

KOBELCO

**KOBELCO Group
Initiatives in the Electric
Power Business**

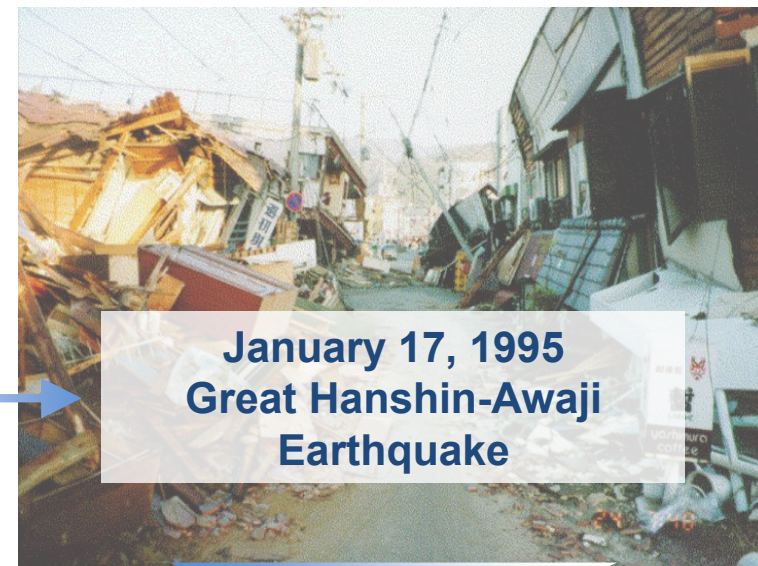
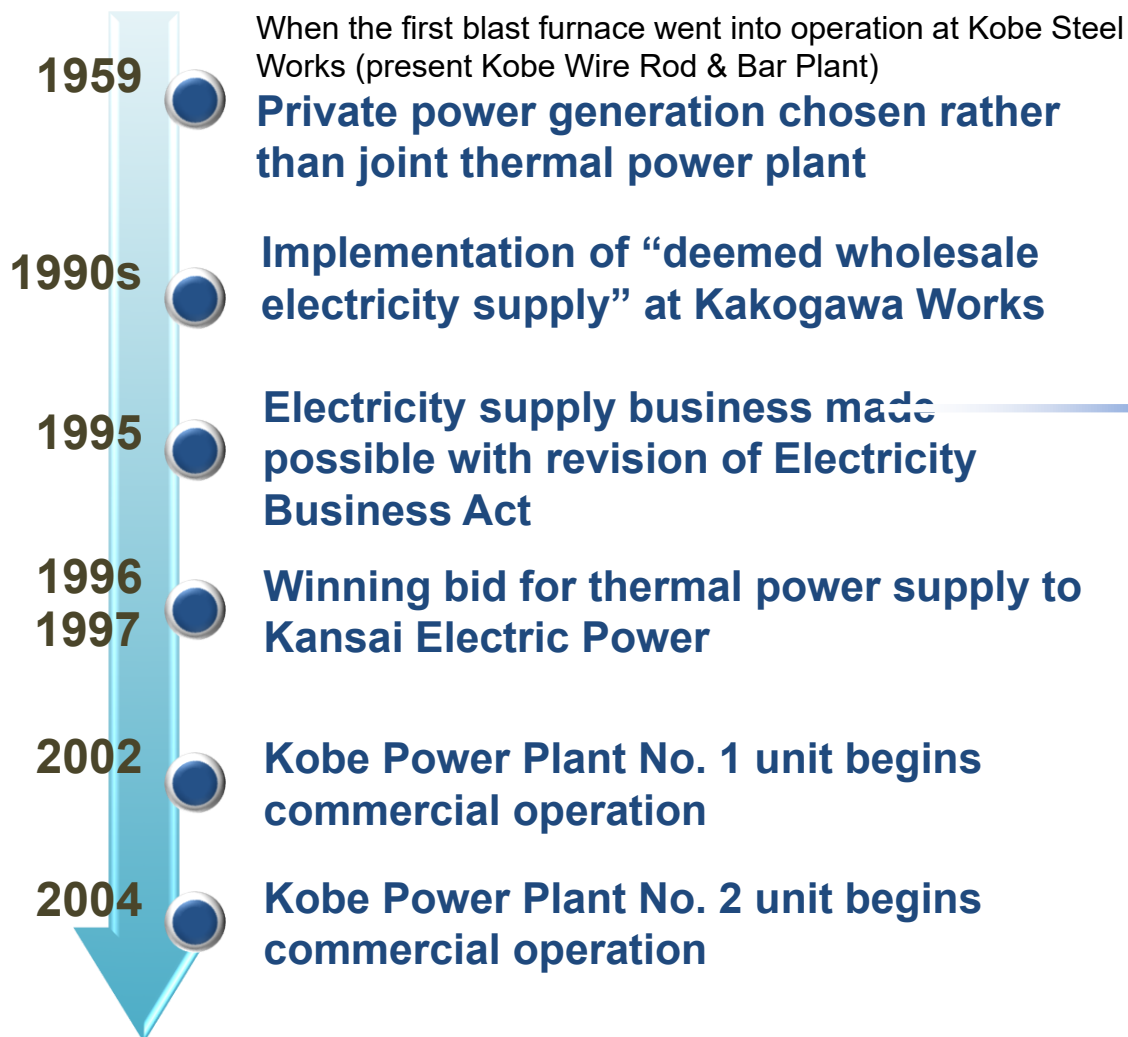
October 26, 2023
Kobe Steel, Ltd.

1. Overview of Electricity Power Business

2. About Business Earnings

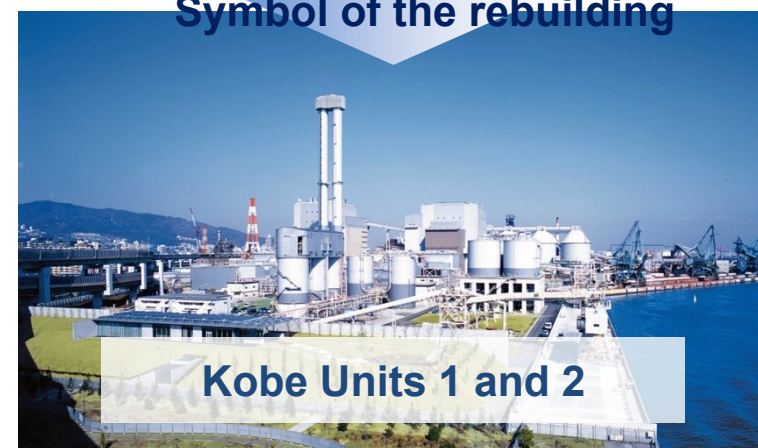
3. Efforts to Become Carbon Neutral

Construction of Kobe Power Plant



**January 17, 1995
Great Hanshin-Awaji
Earthquake**

Symbol of the rebuilding



Kobe Units 1 and 2

Expansion of the Business

Great East Japan Earthquake

- Electric power in tight supply
- Fears of higher electricity costs from rising cost of fuel

➔ Stronger than ever demands for **stable and efficient supply of electric power**

Moka Project (gas-fired)

■ Tokyo Gas

- Connecting to existing pipeline starting from newly built Hitachi LNG Terminal
Ibaraki-Tochigi gas pipeline plan

■ KOBELCO

- It was discovered that the **gas pipeline runs near Moka Industrial Park**

Signed a contract with Tokyo Gas for electric power supply

Kobe Project (coal-fired)

■ Kansai Electric Power

- Dealing with **advanced age** of thermal power plants
- **Making more economical** by lowering fuel costs

■ KOBELCO

- Studied use of former site of **Kobe Works No. 3 Blast Furnace**
- Sought further expansion of **electric power business**

Bid successfully on a FY2014 Kansai Electric Power thermal power supply tender project and signed a contract for electric power supply

Expansion of the Business



Kobe Power Plant No. 3 and 4 units



Moka Power Plant No. 1 and 2 units

1,400 MW

Establishing a stable earnings base

3,950 MW

Kobe No. 3 and 4 units begin operation

Ultra-supercritical (USC) fine coal-fired power plant

2,650 MW

Moka No. 1 and 2 units begin operation

Gas turbine combined cycle power plant using natural gas as fuel

Continued stable operation of Kobe No. 1 and 2 units

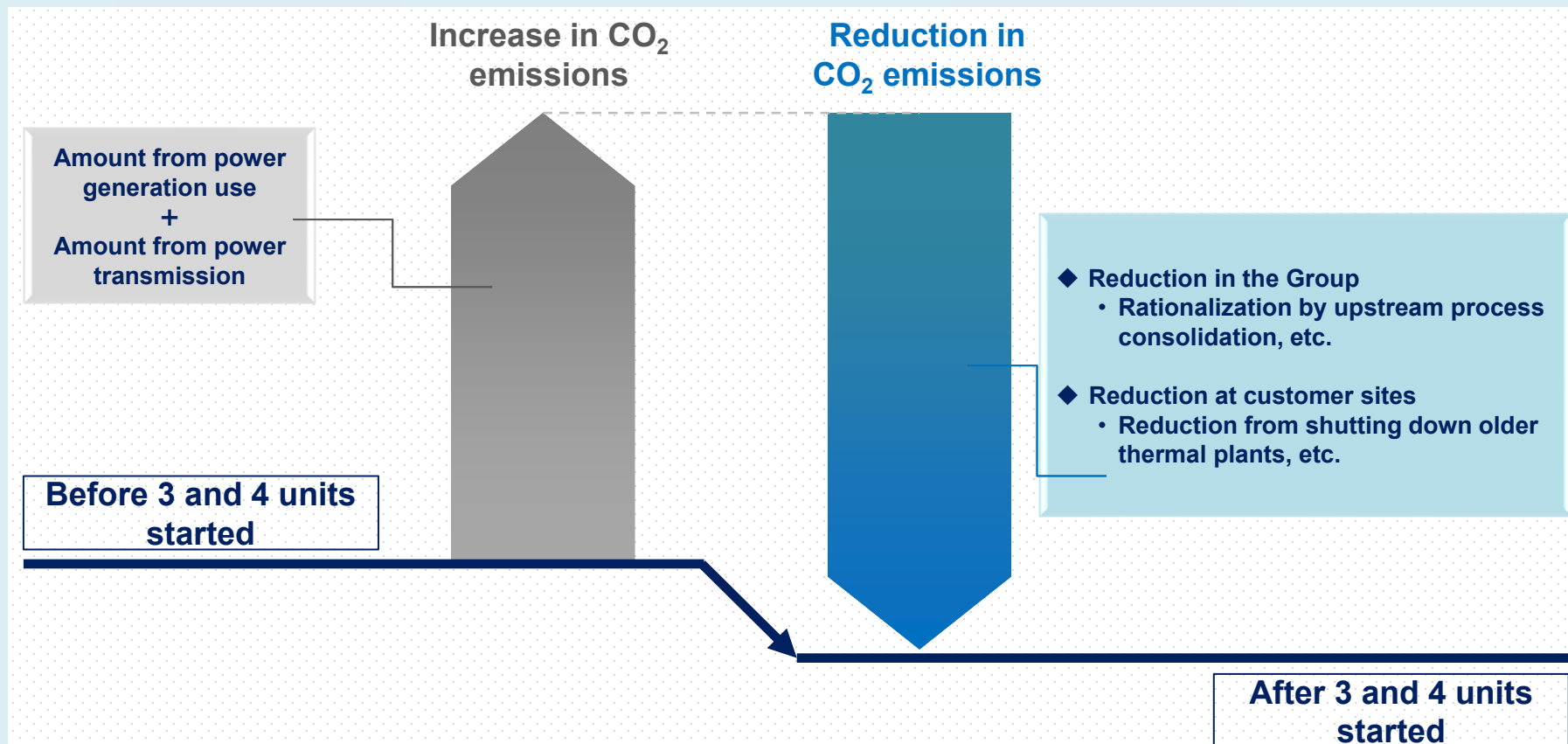
Supercritical (SC) fine coal-fired power plant

FY2019

FY2022

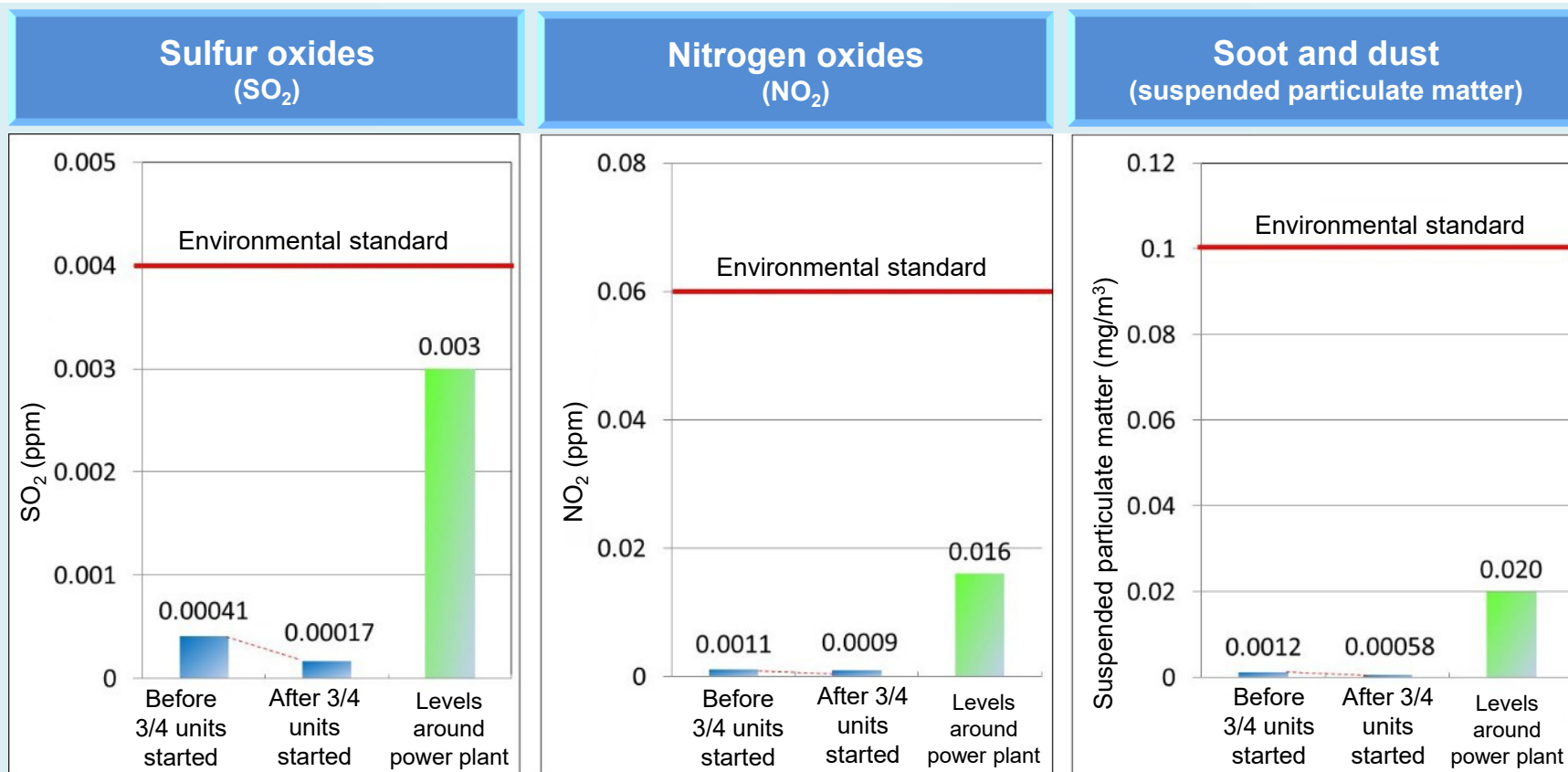
■ Kobe Power Plant: CO₂ emissions from operation of No. 3 and 4 units

Visualization of changes in CO₂ emissions



No increase in CO₂ emissions in the local area from operation of No. 3 and 4 units

■ Steel works + power plant: Maximum ground concentration and levels in environment around power plant after start of No. 3 and 4 units



- Notes: 1. Indicated here are annual average values at point of maximum ground concentration contributed to by steel works + power station, calculated at 100% usage rate of steel works-related facilities and 80% usage rate of Kobe Power Plant.
2. Levels in environment around power plant are shown as five-year average of annual averages from FY2011–2015, as measured at atmosphere monitoring stations within 10 km of planned location of No. 3 and 4 units.
3. Hourly values for environmental quality standards are defined as daily average values below the red line on the graph.

Extremely demanding environmental protection agreement signed

Kobe Power Plant

Assumed electric power in Kobe City during peak usage

Approx. 2,000 MW

Kobe Power Plant
No. 1-4 units

No. 1, 2 units 1,400 MW
No. 3, 4 units 1,300 MW



Kobe City peak electric power
100%
+
Greater self-sufficiency in Hanshin area

Moka Power Plant

Assumed electric power in Tochigi Prefecture during peak usage

Approx. 3,000 MW

Moka Power Plant
No. 1, 2 units

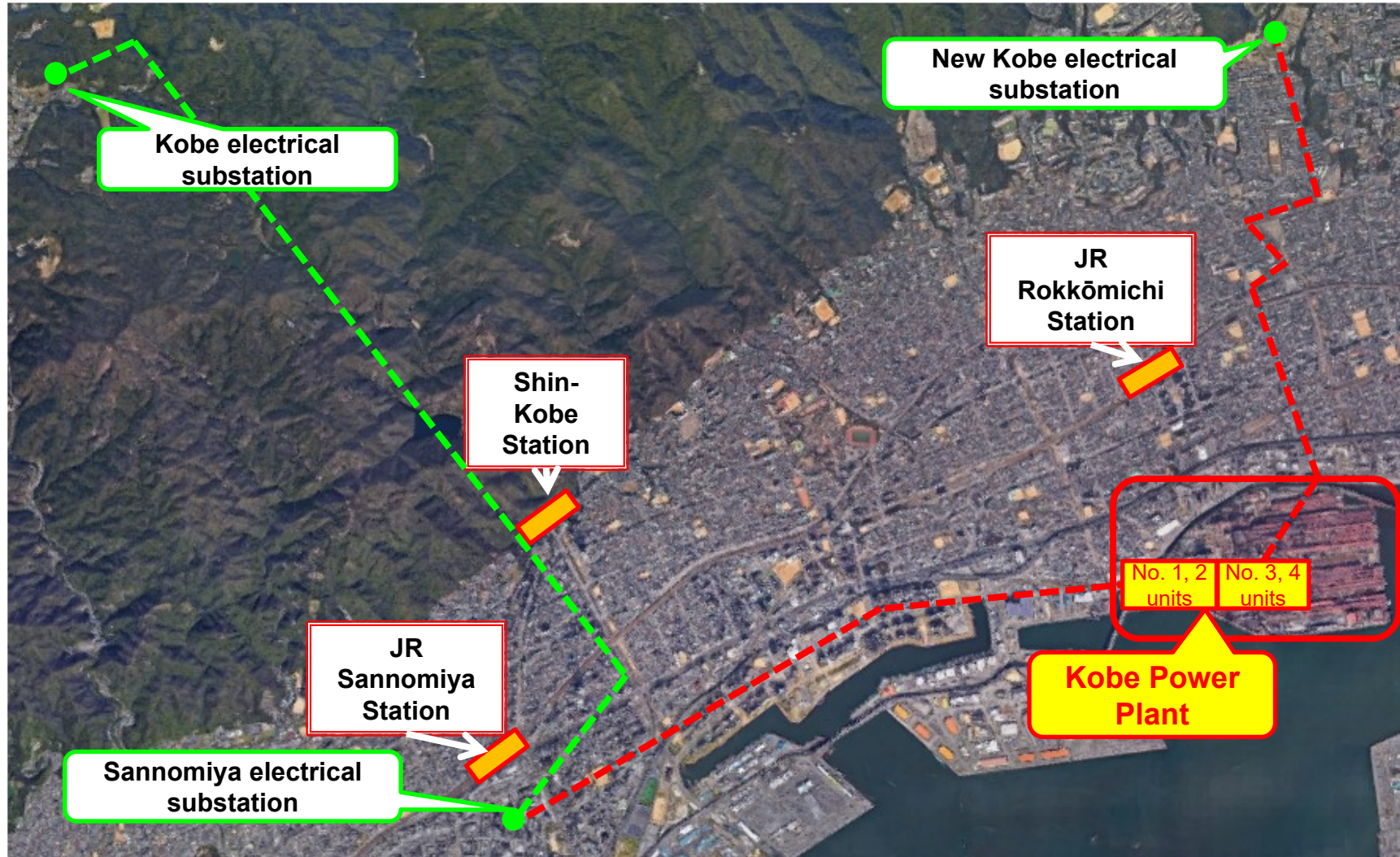
No.s 1, 2 units 1,250 MW



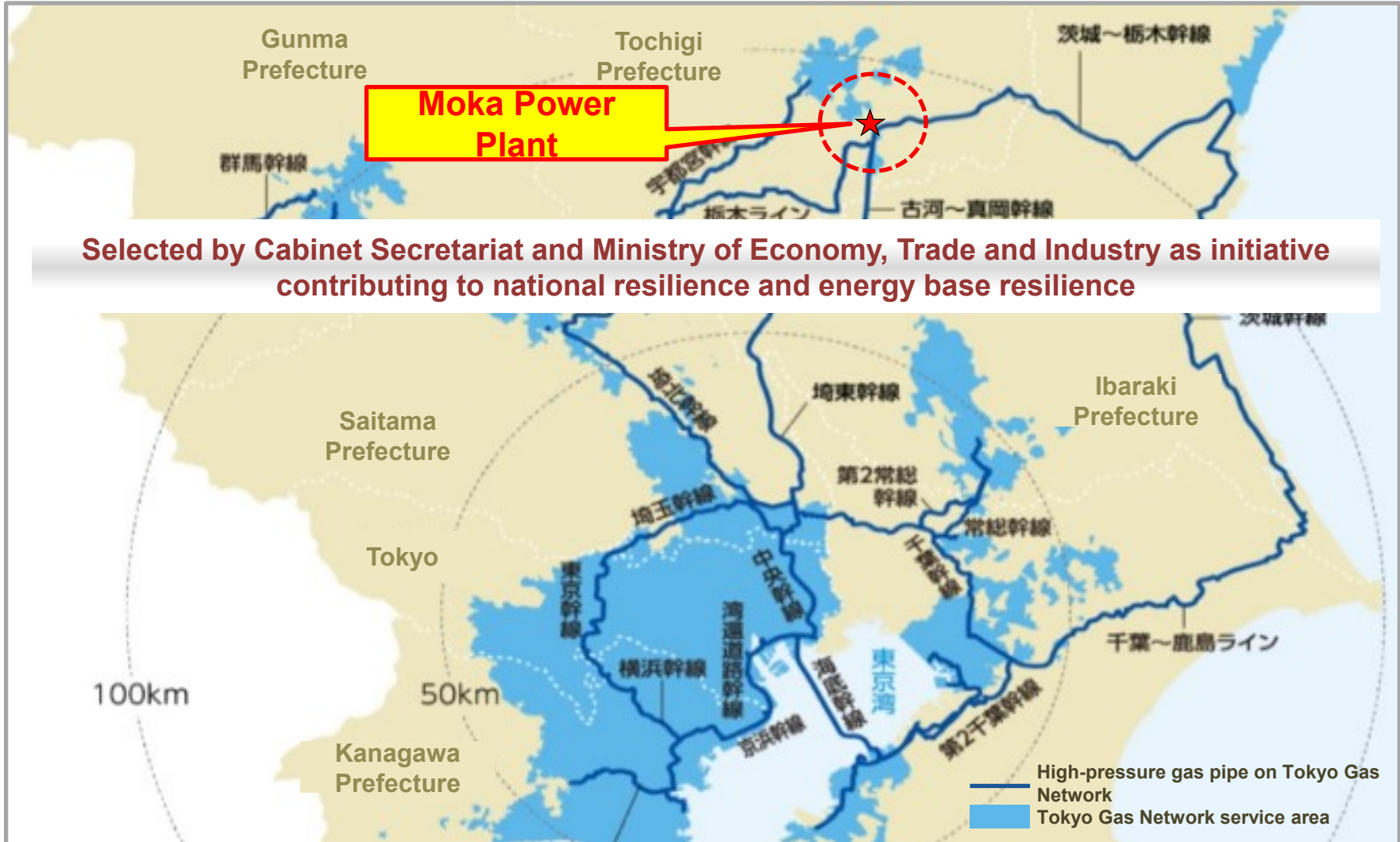
Tochigi Prefecture peak electric power
Approx. 40%
Selected as initiative contributing to national resilience and energy base resilience

Make up around 10% of electric power supply in Kansai Electric Power service area and 2% in Tokyo Electric Power service area

Power transmission to multiple electrical substations: Contributing to stable power supply in a disaster



Inland power station: Diversification of risk by locating away from tsunami threat areas

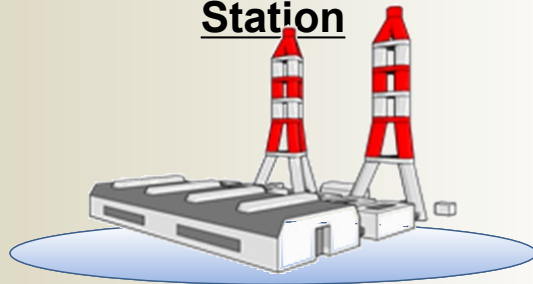


Selected by Cabinet Secretariat and Ministry of Economy, Trade and Industry as initiative contributing to national resilience and energy base resilience

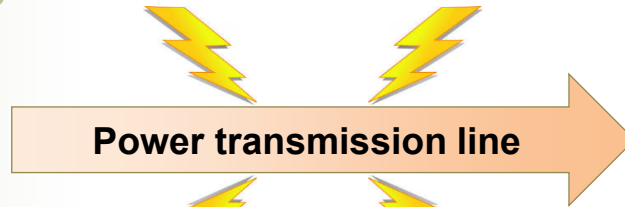
(Source) Taken from Tokyo Gas website "Tokyo Gas Group City Gas Supply Area" with additional notation

Ordinary power station

Power Station



Power transmission line



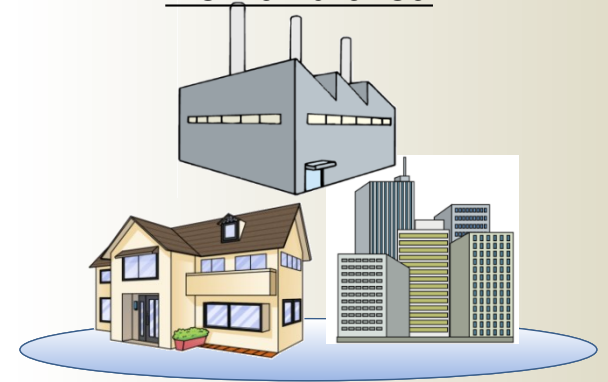
Heat generation from resistance

||

transmission loss

(becomes larger with greater distance from demand area)

Demand area



Our power stations

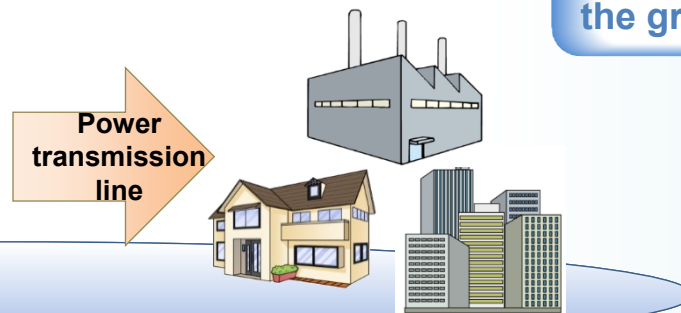
Kobe Power Plant



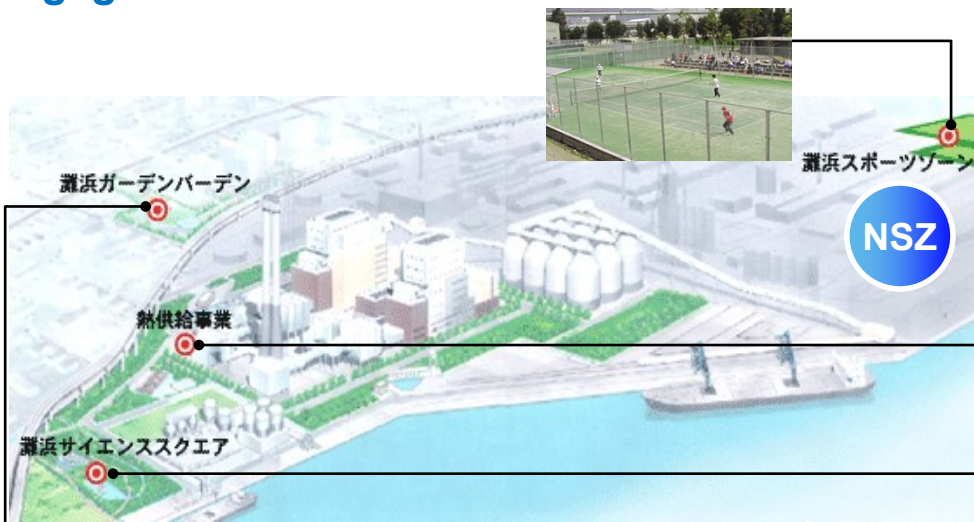
Moka Power Plant



Demand area



Reduction of energy loss by proximity to demand areas in the greater Tokyo and Hanshin



Heat supply business



- Supply of steam to nearby sake breweries by making effective use of waste heat from power station (Sawanotsuru, Oenon Product Support, Kansai Bottling)

Nadahama Garden Baden

NGB



- Making effective use of hot steam from power station to operate health spa facilities on Kobe City park grounds
- Use of pool water for fire fighting and domestic water in a disaster

Nadahama Science Square

NSS



- A hands-on museum for learning and experiencing the wonders of science and technology while having fun, with exhibits on themes such as steelmaking, power generation, energy, and the environment.

Community engagement facilities: NSZ, NGB, NSS

More than 2.7 million total visitors through FY2022

2008 Won the Minister of Education, Culture, Sports, Science and Technology Prize in the 17th Global Environmental Awards program

2010 Certified as one of the 100 Corporate Greenspaces Helping to Preserve Biodiversity

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Five key measures toward establishing a stable earnings base

1 Strengthening the earnings base of the steel business

- Lowering break-even point
- Improving product mix

2 Smooth startup and stable operation of new electric power projects

- Ensuring stable operation of existing power plants
- Securing stable earnings with the start of operation of Kobe Power Plant No. 3 and 4 units

3 Strategic investment in the materials businesses leading to earnings contribution

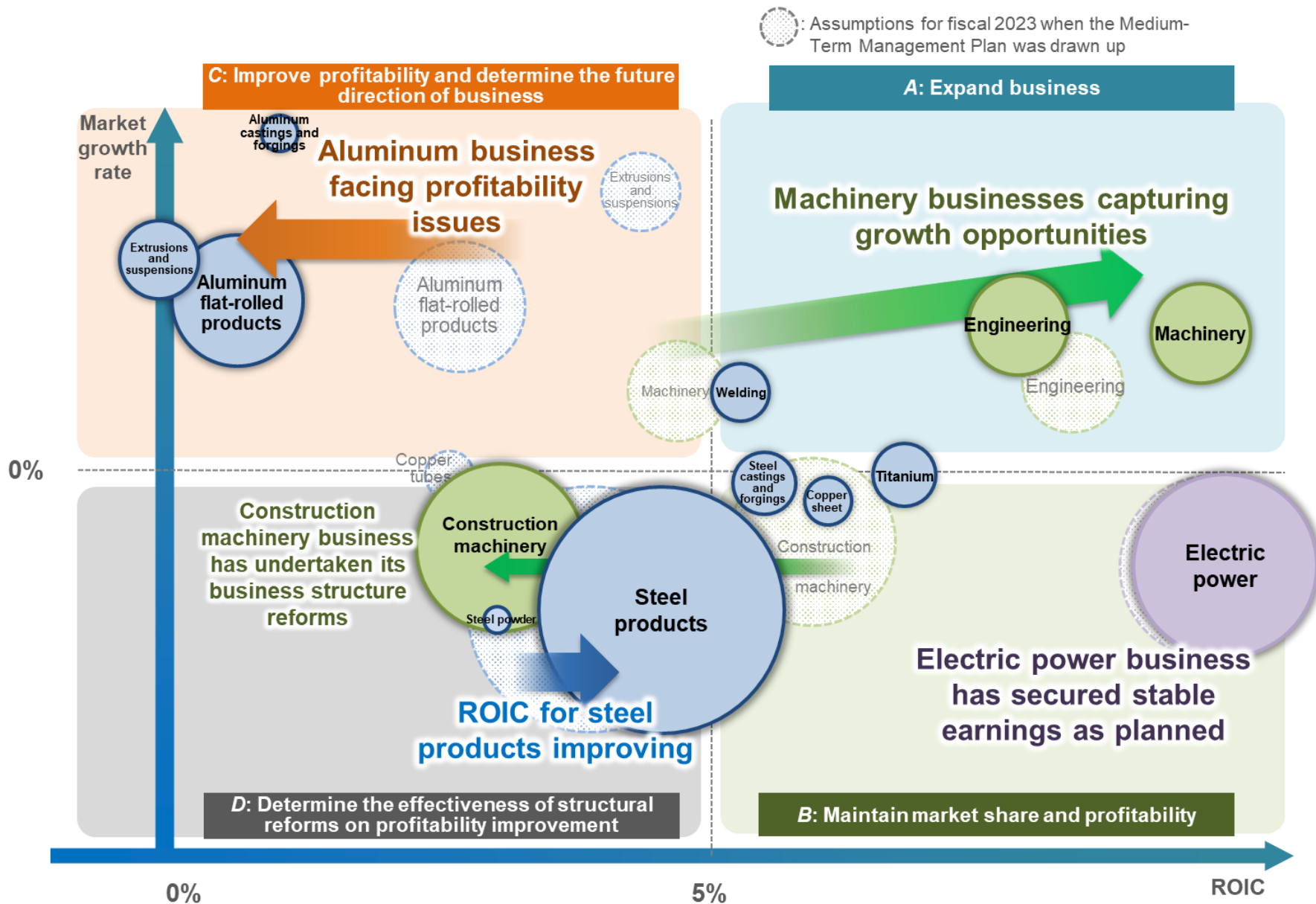
- Realizing steady and early contribution to earnings from strategic investment for automotive weight reduction

4 Restructuring unprofitable businesses

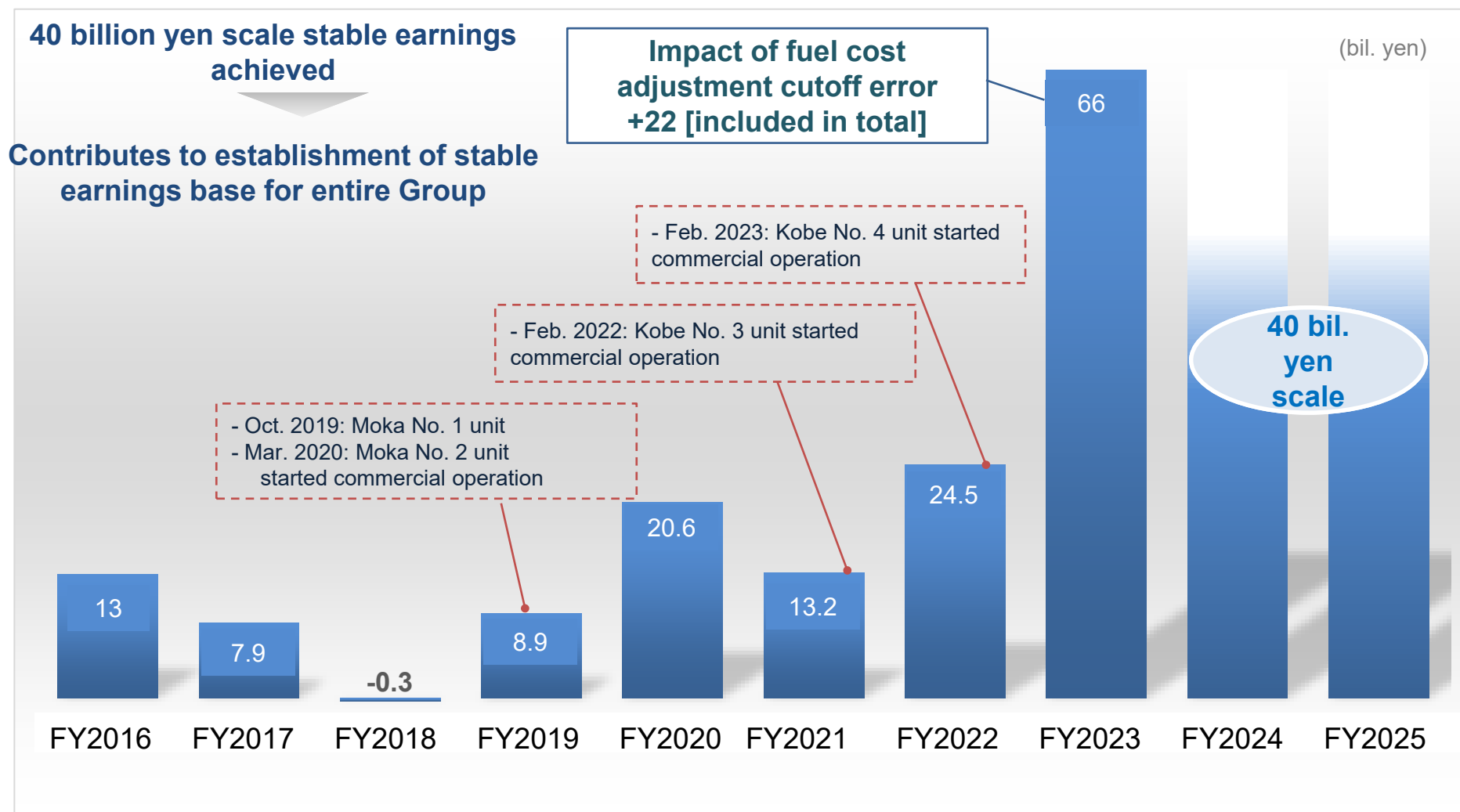
- Making the steel casting and forging, titanium, and crane businesses return to profitability

5 Stabilizing earnings in the machinery businesses and responding to growing markets

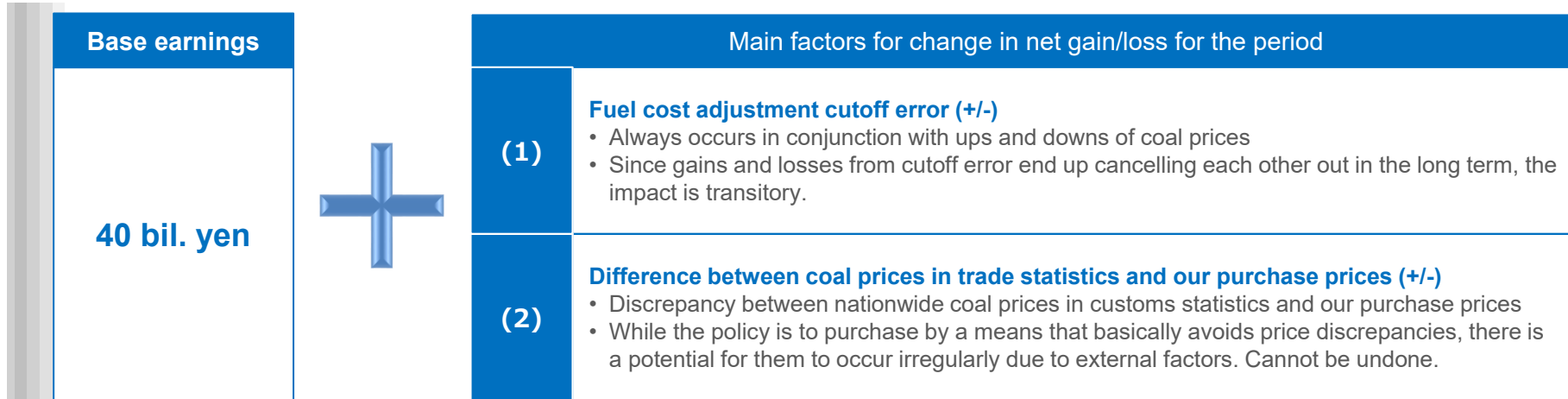
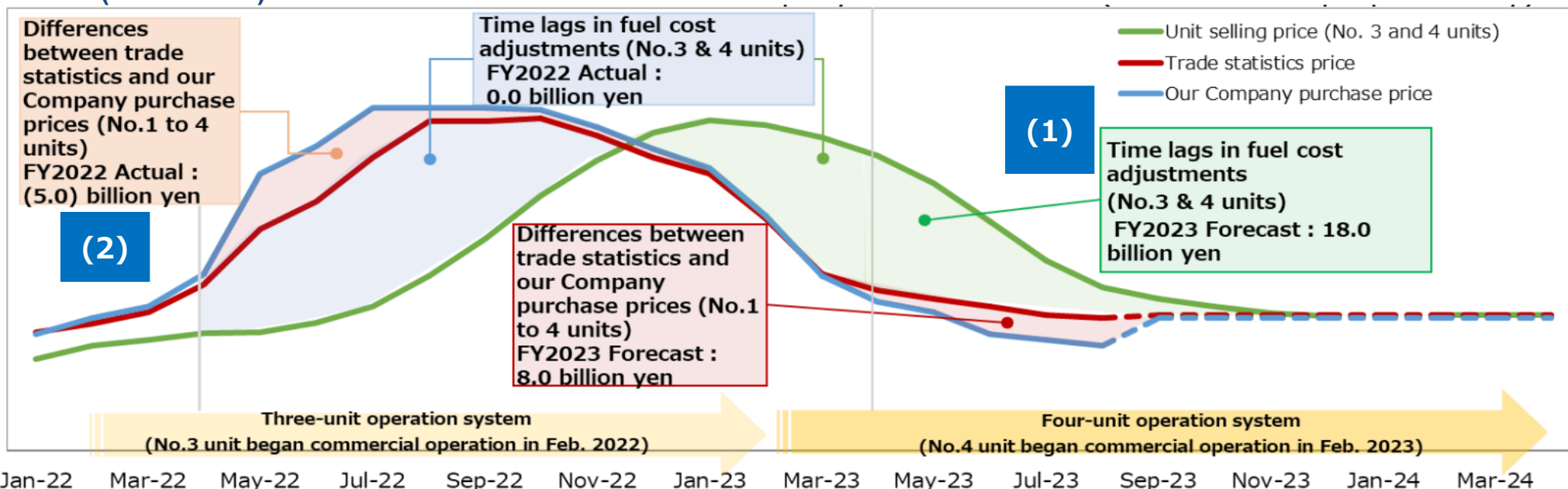
- Enhancing environmental contribution lineup and strengthening of collaboration in Group
- Reforming earnings structure of the construction machinery business



Ordinary P/L trend in electric power business



■ Explanation of 1Q financial results: Trends in coal prices in trade statistics and our purchase prices (illustration)



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Vulnerability of Japan's energy supply

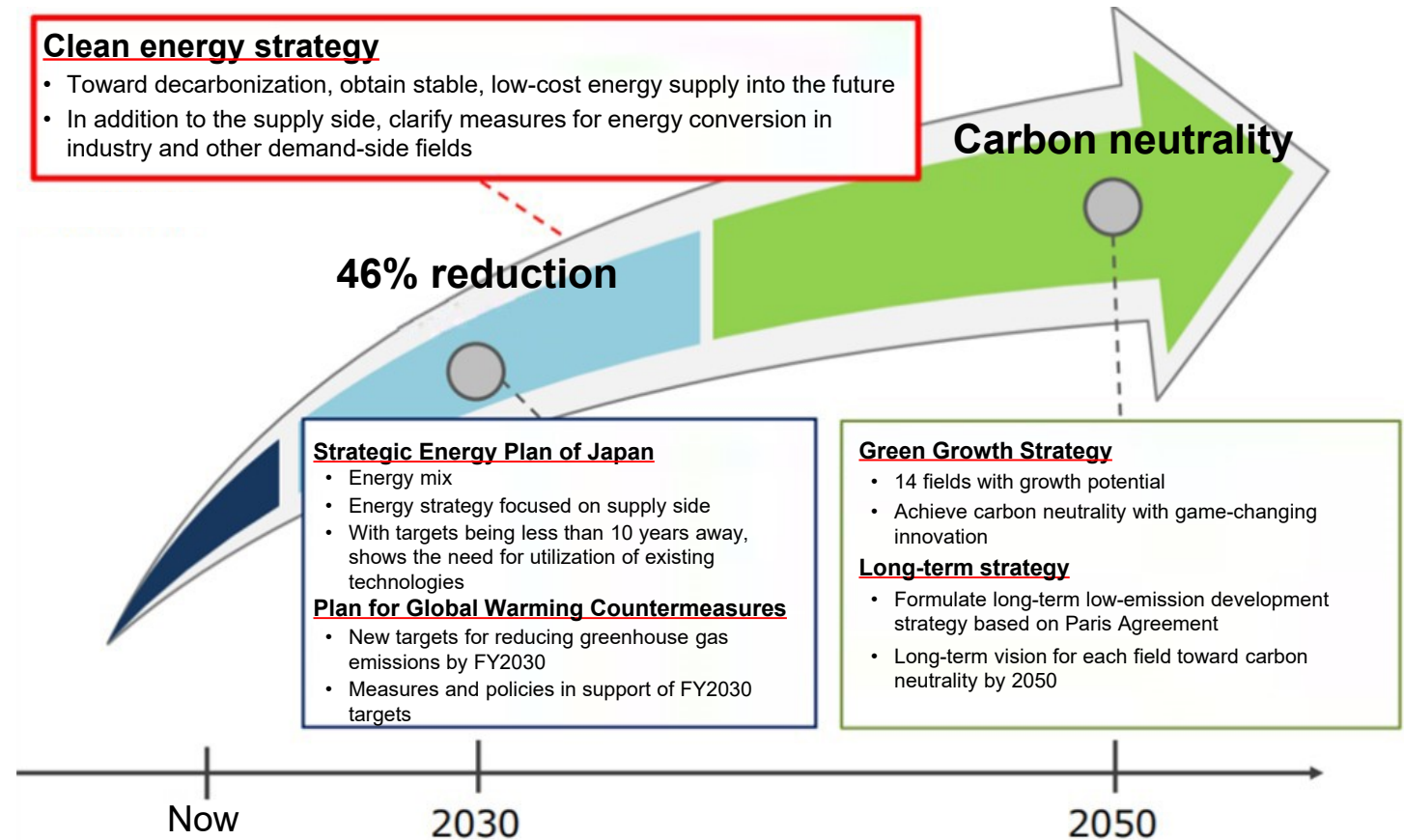
- ✓ Lacking fossil resources, Japan largely depends on imports for its energy supply.
- ✓ The hurdles to further expanding introduction of renewable energy are high, in the challenging natural environment with few non-mountainous terrains.
- ✓ Surrounded by the seas on all sides, Japan lacks an international interconnect for import/export of electric power.

Government declarations and strategies

- 2050
→ **Carbon neutrality**
- FY2030
→ **46% cut in greenhouse gas emissions**
(from FY2013 levels)
- Proposed the **Clean Energy Strategy for obtaining stable and low-cost energy supply into the future, leading to further economic growth**

Clean energy strategy

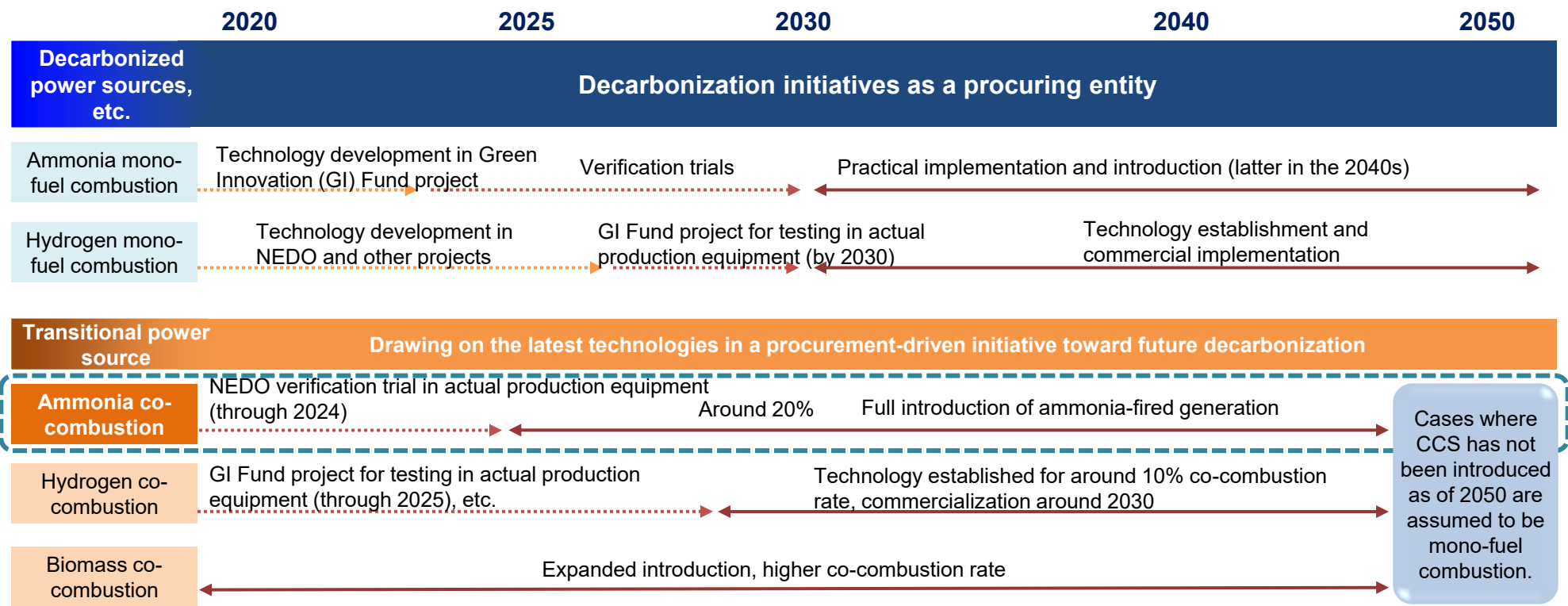
- Toward decarbonization, obtain stable, low-cost energy supply into the future
- In addition to the supply side, clarify measures for energy conversion in industry and other demand-side fields



(Source) Interim summary report of joint meeting of the Subcommittee on Green Transformation Promotion of the Industrial Structure Council's Committee on Industrial Science and Technology Policy and Environment and the Study Subcommittee on Next-generation Energy Supply and Demand Structures toward Carbon Neutrality in 2050 of the Advisory Committee for Natural Resources and Energy's Strategic Policy Committee

Government policy toward decarbonization of thermal power sources

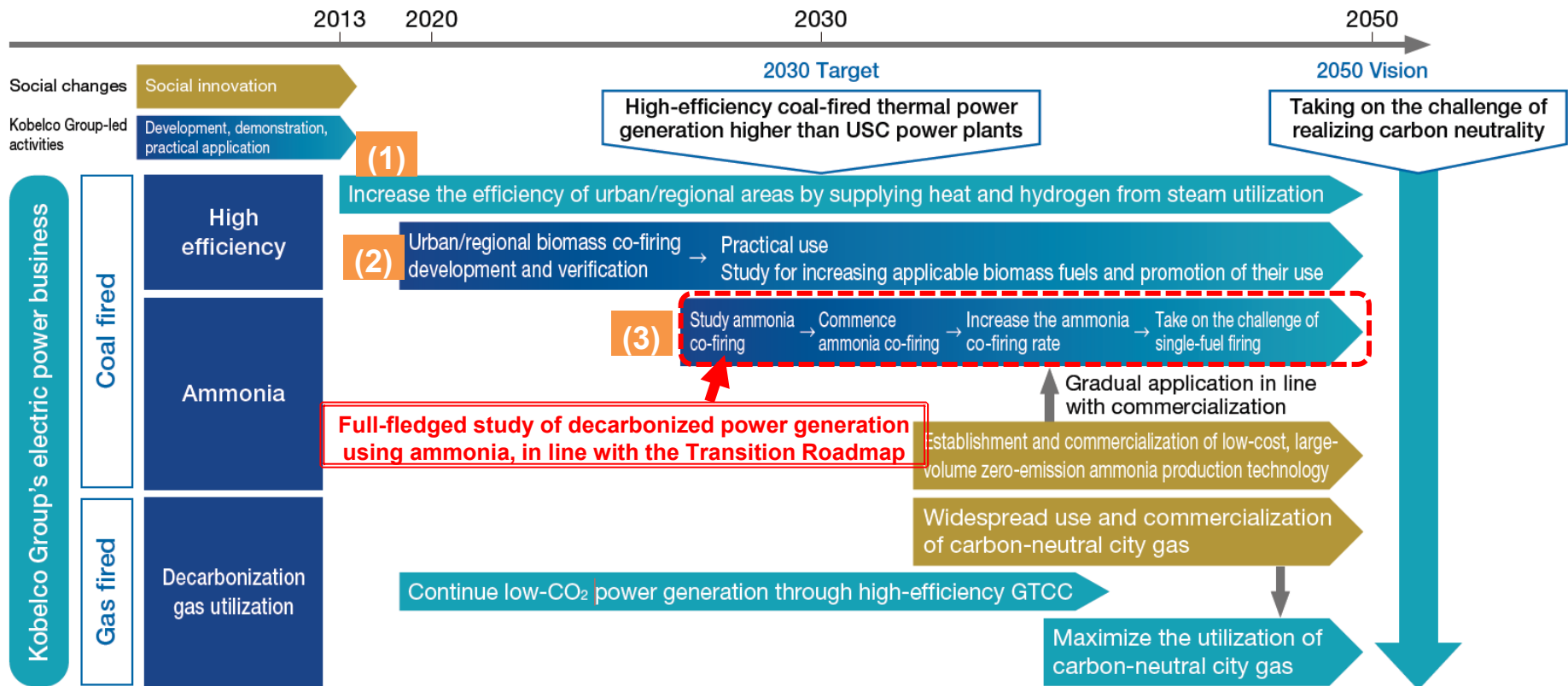
- Even with the expanding introduction of renewable energy sources, with their intermittent output, thermal power sources **play an important role in the stable supply of energy with their supply capacity, adjustability, and staying power**. Because of their large CO₂ emissions, however, **technical development and verification testing are being carried out on alternatives toward decarbonization, including hydrogen, ammonia, and biomass co-combustion and mono-fuel combustion**, on the way to implementation as early as possible.
 - Among these efforts, with a final goal of achieving carbon neutrality achieved by 2050, the Japanese government has issued a **“transition roadmap” indicating the low-carbon and zero-carbon technologies that are expected to be implemented by 2050, and the timing of their implementation**.
- In line with these government guidelines, we are carrying out initiatives on **ammonia co-combustion as a main approach to decarbonization**.



(Source) Excerpted from p. 21 of Transition Roadmap for Power Sector (Feb. 2022, Electricity Infrastructure Division, Agency for Natural Resources and Energy)

Our decarbonization initiatives

- With the coal-fired Kobe Power Plant, by **providing heat and hydrogen to the surrounding area using steam from the power station**, we are seeking to raise the efficiency of energy use in the entire area. Further, in cooperation between the Electric Power Business and Engineering Business segments, we are **stepping up CO₂ reduction initiatives, including co-combustion of biomass fuel (sewage sludge, food residue) and ammonia co-combustion → mono-fuel combustion, aiming for the world's most advanced urban coal-fired thermal power station.**
- As for the gas-fired generation at the Moka Power Plant, in addition to continuing with stable operation of low-CO₂ generation by means of high-efficiency GTCC, we will investigate the maximum use of carbon neutral city gas and take up the challenge of achieving carbon neutrality by 2050 through these measures.
- Today we will explain coal-fired power generation initiatives (1) to (3).

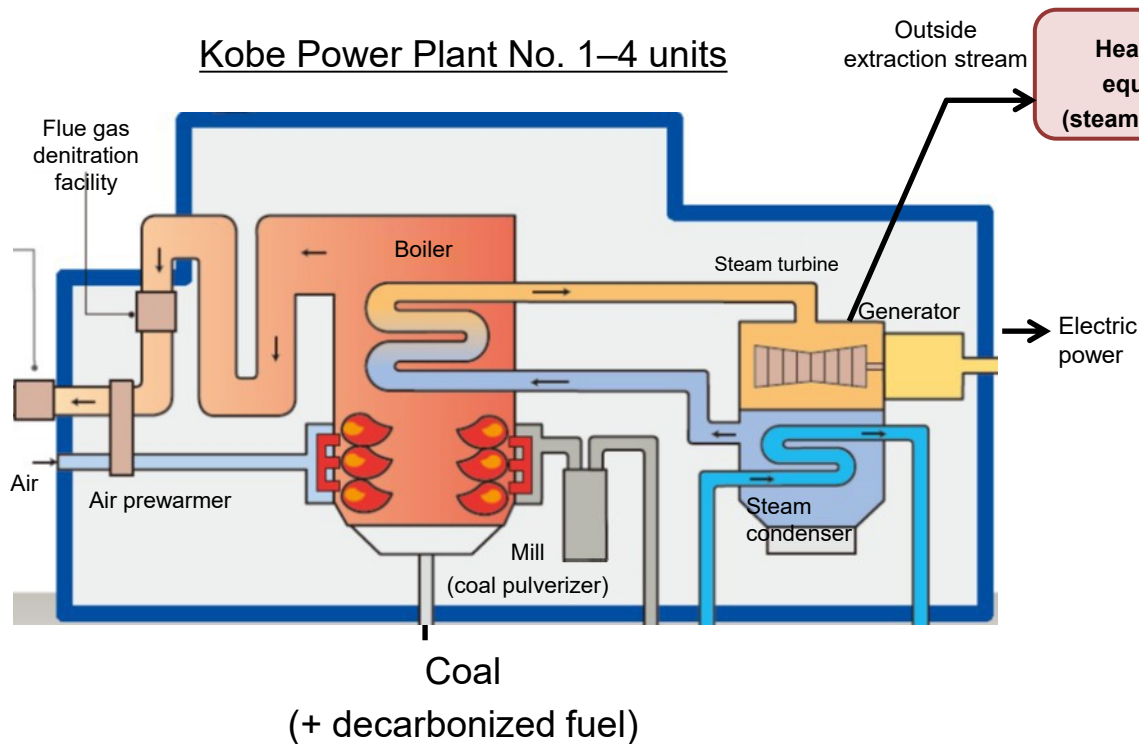


(1) Expansion of heat supply business

- No. 1 to 4 units of the Kobe Power Plant have capability for outside extraction stream supply, enabling supply of heat to customers.
- No. 1 and 2 units are already supplying heat to nearby sake breweries and others, but there is still spare capacity. No. 3 and 4 units have similar outside extraction stream supply capability.



- ▶ We will work toward further expansion of the heat supply business, aiming to contribute further to the region and improve power generation efficiency.
- ▶ As for coal, by co-combustion with decarbonized fuels (biomass, ammonia), heat supply contributing toward carbon neutrality will be made possible.



Advantages to supplied customers

- Does away with need for heavy oil-burning boilers
 - • No need for equipment maintenance
 - No need to purchase heavy oil
 - No need to station qualified boiler supervising engineer

At the turn of a faucet, the required amount of steam is available whenever needed.



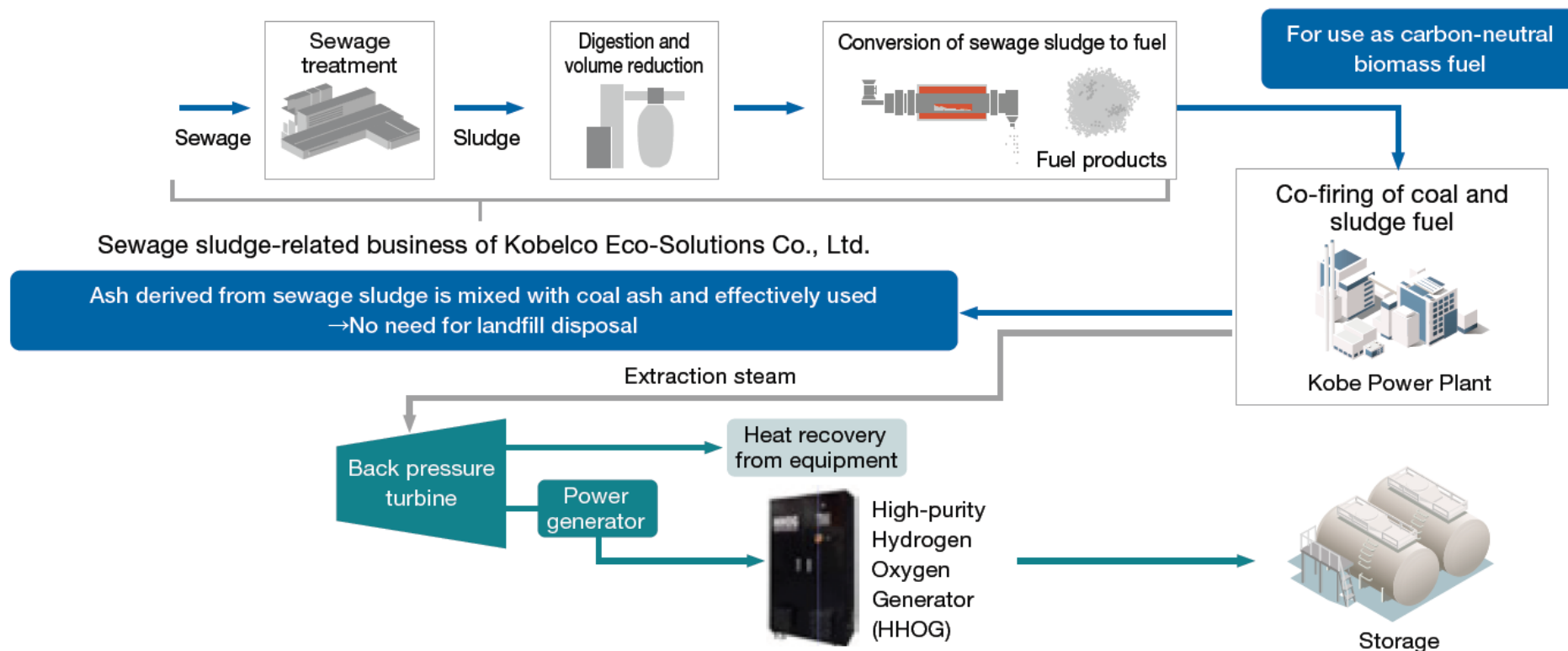
(2) Conversion of sludge to fuel

- **Effective use is made of sewage sludge**, which already exists in the region, **as fuel for electric power generation**.
- The steam generated from combustion of sewage sludge is extracted during turbine operation and used to generate electric power by turbine generation, binary generation, or other means.
- Making use of the electric power generated by the binary cycle, etc., **hydrogen is manufactured from biomass** by electrolysis.



- ▶ As of the end of FY2022, Kobelco Eco-Solutions Co., Ltd. (KES) had received three orders for sludge-to-fuel service.
- ▶ In FY2023, we are conducting a joint project with KES toward co-combustion of biomass fuel* extracted from sewage sludge and utilization of steam from the extraction steam (hydrogen manufacturing by means of a water electrolysis hydrogen generator).

*Supply is expected to begin in FY2025 in Hyogo Prefecture and by neighboring municipalities.

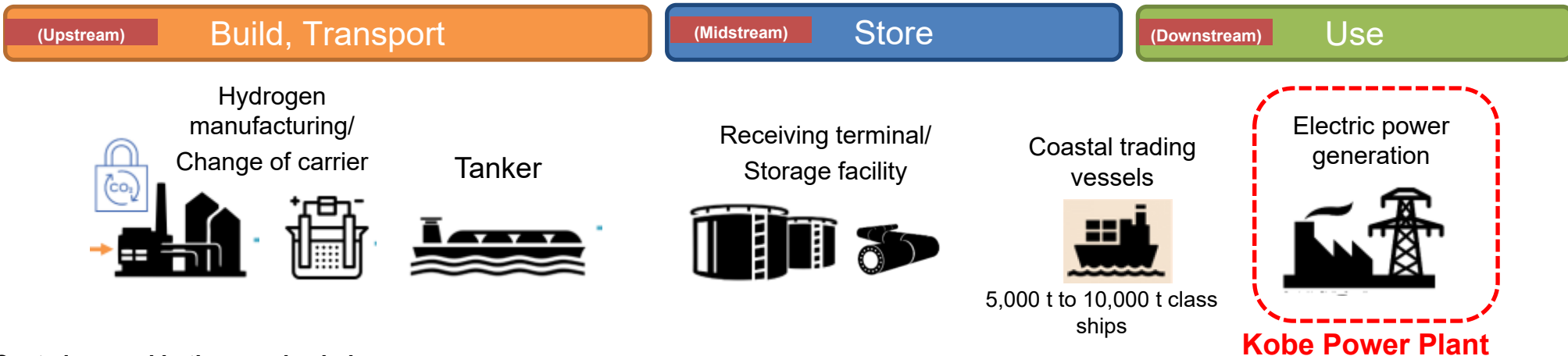


(3)-1 Overview of the ammonia supply chain

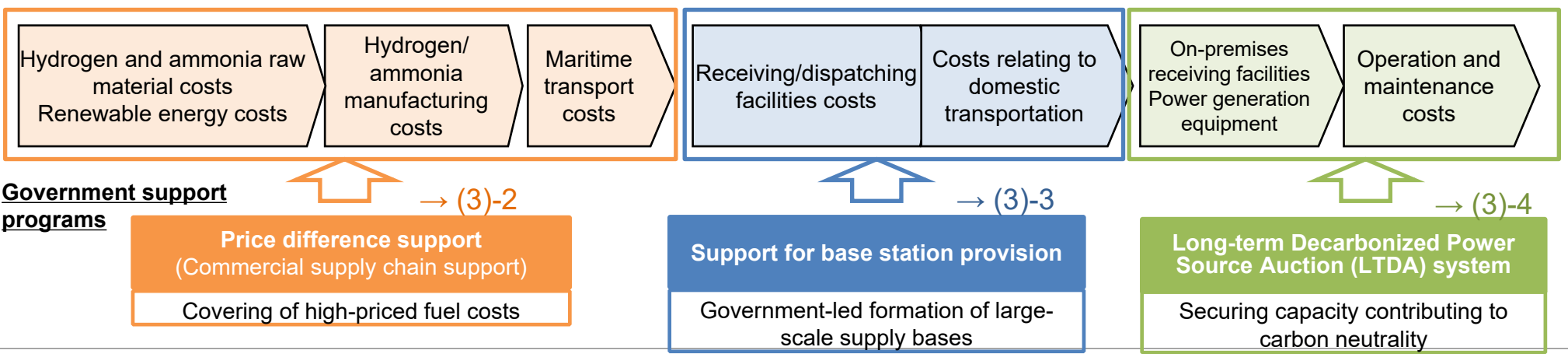
- In a combined effort by public and private sectors, progress is being made toward **building up an ammonia supply chain on a global scale.**
- **Provision of government support programs** corresponding to each of the costs in this supply chain is currently progressing.

Our initiatives

- **We are participating in the ammonia supply chain as a downstream player (ammonia offtaker).**
- We are considering low-cost and stable ammonia procurement from the upstream and midstream and use for ammonia co-combustion in existing coal-fired power plants.



Costs incurred in the supply chain



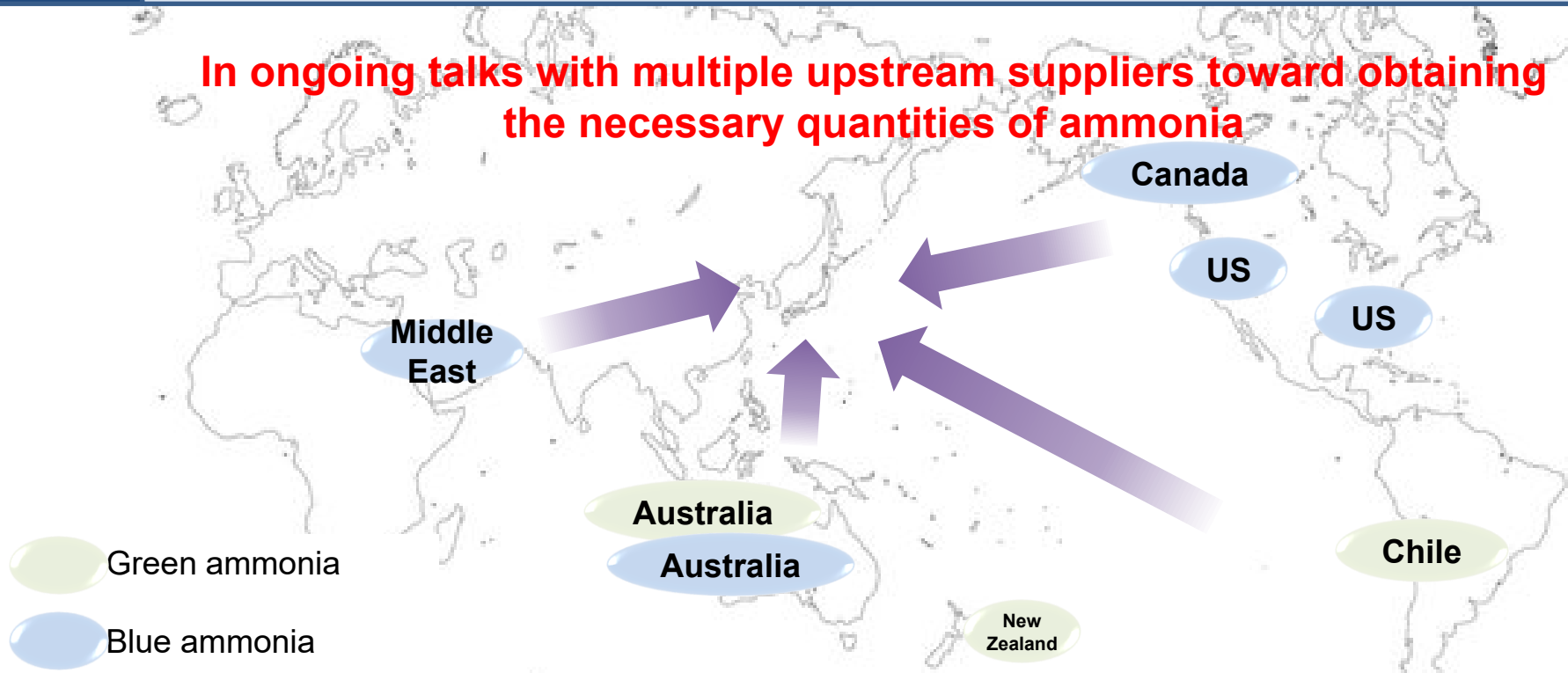
(3)-2 Upstream: Ammonia manufacturing projects extending globally

- Considering the decarbonized fuels hydrogen and ammonia as essential energy sources for achieving carbon neutrality, the Strategic Energy Plan of Japan likewise sets a **target for domestic introduction of fuel ammonia of around 3 million tons in 2030**.
- Toward this end, **ammonia manufacturing projects are being developed and promoted around the world**, mainly by Japanese trading firms, energy-related companies, and heavy equipment manufacturers.

Our initiatives

- Aiming for low-cost and stable procurement of clean ammonia, we are in **ongoing talks with multiple upstream suppliers**. **We are seeking to obtain the quantity of ammonia needed for the Kobe Power Plant.**
- The current supply cost of ammonia being higher than existing fuels, one challenge will be to lower this cost through such means as enlarging the supply chain and carrying out technology innovation. As market-based support measures, the Japanese government is readying a “price difference support” program, and **we are in talks with upstream suppliers on procuring ammonia from projects that take advantage of this support.**

In ongoing talks with multiple upstream suppliers toward obtaining the necessary quantities of ammonia



(3)-3 Midstream: Procurement of ammonia from base suppliers

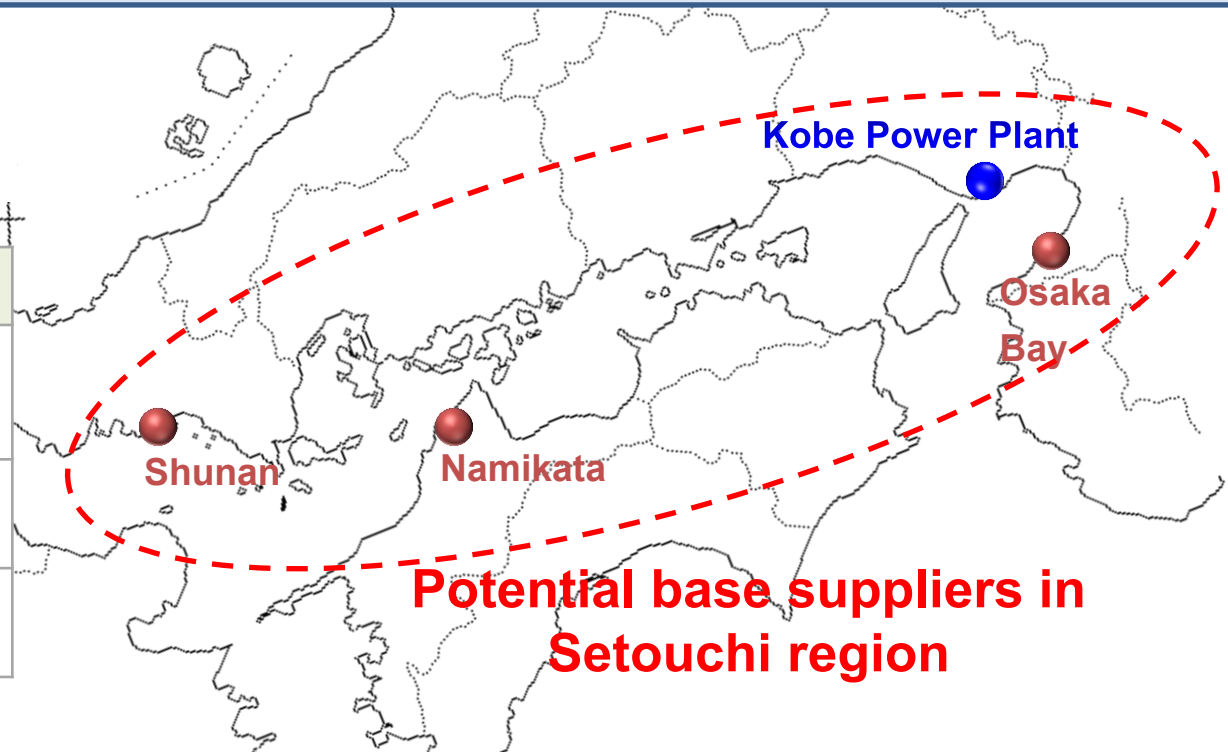
- The Japanese government is readying bases that will encourage the concentration of globally competitive industry (around three large-scale and five medium-scale bases in Japan), aimed at realizing the **creation of large-scale demand and building of an efficient supply chain to enable stable, low-cost supply of hydrogen and ammonia**.

Our initiatives

- For the Kobe Power Plant, ammonia procurement by secondary transport is being studied, using coastal trading vessels from ammonia relay stations.
- We have begun talks with several companies having **sites in the Osaka waterfront industrial belt near the Kobe Power Plant** (Mitsui & Co., Mitsui Chemicals, IHI Corporation, Kansai Electric Power), as potential users of ammonia.
- Parallel **talks are also going on with multiple base suppliers** whose sites in the Setouchi region not far from Kobe Power Plant are part of an ammonia supply chain base concept.

- Bases that, aiming for building of an ammonia supply chain, have issued press releases

Sites	Potential suppliers
Osaka Bay	Mitsui & Co., Mitsui Chemicals, IHI Corporation, Kansai Electric Power
Namikata	Mitsubishi Corporation, etc.
Shunan	Idemitsu Kosan, etc.



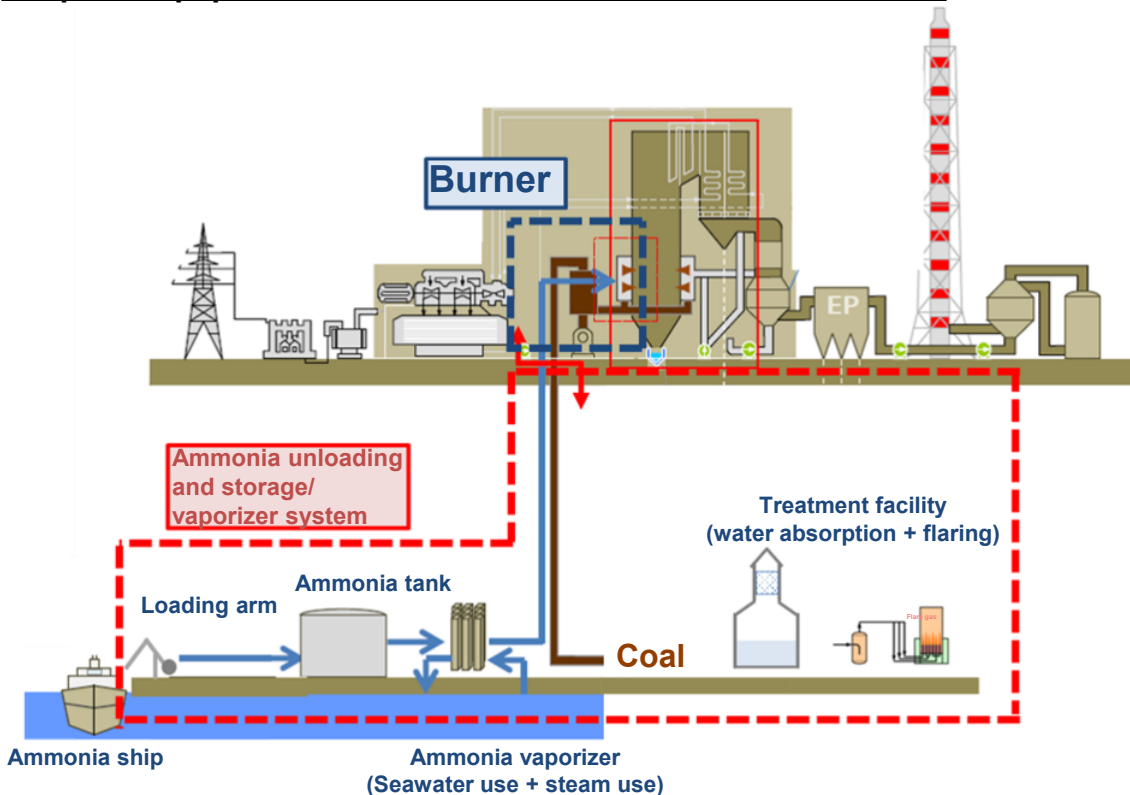
- Ammonia co-combustion technology development is being carried out with partial funding by the New Energy and Industrial Technology Development Organization (NEDO).

Our initiatives

- Regarding co-combustion technology, we are **conducting detailed studies in the Group while monitoring national policies and following technology development trends chiefly in NEDO.**
- At the Kobe Power Plant, concrete studies are under way toward ammonia co-combustion, involving also use of the Kobe Wire Rod & Bar Plant grounds, for which the scope of investment covers the receiving of ammonia from a loading arm and burner modification.
- Also under study, regarding recovery of investment, is **use of the Long-term Decarbonized Power Source Auction (LTDA) system.** (Use of this system **will guarantee long-term recovery of investments in decarbonization facilities over a period of 20 years.**)



Scope of equipment modification for ammonia co-combustion



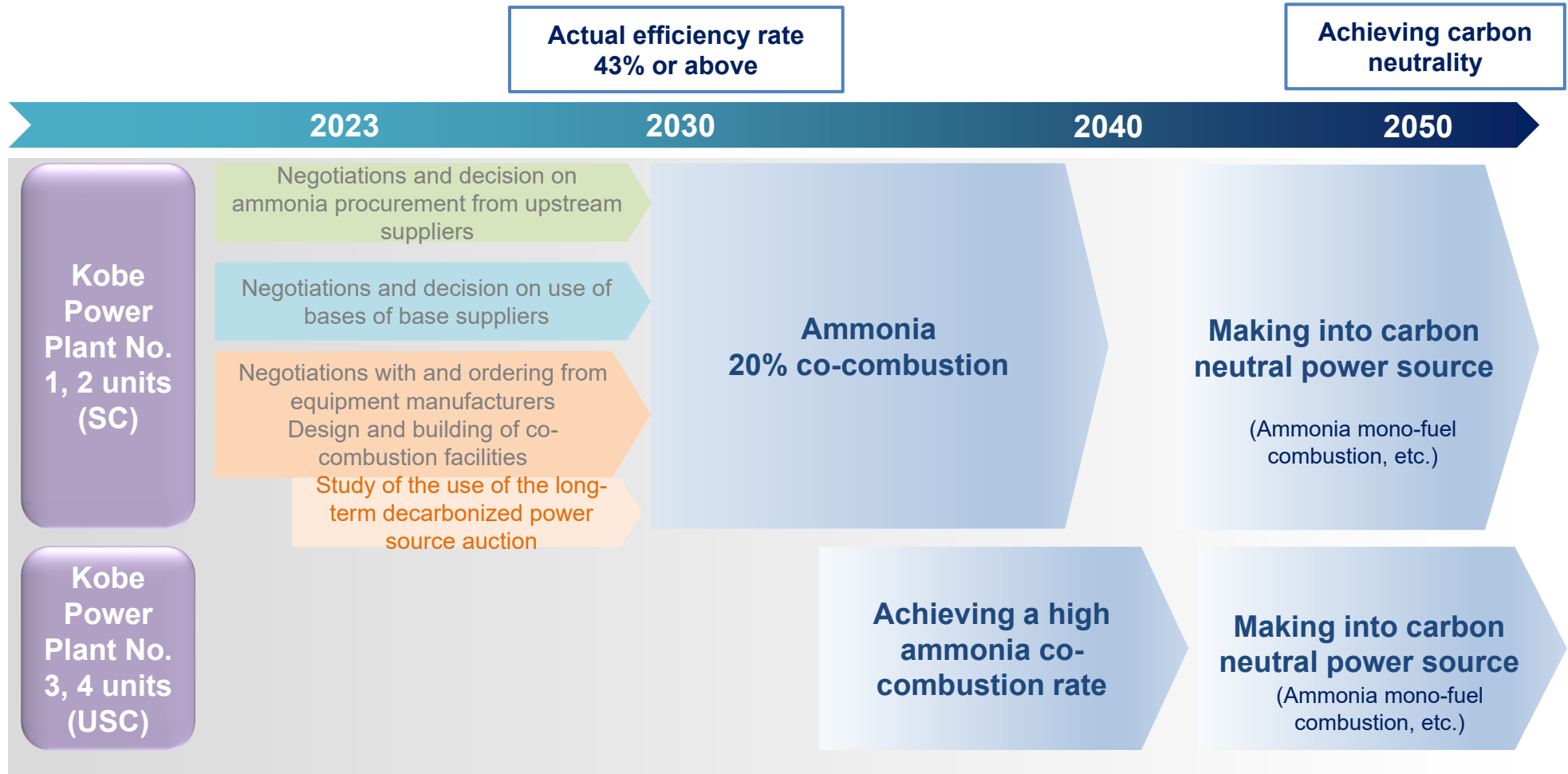
Long-term Decarbonized Power Source Auction system

- This is a multi-price auction, able to recover fixed costs over a period of 20 years from the start of operation for new spending on generation facilities contributing to carbon neutrality in 2050, including new construction, replacement, and modification projects.
- Bidding for the initial fiscal year will be in January 2024.
- Plans are to offer bidding on a total of 120 GW by FY2050

(3)-5 The road to carbon neutrality of the Kobe Power Plant

Our initiatives

- Initially, toward achieving ammonia 20% co-combustion, we will **steadily carry out each of the upstream, midstream, and downstream initiatives**, aiming for **low-cost and stable ammonia procurement**, and for **introduction of co-combustion facilities for which the technology has been established**.
- On the way to 2050, we will **achieve carbon neutrality using the low-carbon and zero-carbon technologies that have been put into practical use by then**, including ammonia mono-fuel combustion.



Group Corporate Philosophy

KOBELCO's View of the Future	<p>Our view of a society and future to be attained as we carry out KOBELCO's mission</p> <p>We envision a world in which people, now and in the future, can fulfill their hopes and dreams while enjoying safe, secure, and prosperous lives.</p>
KOBELCO's Mission	<p>Our mission and the social significance of the KOBELCO Group that we must fulfill</p> <p>Our mission is to provide solutions to the needs of society, by making the best use of the talents of our employees and our technologies.</p>
Core Values of KOBELCO	<p>The commitments of the KOBELCO Group to society and the values shared by the entire KOBELCO Group</p> <ol style="list-style-type: none"> 1. We provide technologies, products and services that win the trust and confidence of our customers we serve and the society in which we live. 2. We value, and support the growth of, each employee on an individual basis, while creating a cooperative and harmonious environment. 3. Through continuous and innovative changes, we create new values for the society of which we are a member.
Six Pledges of KOBELCO	<p>Code of Conduct for all Group employees to follow to fulfill the Core Values of KOBELCO and the Quality Charter</p> <ol style="list-style-type: none"> 1. Uphold the Highest Sense of Ethics and Professionalism 2. Contribute to the Society by Providing Superior Products and Services Quality Charter 3. Establish a Comfortable but Challenging Work Environment 4. Live in Harmony with the Local Community 5. Contribute to a Sustainable Environment 6. Respect Each Stakeholder

■ Cautionary Statement

- Certain statements in this presentation contain forward-looking statements concerning forecasts, assertions, prospects, intentions and strategies. The decisions and assumptions leading to these statements are based on information currently available to Kobe Steel. Due to possible changes in decisions and assumptions, future business operation, and internal and external conditions, actual results may differ materially from the projected forward-looking statements. Kobe Steel is not obligated to revise the forward-looking contents of this presentation.
- Uncertain and variable factors include, but are not limited to:
 - Changes in economic outlook, demand and market conditions
 - Political situation and trade and other regulations
 - Changes in currency exchange rates
 - Availability and market conditions of raw materials
 - Products and services of competing companies, pricing policy, alliances, and business development including M&As
 - Strategy changes of alliance partners

KOBELCO