energy Transformation)



Integrated EX/DX initiatives to “Create a New Future”

Greenhouse Gas (GHG) Emissions Reduction Targets

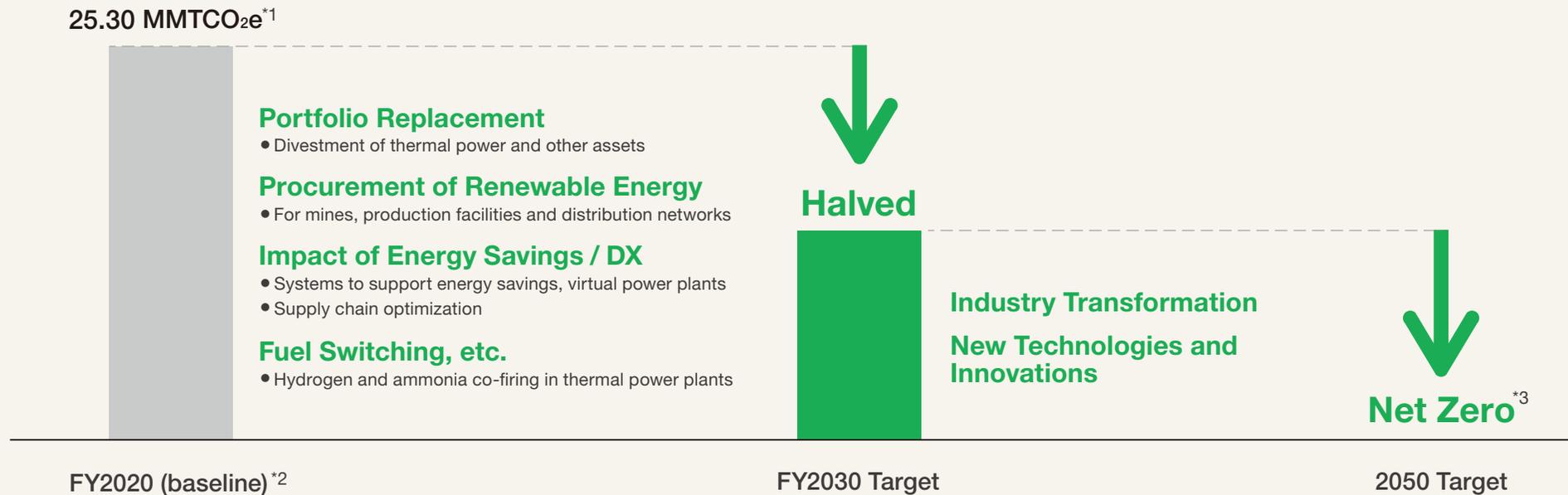
- Net zero GHG emissions by 2050, and a new FY2030 target with a detailed reduction plan.
- Emissions halved by FY2030 through portfolio replacement driven predominantly by divestment of thermal power assets.

GHG Emissions Halved by FY2030 (FY2020 baseline)

We will utilize every means available, aiming to reduce total emissions to a level consistent with the Paris Agreement, including by replacing assets and by switching operations to renewable energy and alternative fuels.

Net Zero GHG Emissions by 2050

We aim to achieve a Paris-aligned target of net zero by 2050 by leveraging our collective capabilities to drive industrial transformation, as well as by embracing new technologies and innovation.

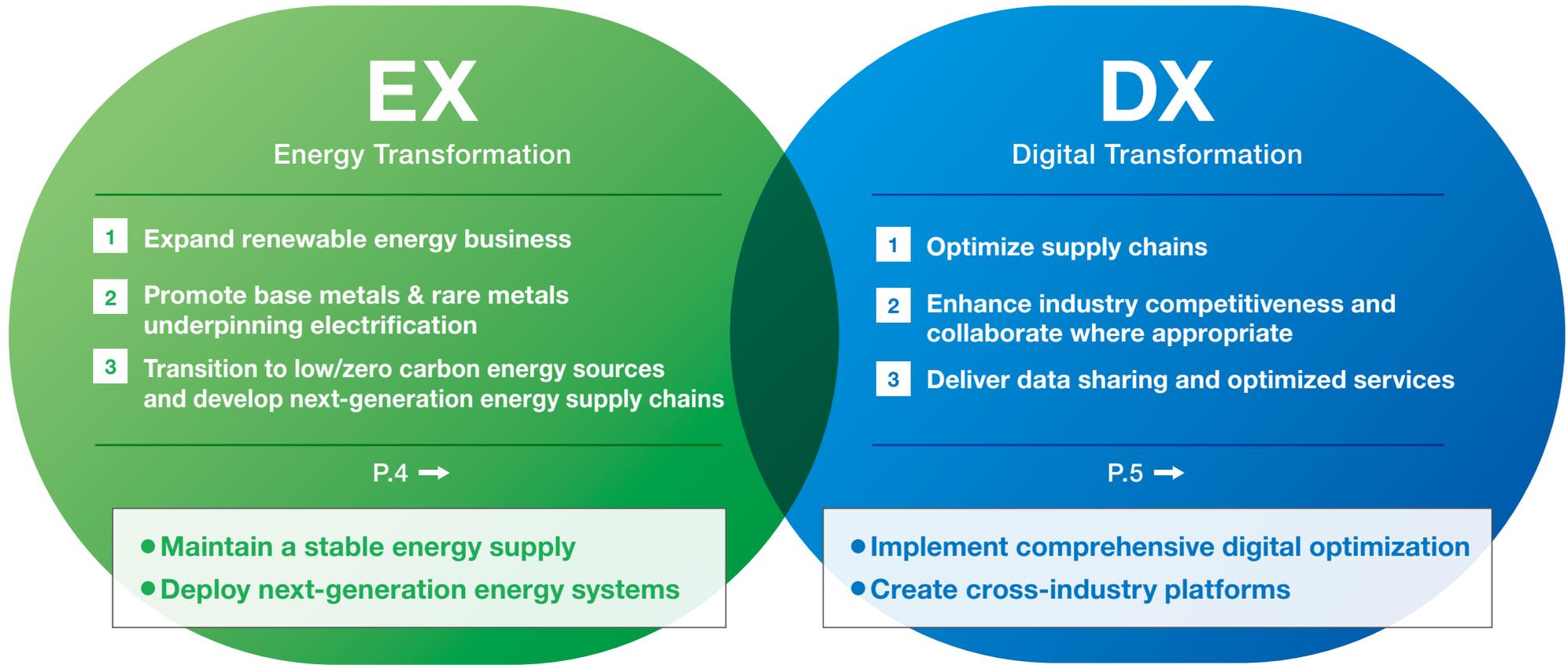


*1 The above figures represent the Scope 1 and Scope 2 emissions of MC and its consolidated companies, including affiliates, based on the equity share approach (for details, refer to our [Sustainability Website](#)).

*2 FY2020 is set as the new baseline, as it provides the most accurate affiliate data that was previously unavailable, e.g. Scope 2 market-based method emissions. The data are currently under detailed examination and may be subject to minor revisions.

*3 Any residual emissions, after reduction efforts have been made, will be neutralized using internationally-accepted offsetting methods including carbon removal.

Key Priorities for the Future: Our Approach

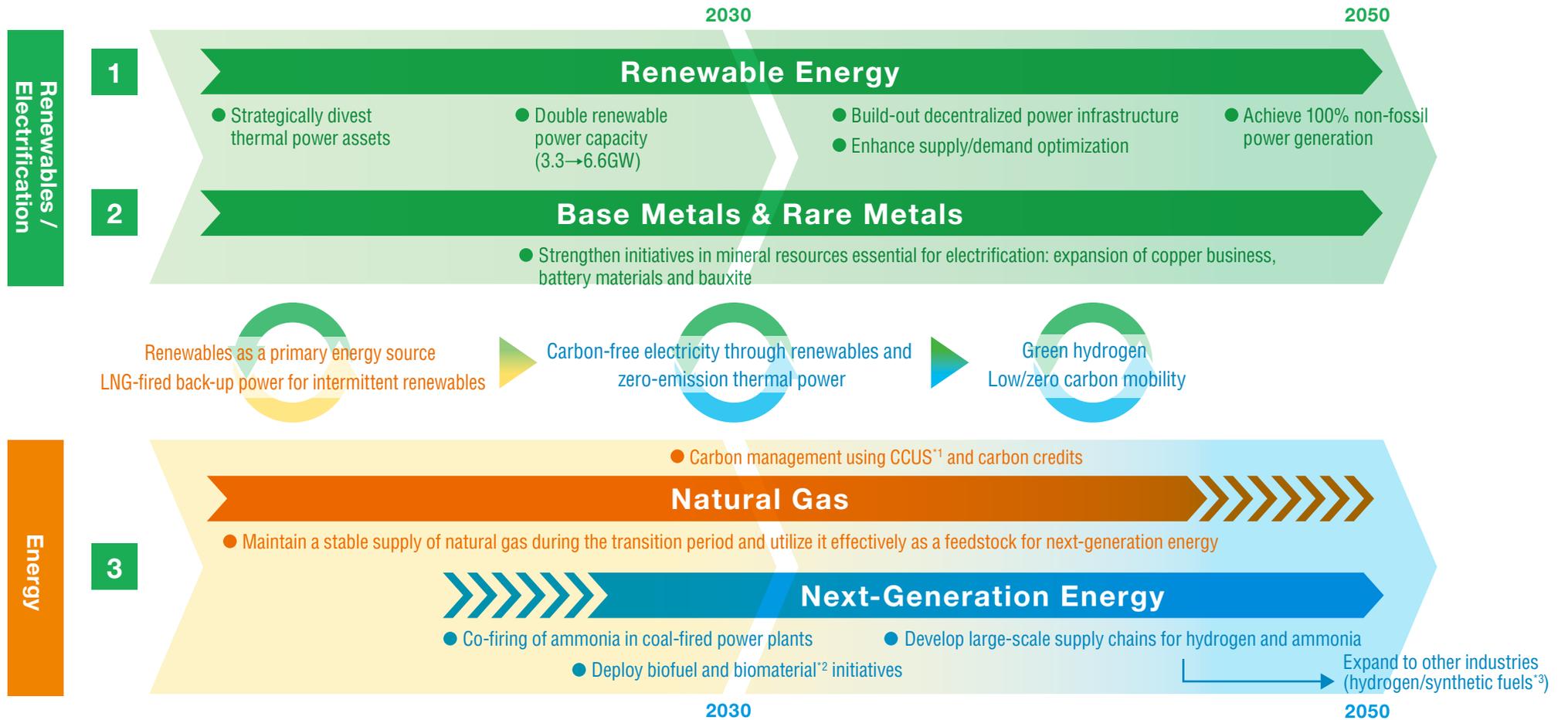


Innovative Value Creation Through **EX/DX**
Initiatives Transcending Industries and Regions

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Our Approach to EX

- While fulfilling our responsibility as a reliable supplier of energy, we will pursue global initiatives to double renewable power capacity and create next-generation energy supply chains.
- We will invest approximately 2 trillion yen by FY2030, in areas including renewable energy, copper, natural gas, hydrogen and ammonia, while maintaining a sound balance sheet.

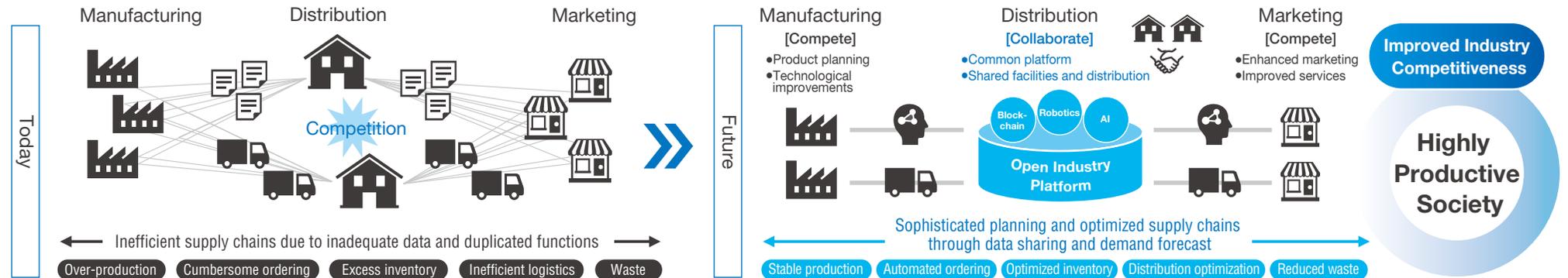


*1 Carbon Capture, Utilization and Storage *2 Sustainable fuels and materials made from biological resources *3 Clean fuels produced with hydrogen and CO₂ from the atmosphere or industrial sources, etc.

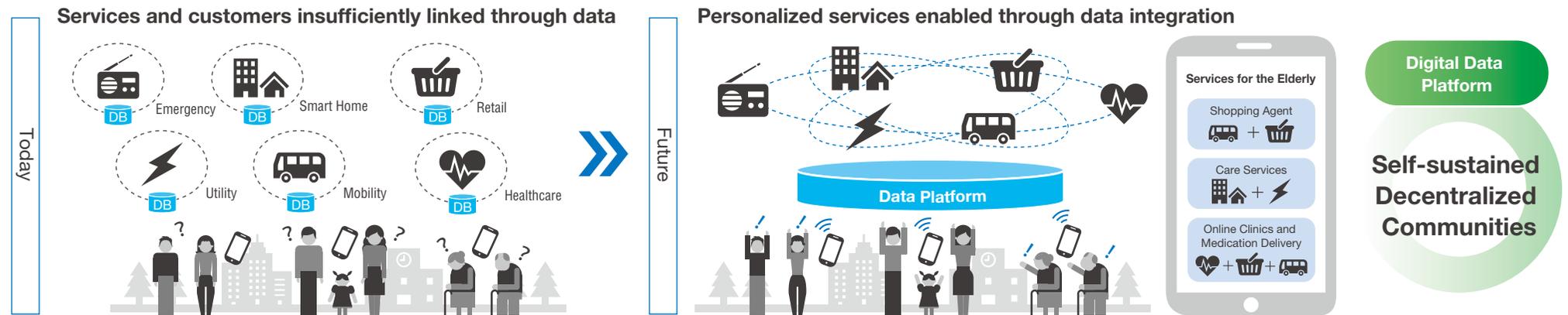
Our Approach to DX

- We will achieve energy savings and waste reduction through supply chain optimization while simultaneously enhancing industry competitiveness.
- We will provide integrated services, tailored to the lifestyles and life stages of individuals and households, by connecting data from various domains.

1 2 Optimize inefficient supply chains to enhance competitiveness and collaboration

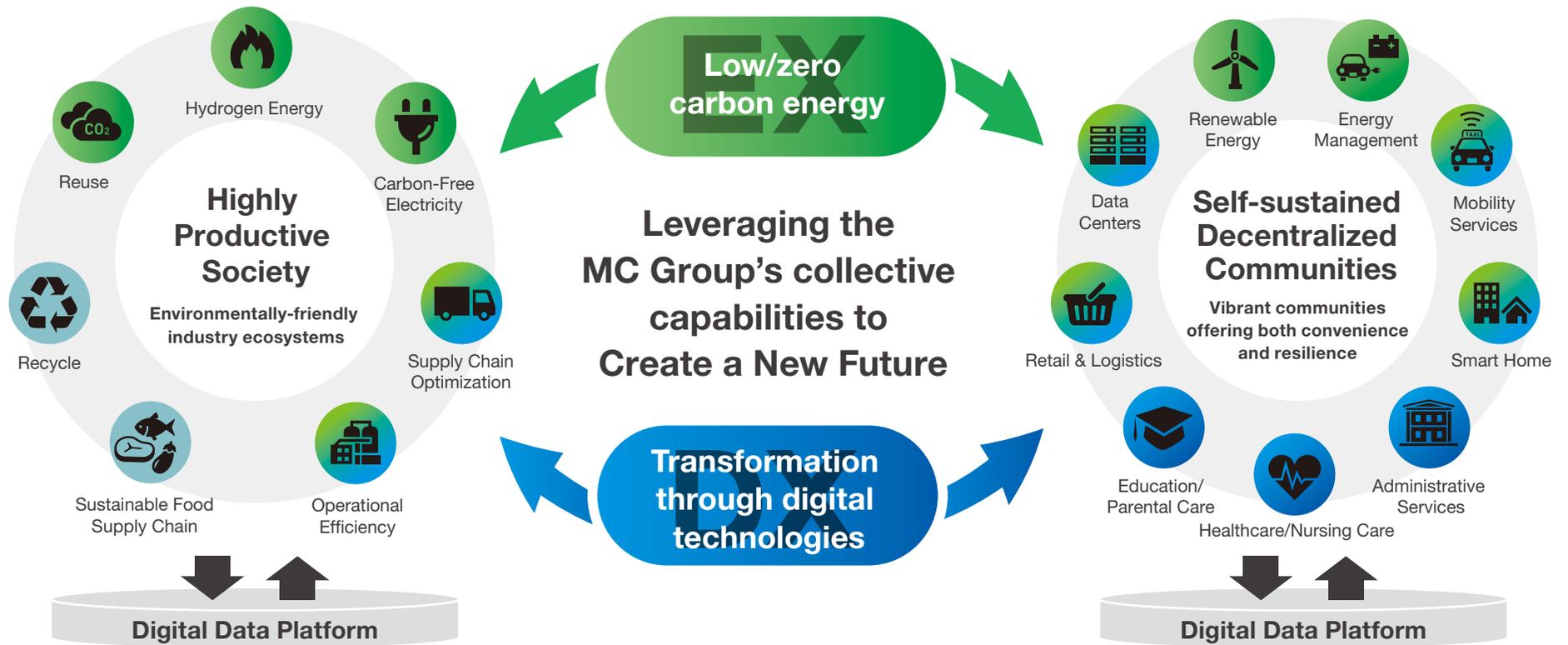


3 Provide tailored services to meet daily needs through data integration



Integrated EX/DX Initiatives to “Create a New Future”

- We will enable a highly productive society by combining our diverse business knowledge with digital technologies to enhance industry competitiveness.
- We will grow together with local communities by working with regional partners to create self-sustained, decentralized communities.



See page 9-13 for details on initiatives at each Business Group.

Natural Gas Group Stable energy supply	Petroleum & Chemicals Solution Group Next-generation energy & material development	Industrial Infrastructure Group Plant operation optimization	Food Industry Group Manufacturing & logistics network optimization	Power Solution Group Renewable energy
Industrial Materials Group Supply chain transformation	Minerals Resources Group Mineral resources to underpin electrification	Automotive & Mobility Group Mobility services	Consumer Industry Group Food distribution optimization	Urban Development Group Smart city development & operations

Looking to the Future

MC has always served to underpin economic development and reliably meet the needs of society by developing value chains for essential commodities such as LNG, metallurgical coal, copper, automobiles and food supplies, as well as through renewable energy and DX-related initiatives.

Making effective use of resources, reducing environmental impacts, enhancing resilience toward natural disasters and shifting to a decentralized society are just some of the challenges facing society today.

In order to address these issues without compromising people's wellbeing, we must utilize DX to create an efficient society that maximizes the use of renewable energy, strengthens resilience through distributed infrastructure, optimizes supply chains and reduces waste.

I believe that we can achieve this by leveraging the unique characteristics of each city and region to create appealing, self-sustained and decentralized communities and smart cities for the benefit of local residents.

By grasping the needs of the times and leveraging innovation to continue to stay a half-step ahead, we will strive to lead the next transformation, achieve sustainable growth for society and create value for the future.

Capitalizing on the MC Group's strengths, including its global network and diverse connections across a wide range of industries, let us tackle these challenges head-on through integrated EX and DX while transcending industries, regions and borders.



October 2021

Takehiko Kakiuchi

Member of the Board,
President and CEO

Initiatives Towards Decarbonization



Natural Gas Group

Emerging trends

With its comparatively lower environmental impact, natural gas is a key energy source in the transition period; as a replacement for coal and oil, as a balancing source for renewable intermittency and as a feedstock for next-generation fuels.

Initiatives towards a low/zero carbon society

Providing a stable energy supply during the transition to carbon neutrality, and promoting decarbonization in Asia

We remain committed to fulfilling our responsibility as a reliable supplier of energy while reducing the carbon intensity of our LNG supply chain. In view of the Japanese government's policy to support the energy transition in Asia, we will promote the effective use of natural gas in order to contribute towards a low/zero carbon society at a global scale.



1. Stable supply of LNG and decarbonization

- We remain committed to fulfilling our responsibility as a reliable supplier of LNG to consumers.
- We will develop carbon neutral LNG through responsible use of offsets including CCUS, carbon credits, etc.



2. Fuel switching from coal and oil

We will lead the effective use of natural gas as a source for power and heat to reduce emissions in Asia during the transition phase.



3. Efforts to develop next-generation energy

In collaboration with other business groups, we will develop and bring to market hydrogen derived from natural gas, laying the foundation for our next-generation energy business.



4. Supporting decarbonization at a global scale

We will bring the world's best practices to emerging countries.



Industrial Materials Group

Emerging trends

The industrial materials supply chain is essential to the global manufacturing industry, thus industry-wide action plans are required to minimize negative impacts on the environment.

Initiatives towards a low/zero carbon society

Optimizing the industrial materials supply chain and solving industry challenges

We aspire to simultaneously realize economic, societal and environmental value of industrial materials by solving industry-wide challenges through the transformation of the global supply chain and committing to the sustainable supply of materials.



1. Supply chain transformation

By using digital technology to improve productivity and efficiency in the industrial materials supply chain, we will enhance decarbonization and competitiveness of the entire industry.



2. Solutions for Industrial Materials

We will aggressively support to improve the sustainability of industrial materials by proactively tackling the challenges such as weight reduction, recycling and decarbonizing.



Petroleum & Chemicals Solution Group

Emerging trends

As we face the important challenges of addressing climate change and reducing marine plastics and waste, there is a clear need to enable fuels and materials with low environmental impact and build a circular economy.

Initiatives towards a low/zero carbon society

Achieving carbon neutrality in the fuel and materials sectors and a circular economy

While providing a stable supply of fuels and materials, we will develop business initiatives in areas including ammonia fuel, carbon recycling, biotechnologies and product recycling to realize a low/zero carbon and recycling-oriented society.



1. Ammonia fuel business

After establishing an ammonia fuel supply chain for power generation, we will then work to expand to mobility and industrial applications.



2. Carbon recycling business in fuel and materials

We will engage in various CCU businesses that recover and recycle CO₂ as a feedstock, to make an array of fuels and materials.



3. Biofuels and materials business

We will aim to develop and introduce carbon-neutral fuels and materials by utilizing sustainable biological resources.



4. Product recycling business

We will continue to promote the recycling business for plastic products to contribute towards a low-carbon, circular economy.



Minerals Resources Group

Emerging trends

Electrification and renewable energy are essential for the realization of a carbon-neutral society, and therefore the demand for copper and other mineral resources will increase dramatically. In the steel industry, the transition to electric arc furnaces and hydrogen reduction will continue in the long term, while for the time being, emission reduction initiatives for blast furnaces will be a critical challenge.

Initiatives towards a low/zero carbon society

Continuing to provide stable supplies and transforming into a theme-based portfolio

While fulfilling our responsibility to provide a stable supply of high-quality metallurgical coal and iron ore, we will contribute to EX from the perspective of raw material supply by transforming our portfolio based on the three overarching themes facing society: decarbonization, electrification and the shift to a circular economy.



1. Driving carbon neutrality

- Through the introduction of renewable energy and the electrification of heavy machinery, we will achieve carbon neutrality in existing mining operations by 2050.
- We will increase our exposure in CCUS to contribute to the decarbonization of various industries, including the steel industry.



2. Expanding the copper business

We aim to expand our copper business through organic growth opportunities in existing assets, which boast some of the world's largest copper reserves, increasing our interest in existing assets, acquiring new assets and utilizing new technologies to improve resource recovery.



3. Expanding exposure in EX-related mineral resources

We will strengthen our exposure in mineral resources that support EX, such as aluminum (weight reduction), lithium/nickel (battery materials), and precious metals (hydrogen).



Industrial Infrastructure Group

Emerging trends

Although the degree of impact varies throughout the industry, business transformation will be required in light of the shift towards decarbonization, particularly in relation to fossil fuel-related infrastructure.

Initiatives towards a low/zero carbon society

Developing and building the services & infrastructure necessary to decarbonize related industries

We will implement specific measures that will lead to solutions for industries and customers with which we engage, such as promoting hydrogen supply services (development of hydrogen supply chain) for power generation, steelmaking and petrochemical industries; reducing emissions of marine/shipping fuels and improving productivity through the use of digital technology.



1. Hydrogen supply service business

We will create a global hydrogen supply service business through our collaboration with Chiyoda Corporation, which has successfully developed SPERA Hydrogen, technology that enables the mass storage and transportation of hydrogen.



2. Electric vessels, decarbonization of marine fuels

We will contribute to the take-up of next-generation fuels and the establishment of an environmentally-friendly marine logistics network by developing and promoting electric vessels and commercializing liquefied gas transportation (hydrogen, ammonia, CO₂, etc.).



3. Contribute to energy and labor saving for related industries and customers

We will provide solutions for sustainability issues in related industries, such as reducing electricity consumption in buildings, warehouses and commercial facilities; optimizing equipment, labor and processes in the manufacturing industry; improving productivity by optimizing plant operations; and reducing domestic vessel crew numbers through autonomous navigation solutions.



Automotive & Mobility Group

Emerging trends

While the development of various next-generation vehicles is progressing, the pace of uptake differs by region. We expect to see a delineation of the sector based on vehicle application well into the future.

Initiatives towards a low/zero carbon society

Promoting next-generation vehicles and developing mobility businesses

We will work to expand sales of next-generation vehicles in our automotive value chain businesses, promote more efficient use of automobiles through the development of mobility businesses, and create new services that combine the provision of vehicles and means of transportation with clean fuels and electrification-related services.



1. Expand sales of next-generation vehicles

As a strategic partner of automotive OEMs, we will contribute to expanding sales of environmentally-friendly, next-generation vehicles (including clean fuel compatible) by leveraging the solid foundation of our automotive value chain businesses and our broad industrial exposure.



2. Regional transport DX

By providing new means of transportation, such as on-demand transportation, we will help solve each country's regional transport issues and reduce environmental impacts.



3. EV Fleet Management

In combination with the automotive value chain and mobility businesses, we will work to create new services that combine optimal next-generation vehicles, clean fuels and energy management.



Food Industry Group

Emerging trends

As consumers' awareness toward the environment and food changes, and as production technologies evolve, there is a need to develop a sustainable food supply model.

Initiatives towards a low/zero carbon society

Reducing environmental impacts through new technological initiatives and the use of digital technology

We will reduce our environmental impact by working on new technologies with an eye towards future changes in diets, and by using digital technology to optimize supply and demand distribution and improve efficiency.



1. Optimizing supply chains with digital technologies

Across the entire supply chain, from the production and procurement of raw materials such as food, perishables and ingredients, to manufacturing and sales, we will enhance productivity and efficiency by improving the accuracy of demand forecasting and by optimizing production and logistics through digital technologies.



2. Developing new technologies to achieve stable food supplies

Through initiatives such as cultured meat and land-based aquaculture, we will continue to fulfill our responsibility as a stable supplier of livestock and marine products in response to the diversification of diets, while reducing the environmental impacts of logistics and production.



3. Transitioning to low/zero carbon manufacturing

In addition to reducing electricity consumption by optimizing manufacturing processes and utilizing energy-saving technologies, we will also continue the transition to renewable energy sources for aging facilities towards a low/zero carbon future.



Consumer Industry Group

Emerging trends

In a decentralized society, it is necessary to reduce environmental impacts while reliably supporting infrastructure for daily life, especially in the food sector.

Initiatives towards a low/zero carbon society

Reducing environmental impact through the use of digital technology across store networks

We aim to reduce environmental impacts by optimizing our entire supply chain with digital technology and enabling a decentralized society through the new utilization of our nationwide network of retail stores.



1. Food distribution DX

By linking data from retailers to manufacturers, with a focus on food wholesalers, and by utilizing AI and other digital technologies, we aim to reduce food waste by improving demand forecasting, ordering and production planning, as well as to reduce emissions in our operations through logistics efficiency.



2. Deploying renewable energy and distributed power

- We will deploy renewable energy in retail stores, food wholesalers and distribution centers.
- We will tap into our nationwide network of convenience stores and other retail outlets to serve as EV charging stations and resilient power bases, contributing to the enhancement of distributed power sources.



3. New communications through data marketing

We will further cultivate environmental awareness among consumers through data marketing, including the reduction of food waste by analyzing purchase histories and cell phone location data and promoting close-to-expiry products, as well as by encouraging consumer behavior that contributes towards reduced emissions through membership programs.



Power Solution Group

Emerging trends

As renewable energy becomes a main source of power, the need for DX in this sector will become increasingly important from the perspective of stabilizing and improving the efficiency of intermittent renewable energy supplies.

Initiatives towards a low/zero carbon society

Aiming to revolutionize the power system based on renewable energy and digital technologies

DX in the power business will access AI and big data to balance supply and demand with a high degree of accuracy. We will make extensive use of electricity-related big data, not only to improve the disaster resilience of electric power infrastructure, but also to provide new services and realize initiatives to sustainably enrich society as a whole through the coordination of different types of data.



1. Expansion of renewables

By utilizing our extensive knowledge of the renewable energy sector, we will develop and provide competitive, clean energy according to regional characteristics. ("Generate").



2. Advanced energy utilization technologies

We will integrate a sophisticated balance of supply and demand functions that combine and optimize renewable energy, storage batteries, EVs, customer demand, etc., to enable the use of renewable energy as a stable power source ("Integrate").



3. Evolution to a new utility business

We will develop and provide the power and services needed by cities, communities and customers, and engage in new utility businesses rooted in the community ("Deliver").

Lifestyle services for households



Urban Development Group

Emerging trends

Urban planning and development using digital technology, as well as its management and operation, will help solve various urban challenges and promote the development of "smart cities" that are highly efficient and environmentally-friendly.

Initiatives towards a low/zero carbon society

Promoting smart, decarbonized urban management

By collecting, organizing, analyzing and utilizing various urban data related to people's lives, we will improve service convenience and reduce environmental impacts.



1. Introduction of advanced digital technology into urban planning

We will introduce innovative urban tools and products such as portals for local residents, as well as mobility, security, healthcare and energy-related content by using urban operating systems and other data platforms.



2. Clean and efficient energy systems

We will foster the use of renewable energy and decentralized power sources, not only for the operation of urban infrastructure, but also for data centers and other facilities.



3. Provision of financial functions to promote EX

We will support the promotion of EX-related businesses from a financial perspective by leveraging our extensive knowledge based on debt and equity financing to various companies and projects.