

Keidanren Carbon Neutrality Action Plan

**– Vision toward Carbon Neutrality by 2050
and Fiscal 2022 Follow-up Results
(Performance in Fiscal 2021) –**

(Provisional Translation)

March 31, 2023

KEIDANREN
(Japan Business Federation)

Keidanren's efforts toward carbon neutrality (CN)

"Challenge Zero" (Jun 2020)

- Proactively publicize and support actions to create innovation taken by companies and organizations towards early achievement of CN which the Paris Agreement sets as the long-term goal.



First Policy Speech by then Prime Minister Suga (Oct 2020)

"We hereby declare that by 2050 Japan will aim to reduce greenhouse gas emissions to net-zero, that is, to realize a carbon-neutral, decarbonized society."

Chairman Tokura's Speech at the Keidanren Regular General Meeting "Urgent Policy Proposal toward Achieving Green Growth" (Jun 2021)

Announced that the Keidanren Commitment to a Low Carbon Society would be reformulated as the Keidanren Carbon Neutral Action Plan, an initiative for achieving CN by 2050 and realizing GX (Green Transformation). Relevant industries were invited to formulate action plans following the announcement.

Formulated the "Keidanren Carbon Neutrality Action Plan" (Nov 2021)

"Toward Green Transformation (GX)" (May 2022)

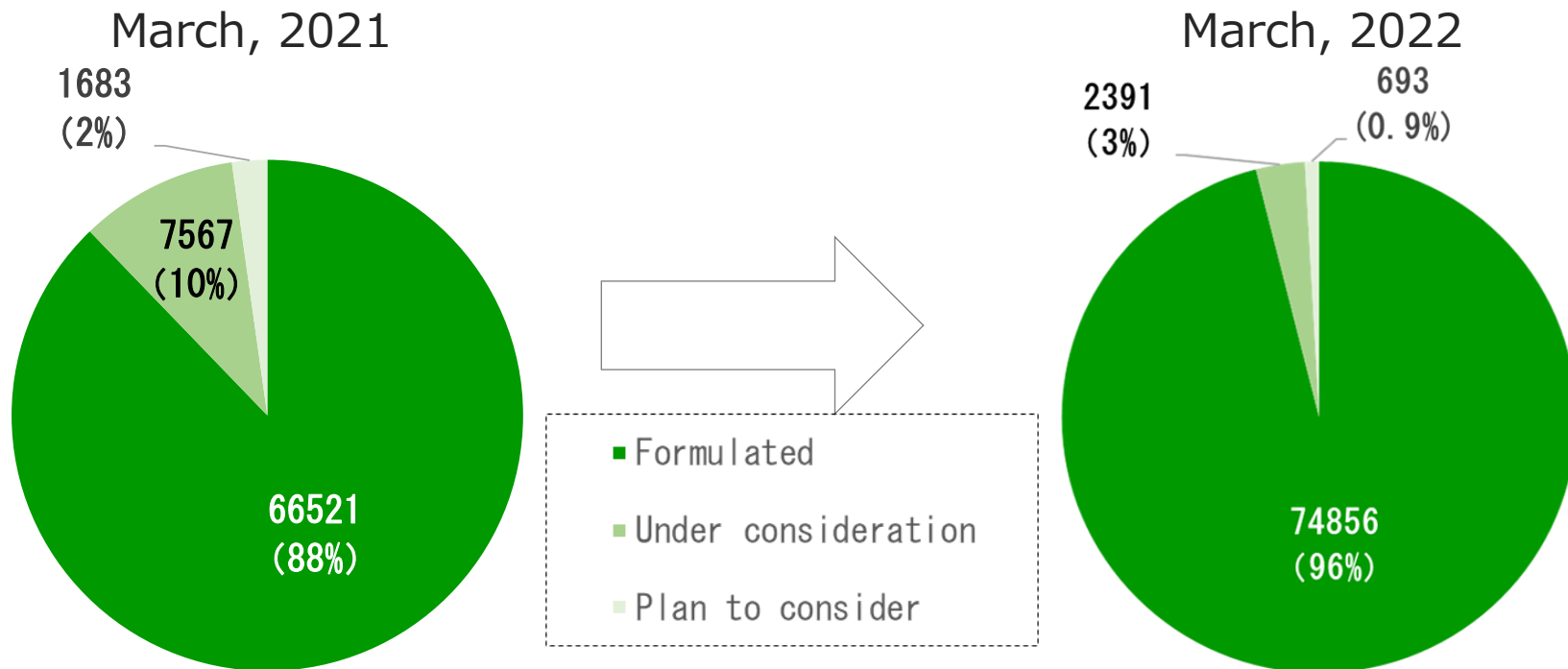
Proposed that a society- and economy-wide "green transformation (GX) would be required to achieve CN in 2050 and called for the early formulation and implementation of a GX policy package by the Government. Renewed its announcement **that Keidanren would firmly implement the Keidanren CN Action Plan and promote the maximum deployment of BATs to reduce emissions and the development of innovative technologies.**

Vision toward Carbon Neutrality by 2050 (1)

2050CN

- CO₂ emissions from the industries that have already formulated visions collectively amount to 96 percent of total emissions.

Status of Vision formulation among participating industries (In terms of emissions (10,000 t-CO₂))



* CO₂ emissions after electric power distribution are used for the industry, commercial and transport sectors, and CO₂ emissions before electric power distribution are used for the energy conversion sector.

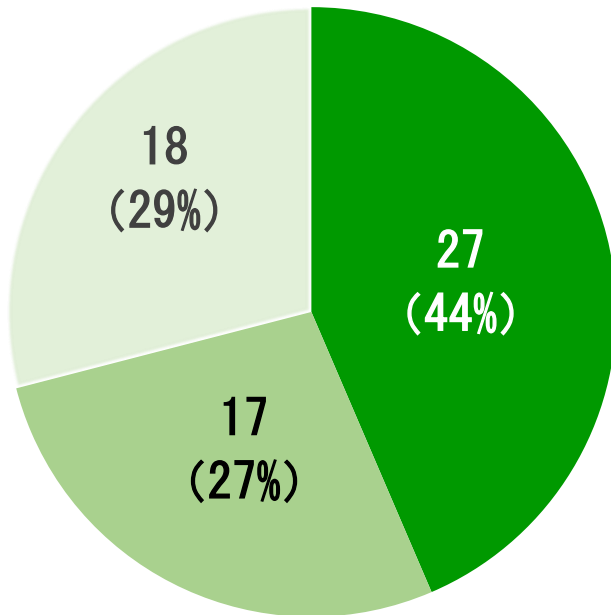
Vision toward Carbon Neutrality by 2050 (2)

2050CN

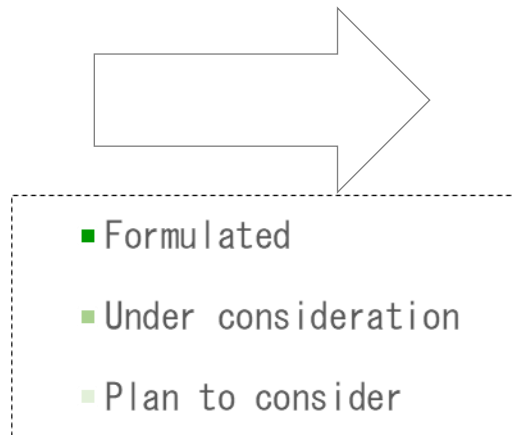
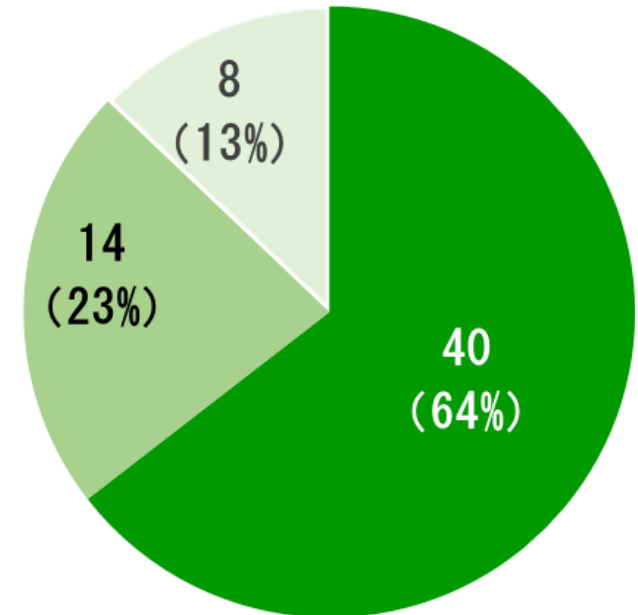
- The number of industries with Visions increased to 40, covering around 60% of all participating industries.
- This shows their determination to maximize their efforts toward achieving CN by 2050.

Status of Vision formulation among participating industries (In terms of number of industries)

March, 2021



March, 2022



Industry-specific Visions toward CN by 2050

2050CN

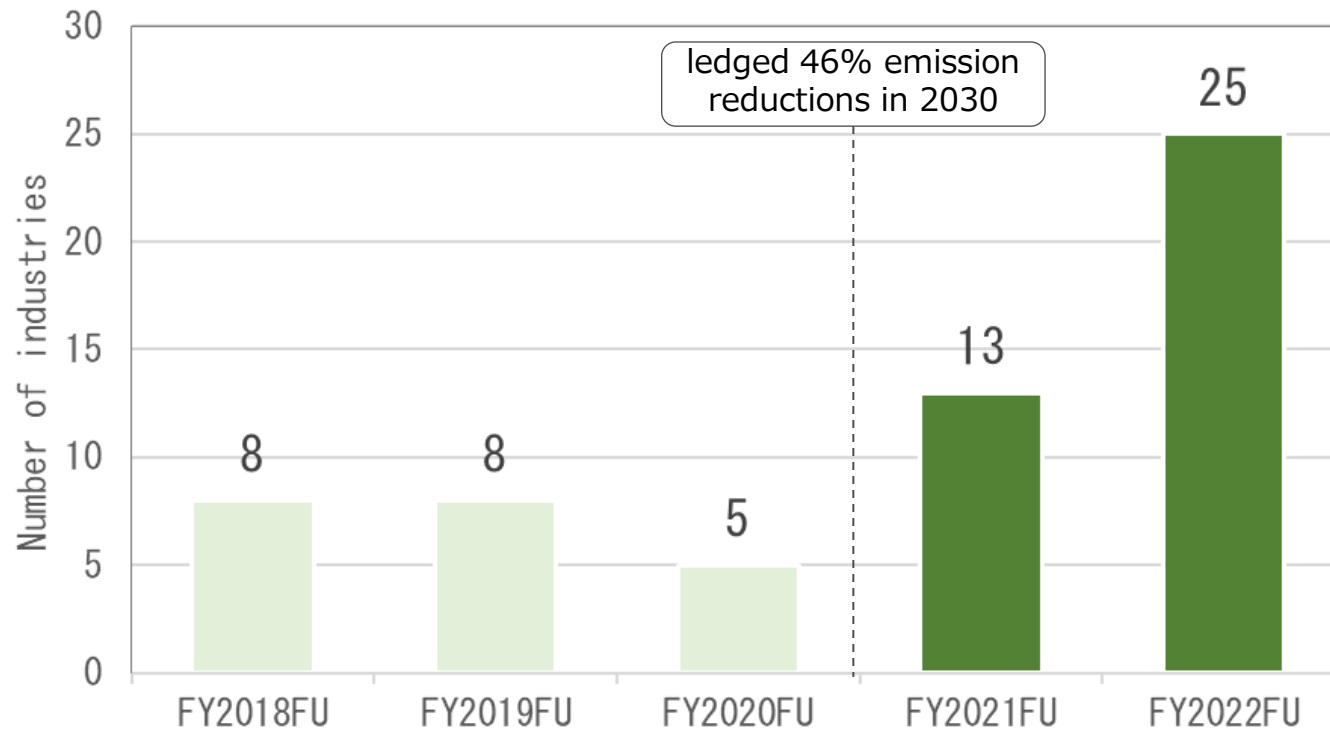
Sector	Industry	Vision (Basic Policy, etc.)
Energy conversion (Efforts to achieve CN in energy)	Electric power	Continue to implement measures that serve both purposes of “ decarbonizing electric power ” and “ promoting electrification ,” such as maximizing the use of established technologies for decarbonizing power generation (nuclear power and renewable energy) and utilizing heat pumps, while also pursuing an energy mix that simultaneously achieves “S+3Es.” At the same time, it will work closely with the government toward the practical application of innovative technologies (small module reactors, next-generation solar power, storage batteries, hydrogen- and ammonia-fired power generation, CCUS/carbon recycling) through “ innovations ,” or solutions to advance electric power supply services.
	Petroleum	Aim to achieve net zero CO ₂ emissions (CN) and at the same time contribute to achieving society-wide CN through decarbonizing the products it supplies by accelerating efforts to decarbonize supply chains and products and actively engaging in the research and development and social implementation of innovative technologies infrastructure (CO₂-free hydrogen, synthetic fuels, CCS/CCU, etc.) that can utilize existing.
	Gas	Under the policy to achieve carbon neutralization of gas, promote conclusive shift to natural gas and the sophisticated use of natural gas, decarbonization of gas (methanation and hydrogen use, etc.) and development of CCS/CCU-related technologies .
Industrial (Efforts to establish technologies to fundamentally reduce CO ₂)	Iron and steel	Toward achieving carbon-neutrality, explore multiple pathways by employing every possible means including the drastic reduction of CO ₂ emissions from blast furnace through COURSE 50 and ferro coke technologies plus CCUS, development of super innovative technologies such as hydrogen-based iron making and expanded use of scrap.
	Chemical	Allow the potential power of “chemistry” to emerge, thereby promoting and accelerating innovations that will resolve global issues and contribute to sustainable development. Under this policy, engage in the carbon circulation of raw materials (material use of CO₂, utilization of plastic waste, etc.) , structures to minimize energy use and in the conversion of processes (membrane separation processes).
	Cement	For reducing CO ₂ emissions from producing clinker, the cement industry enhances to reduce not only clinker cement ratio but also fossil energy sources by using various waste and biomass , in addition hydrogen and ammonia in the future .
	Paper manufacturing	Promote energy efficiency efforts and fuel conversion in production activities (active introduction of the latest energy-efficient facilities and technologies, increase of the utilization ratio of renewable energies, innovative technologies (development of high efficiency pulp production methods), etc.). Also engage in unique efforts such as reducing CO ₂ emissions from product life cycles by developing and utilizing environment-friendly materials derived from wood biomass (cellulose nanofiber, etc.) and expand contribution in afforestation as a source of CO ₂ absorption.
	Electrical & electronics	Under the policy of contributing to resolve social issues related to climate change and energy constraints through various business fields from the three perspectives of “technology development”, “co-creation”, and “resilience”, engage in innovating advanced energy conservation and carbon-free technology (smart grids, hydrogen production using water electrolysis, power semiconductors, rapid or wireless charging systems, etc.) and the social implementation of advanced data utilization solutions (autonomous driving systems, smart factories, accurate weather observation and simulation technologies, etc.).
Transportation-related (Efforts to achieve CN in mobility and transport)	Automobile	Deploy electric vehicles (HV, PHV, EV, FCV, etc.) and to achieve a hydrogen economy (spreading FC-based mobility, etc.).
	Shipping	Work on the shift to zero-emission vessels using alternative fuels such as carbon-recycled methane, ammonia and hydrogen .
	Railway	Promote the development of renewable power sources and accelerate its deployment, deploy storage battery-powered ralling stock , develop fuel cell rolling stock , with a view to achieving net zero CO ₂ emissions at every stage across energy production to use.
Commercial (Efforts for full energy efficiency)	Real estate, buildings	Envisioning a society that has reached CN by 2050 with widely deployed “energy-savings and renewable energy-conscious buildings, such as ZEB and ZEH ,” “buildings that use low-impact construction material,” and “cities that enable community-wide CO ₂ reductions by combining renewable energy facilities, storage batteries and power interchange ,” promote ZEB/ZEH and HEMS/BEMS in individual buildings and promote ZET and CEMS in the context of entire communities.

Emission reductions from domestic business operations (Reviewing targets)

2030 target

- Participating industries incessantly review their targets. Industries are reviewing their targets at a higher pace, with **13 industries announcing revisions in the FY 2021 FU survey and 25 industries, in the current FU.**
- This is evidence of the business community's will to contribute to achievement of the Government's 2030 target to reduce emissions by 46%.

Status of review of Phase II (FY 2030) target (number of industries)

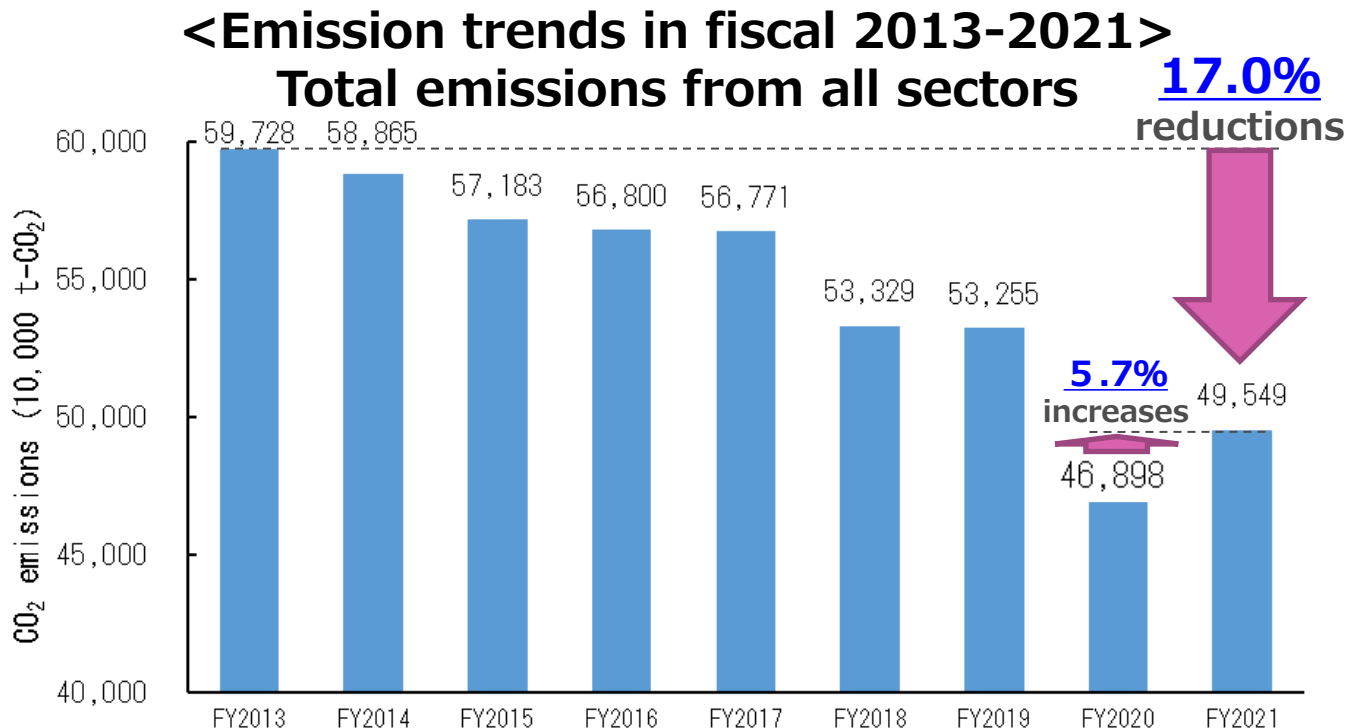


※Result for the 58 industries that have disclosed their targets and performance.

Pillar 1: Emission reductions from domestic business operations ①

CN Action Plan Performance

- Total CO₂ emissions from all sectors (industrial, energy conversion, commercial, transportation) **decreased by 17.0% from fiscal 2013**(*) to fiscal 2021. (*) Baseline year for Japan's 2030 target
- Although emissions have increased by 5.7% from fiscal 2020, it should be noted that economic activity recovered from the impact of COVID-19 in fiscal 2021.



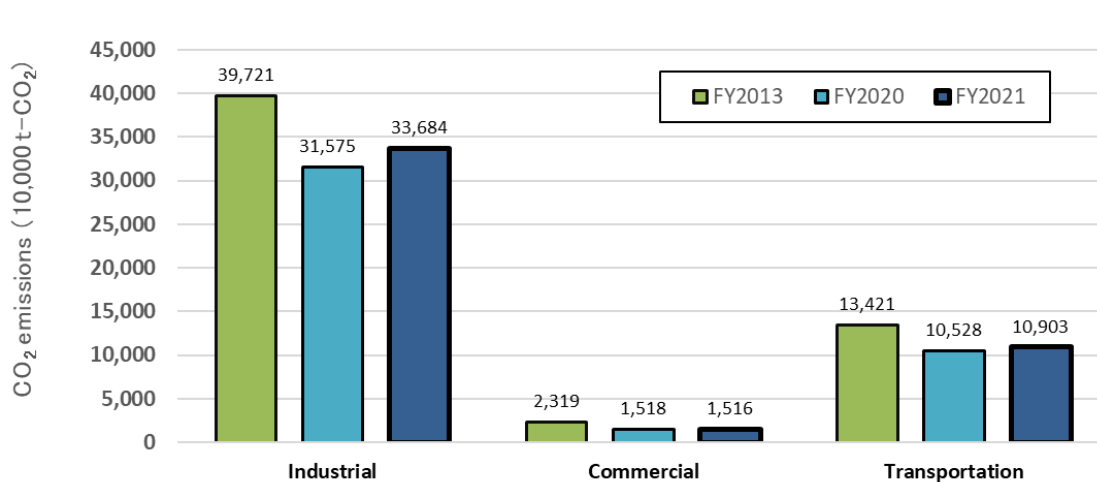
※The Preliminary Version reports CO₂ emissions (after electric power distributions) from 58 industries out of the 62 participating industries. The most recent heat values and carbon emission coefficients available at the time of the survey have been used for calculating CO₂ emissions.

※The scope of calculations differs between fiscal 2013 and after fiscal 2019 due to offshoring of businesses, etc.

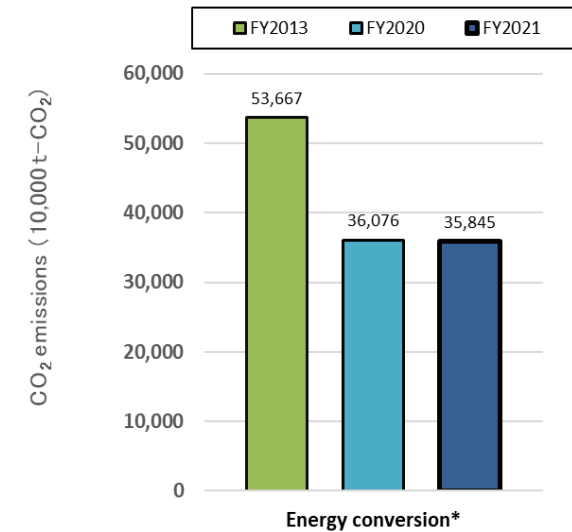
Pillar 1: Emission reductions from domestic business operations ②

CN Action Plan Performance

- In fiscal 2021, CO₂ emissions were reduced in **all sectors relative to fiscal 2013**. Compared to the previous year, CO₂ emissions were reduced in energy conversion and commercial sectors. On the other hand, industrial and transportation sectors were increased.



<CO₂ emissions after power distribution>



<CO₂ emissions before power distribution>

Sector	Target industries/ participating ind.	FY2021 emissions	Relative to FY2013	Relative to previous FY (FY2020)
Industrial	31/31 industries	336.84 Mt-CO ₂	-15.2%	+6.7%
Commercial	16/16 industries	15.16 Mt-CO ₂	-34.6%	-0.1%
Transportation	12/12 industries	109.03 Mt-CO ₂	-18.8%	+3.6%
Energy conversion*	3/3 industries	358.45 Mt-CO ₂	-33.2%	-0.6%

* Emissions before power distribution are provided for the energy conversion sector; and emissions after power distribution, for other sectors.

Pillar 1: Emission reductions from domestic business operations

- Factor analysis of change in emissions: relative to FY2019 -

Breakdown of factors of change in CO₂ emissions

① Change in economic activity

Increase in all sectors

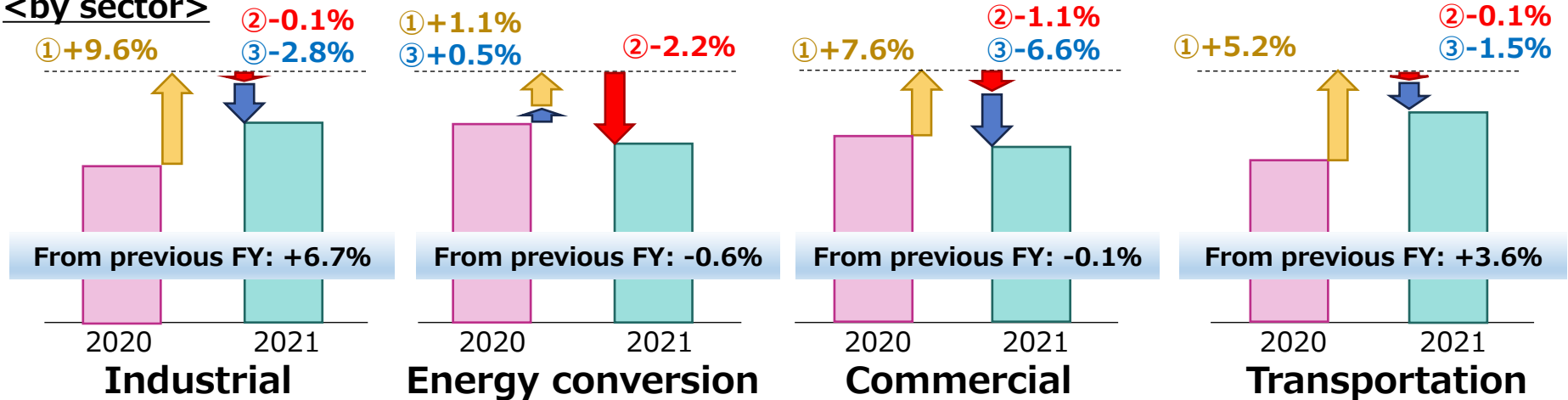
② Change in CO₂ emission factors (decarbonization of energy)

Decrease in all sectors

③ Change in energy consumption per unit economic activity (energy saving efforts)

Increase in the energy conversion sector, decrease in the industrial, commercial and transportation sectors

<by sector>



<Main factors>

- ① : Increased energy consumption due to recovery from COVID-19
- ② : Continued operation of restarted nuclear power plants; increased deployment of renewables, higher thermal power efficiency, increased LNG share
- ③ : Lower heat efficiency of thermal power due to the increased deployment or renewables, and thus increased low-efficiency partial load operation.

<Main factors>

- ① : Increased telecommunication volumes with more time spent at home amid COVID-19
- ② : Improved emission factors for purchased electricity
- ③ : Improved efficiency of facilities, equipment and operations

<Main factors>

- ① Increased people and material flow due to recovery from COVID-19 (aviation, domestic shipping)
- ② : Improved emission factors for purchased electricity
- ③ : Introduction of and improvement to high-efficiency mobility; efficient operations

- ①: Increased production due to recovery from COVID-19
- ②: Fuel conversion, energy recovery
- ③: Continued energy saving efforts, improved emission intensities due to increased production

Status of deployment of renewable energy, energy recovery and utilization

CN Action Plan Performance

- With a view to achieving CN, more industries are **deploying and developing renewable energy (solar power, hydropower, wind power, biomass and geothermal, etc.)**.
- Seek CO₂ emission reductions by **recovering and utilizing waste heat and byproduct gases** generated during manufacturing or fuel use, thus reducing fuel consumption.

Deployment of renewable energy

Development and deployment of solar, hydro, wind, biomass and geothermal power generation (Electric Power Council for a Low Carbon Society)

Biomass power generation (Japan Paper Association, Japan Cement Association)

Use of hydropower generation at business establishment (Japan Aluminium Association)

Solar power generation (Liaison Group of Japanese Electrical and Electronics Industries for Global Warming, The Japan Rubber Manufacturer Association, Japan Soft Drink Association, Japan Dairy Industry Association, The Japan Bearing Industry Association, Japan Machine Tool Builders' Association, Japan Industrial Vehicles Association, Japan Franchise Association, Japan Foreign Trade Council, The Real Estate Companies Association of Japan)

PPA (Power Purchase Agreement)* (Japan Auto Parts Industries Association, Japan Federation of Printing Industries, Japan Franchise Association)

Renewable power generation (Japan Chemical Industry Association, Japan Cement Association, The Japan Bearing Industry Association, Japan Society of Industrial Machinery Manufacturers, Brewers Association of Japan, Telecommunications Carriers Association, Telecom Services Association)

Energy recovery and utilization

Power generation using byproduct gases and waste heat recovered energy; steam use (The Japan Iron and Steel Federation)

Use of waste as alternatives for heat (Japan Cement Association)

Waste heat power generation (Japan Cement Association, Japan Mining Industry Association, The Japan Rubber Manufacturers Association, Flat Glass Manufacturers Association of Japan, Limestone Association of Japan)

Utilization of waste heat from boilers as a heat source for HVAC at plants (The Japan Rubber Manufacturers Association, etc.)

Cogeneration Systems (Japan Chemical Industry Association, The Japan Rubber Manufacturers Association, The Federation of Pharmaceutical Manufacturers' Associations of Japan, Brewers Association of Japan, Japan Foreign Trade Council)

Other waste heat recovery and use (Japan Mining Industry Association, Japan Lime Association, Japan Aluminium Association, Japanese Electric Wire & Cable Makers' Association, Petroleum Association of Japan)

* An agreement where solar power systems, etc. are installed on the rooftop of a business operator's building free of charge and the power generated is bought by consumers, such as the business operator.

Pillar 2: Strengthening co-operation with other interested groups

- Many industries contribute to achieving avoided emissions along the value chain (procurement, provision of products and services, use, disposal, etc.).
- Active communication through the quantification of reductions and Keidanren's concept book in order to raise public recognition of products and services that contribute to society-wide emission reductions.

<Examples of emissions reduction efforts along the value chain>

Procurement of products that emit less before manufacturing

Biomass polyethylene containers (The Federation of Pharmaceutical Manufacturers' Associations of Japan)
Deep Groove Ball Bearing with bioplastic cage (The Japan Bearing Industry Association)

Provision of products and services that emit less during use

High-function steel (The Japan Iron and Steel Federation)
Residential thermal insulation material (Japan Chemical Industry Association)
Digital solutions utilizing IoT and AI (Liaison Group of Japanese Electrical and Electronics Industries for Global Warming)
Next-generation vehicles (Japan Automobile Manufacturers Association)
High mileage tires (The Japan Rubber Manufacturers Association)
Insulating glass (Flat Glass Manufacturers Association of Japan)
Latent heat recovery type high-efficiency oil hot water boiler (Petroleum Association of Japan)

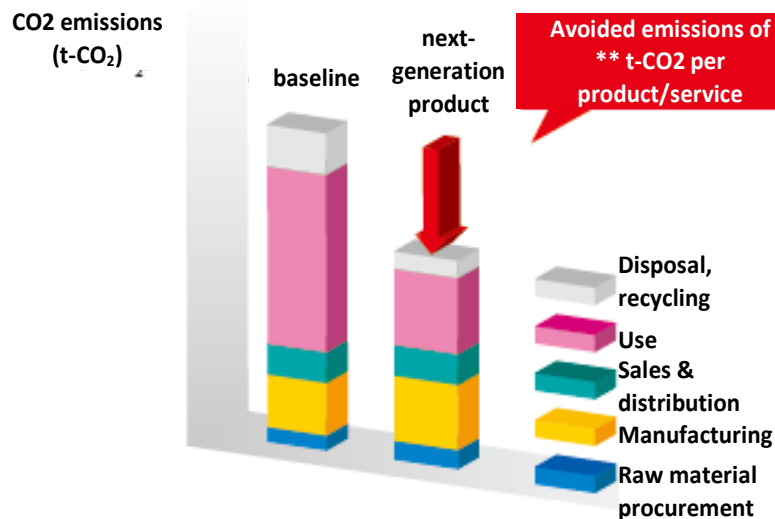
Provision of lightweight products that emit less during transport

Lightweight paper and cardboard (Japan Paper Association)

Disposal of products (3R)

Effective utilization of waste and byproducts (Japan Cement Association)

<Approach to avoided CO₂ emissions>



Pillar 3: Promoting contribution at the international level

CN Action Plan Performance

- Many industries contribute to reducing global GHG emissions through overseas transfer of advanced products and services and overseas deployment of products and services.
- Industries are promoting the quantification of emissions avoided through international contribution, as done in measures taken under Pillar 2.

<Examples of avoided emissions overseas>

Overseas transfer of technologies and knowhow

CDQ (coke dry quenching), TRT (top-pressure recovery turbine) power generation, GTCC*¹ exclusively fired using by-product gas (The Japan Iron and Steel Federation)

Desalination technologies using reverse osmosis membranes (Japan Chemical Industry Association)

Aluminum recycling (Japan Aluminium Association)

Recovering CO₂ from coal-fired power generation plants and utilization for CO₂-EOR*² (Japan Petroleum Development Association)

Renewable power generation (Electric Power Council for a Low Carbon Society, The Japan Gas Association, etc.)

Renewable energy IPP*³ business (Japan Foreign Trade Council)

*1 Gas Turbine Combined Cycle

*2 Enhanced Oil Recovery

*3 Independent Power Producer

Provision of low-carbon products and services

Polyethylene terephthalate from biomass, aircraft lightweight materials, next-generation vehicles materials (Japan Chemical Industry Association)

High efficient thermal power generation and renewable power generation technologies, high efficiency IT products, solutions (Liaison Group of Japanese Electrical and Electronics Industries for Global Warming Prevention)

Next-generation vehicles (Japan Automobile Manufacturers Association)

Energy-saving ships (The Shipbuilders' Association of Japan & The Cooperative Association of Japan Shipbuilders)

Water-saving toilets (Japan Sanitary Equipment Industry Association)

Permanent magnet synchronous motors (PMSM) for railway vehicles (Japan Association of Rolling Stock Industries)

Pillar 4: Development of innovative technologies toward CN by 2050

CN Action Plan Performance

- **The creation of completely new innovations is key** to achieving significant CO₂ reductions in the medium- to long-term toward CN by 2050, as drastic reductions cannot be achieved along the lines of conventional measures.
- Medium- to long-term R&D that the private sector finds difficulty in committing to alone will be continued **through collaboration with the Government**.

<Example of roadmaps for developing and deploying innovative technologies>

Industry/company	Innovative technologies*	2021	2025	2030	2050
The Japan Iron and Steel Federation	COURSE50			Actual operation	Deployment
Japan Chemical Industry Association	Plastic feedstock production technologies using CO ₂ , etc.		R&D, commercialization		Business phase
Japan Paper Association	Cellulose nanofiber (CNF)			Market creation	
Japan Cement Association	Lower emission cement	Preliminary considerations	Confirm manufacturing conditions, economic rationality, etc.		
Electric Power Council for a Low Carbon Society	Ammonia co-firing		Demonstration	Start operations; increase co-firing ratio	Single fuel firing
Petroleum Association of Japan	Technology development of synthetic fuels (e-fuel)	R&D	Demonstration of large scale	Increased deployment; cost reduction	Commercialization (non-subsidized)
The Japan Gas Association	Methanation		R&D, demonstration	Commercialization	Increased commercialization
Telecommunications Carriers Association	DX in agricultural product distribution	Demonstration	Commercialization		
East Japan Railway Company	Development of hydrogen-powered train		Demonstration	Introduction	Increased deployment

*Includes transition technologies

Reference

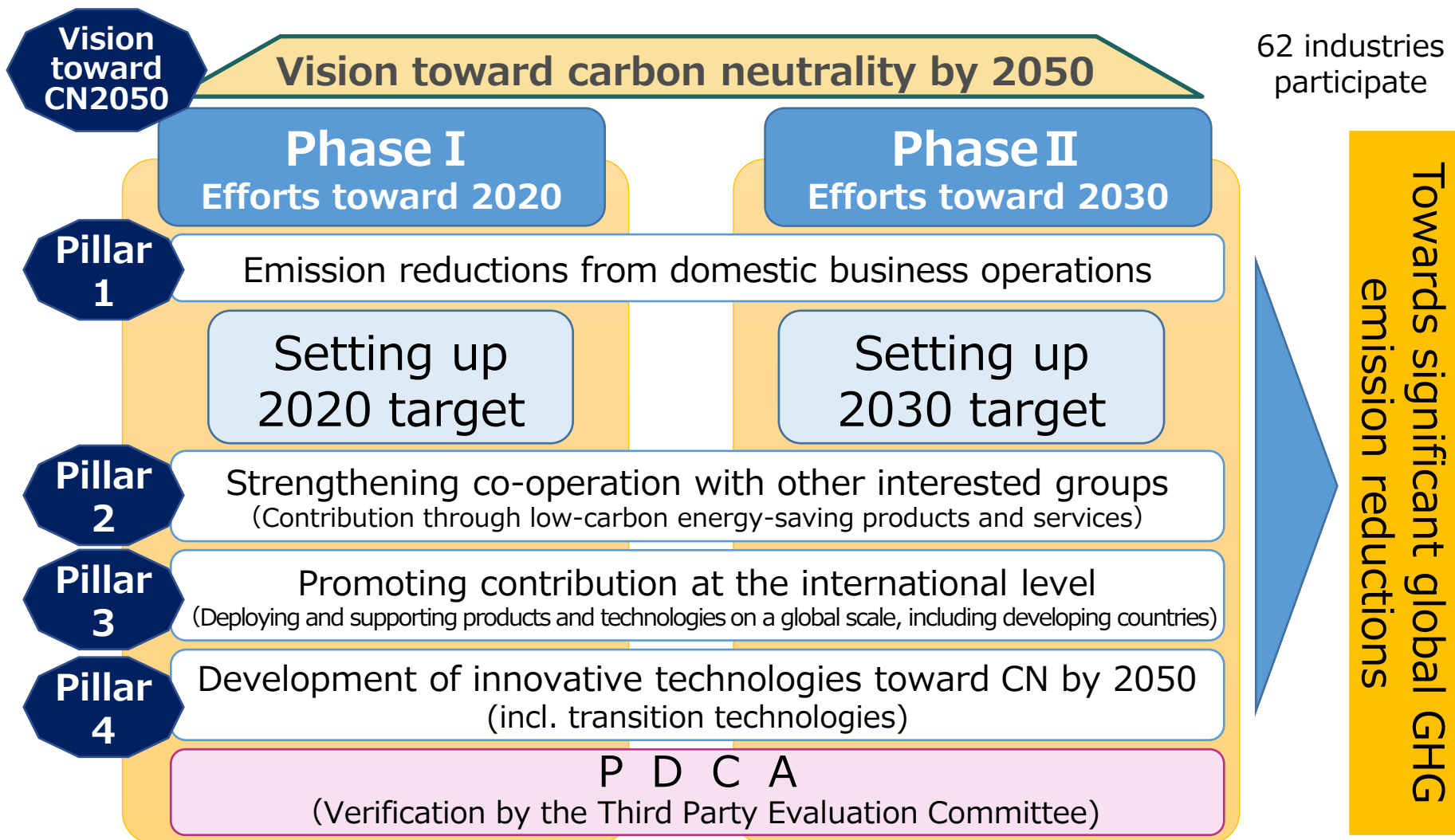
Keidanren's efforts to combat climate change

- Keidanren took the first pioneering steps on climate change ahead of governmental policy decisions.



Outline of Keidanren Carbon Neutrality Action Plan

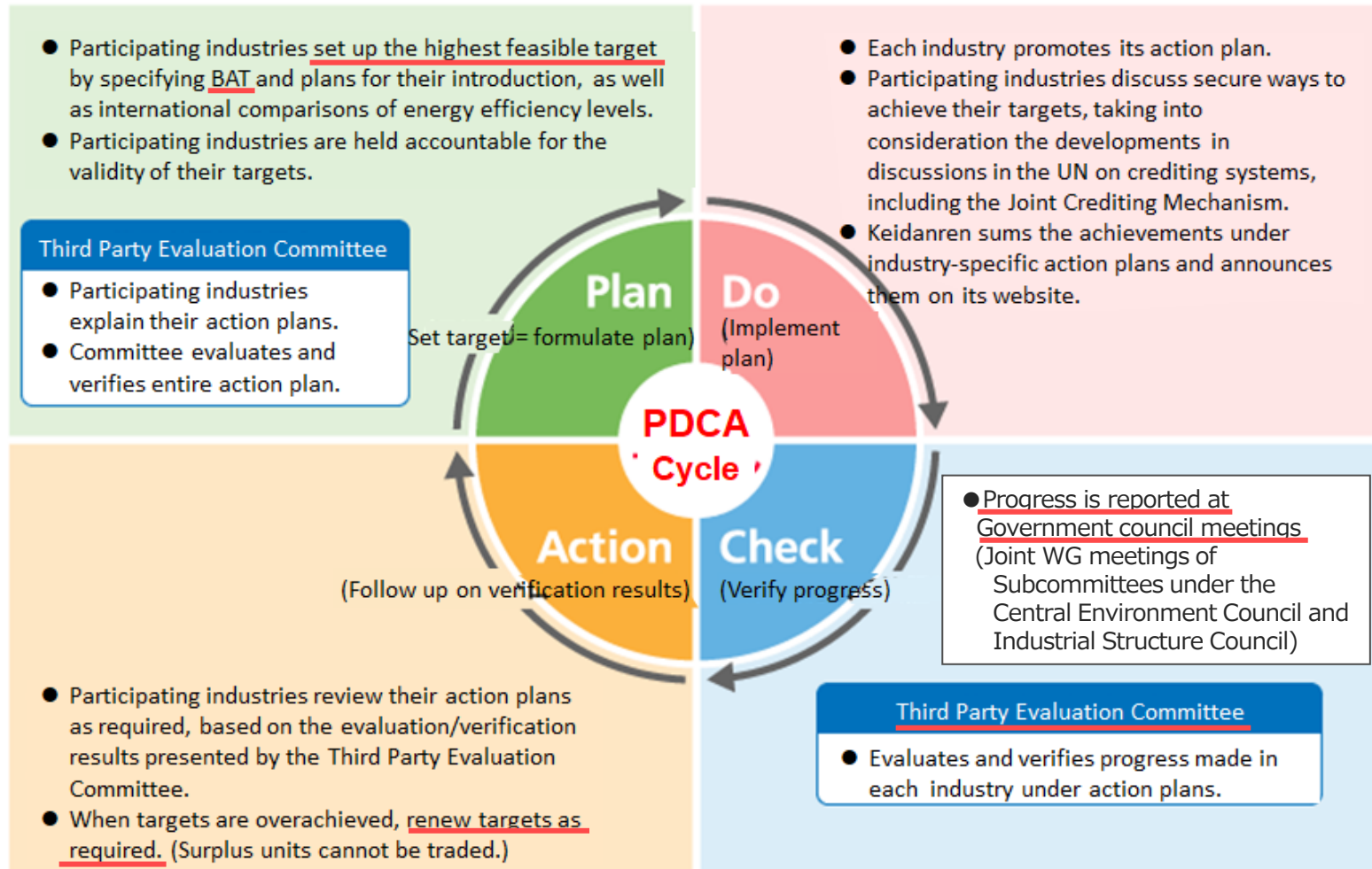
- Contributing to long-term global warming countermeasures on a global scale through efforts based on the formulation of a **Vision and four pillars**.



* The current report summarizes the results of Phase I.

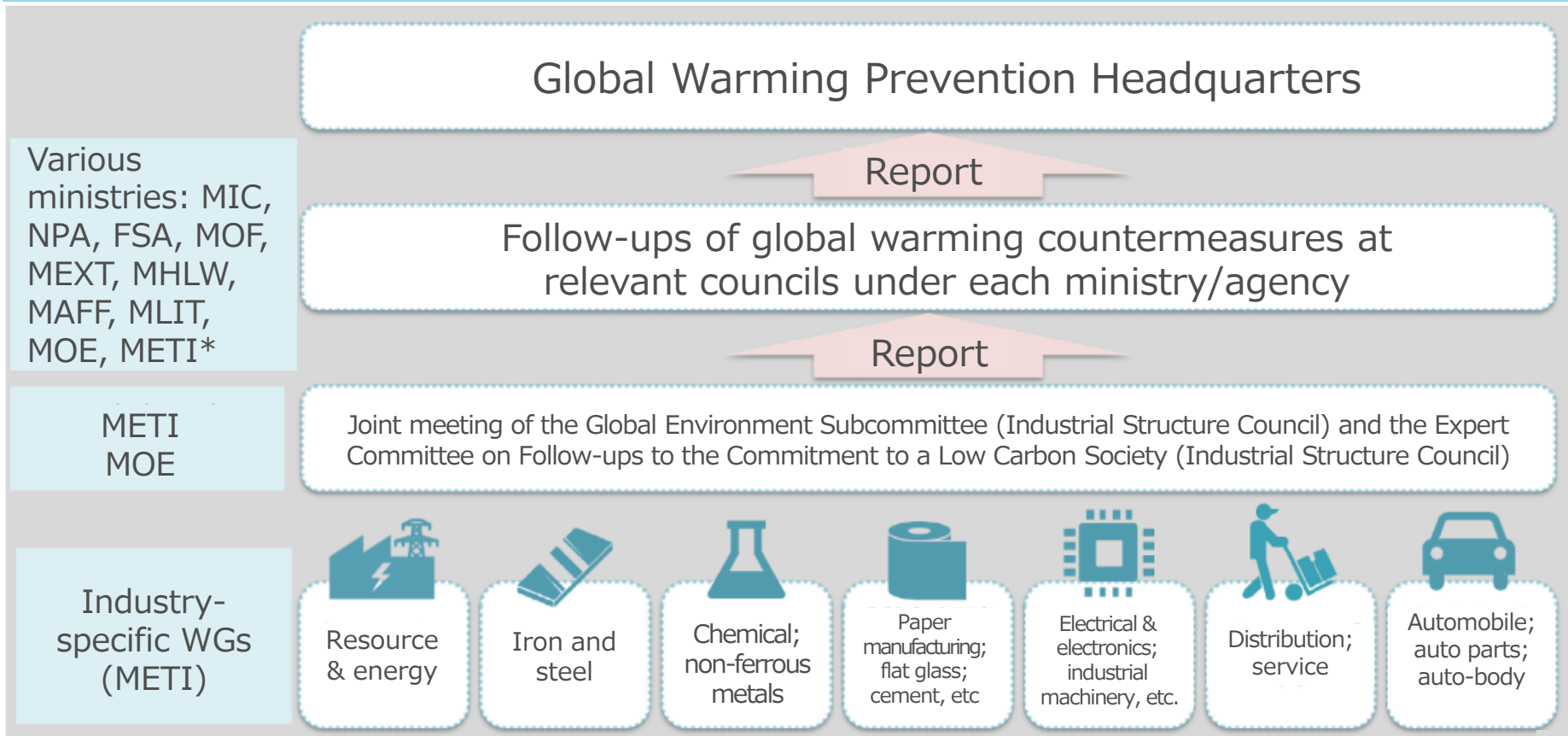
Evaluation and verification of the Keidanren CN Action Plan

- Individual industries formulate targets based on the maximized deployment of BAT (best available technologies) and prospects of economic activity.
- The progress made under the Action Plan is checked by the Third Party Evaluation Committee and Government councils and target levels are continuously reviewed.



Annual follow-ups by the Government

- Annual follow-ups are conducted for industries under the supervision of the Ministry of Economy, Trade, and Industry (METI) by 7 industry-specific WGs under Councils comprising expert committee members from universities and research institutions. Results are reported to a higher level, the joint meeting of METI and the Ministry of the Environment (MOE)'s councils.
- Government-wide annual follow-ups are conducted on global warming countermeasures, including the business community's Commitment to a Low Carbon Society, and results are compiled by the Global Warming Prevention Headquarters led by the Prime Minister.



Source: METI material

*MIC: Ministry of Internal Affairs and Communications; NPA: National Policy Agency; FSA: Financial Services Agency; MOF: Ministry of Finance; MEXT: Ministry of Education, Culture, Sports, Science and Technology; MLIT: Ministry of Land, Infrastructure, Transport and Tourism; MAFF: Ministry of Agriculture, Forestry and Fisheries; MHLW: Ministry of Health, Labour and Welfare of Japan; MOE: Ministry of the Environment

Positioning in Japan's Climate Change Countermeasures

- Keidanren's proactive efforts have been positioned as a **pillar of Japan's climate change countermeasures**.

"Current policy regarding global warming prevention" (March 15, 2013; Global Warming Prevention Headquarters)

Regarding measures to be taken in each sector against carbon dioxide emissions, of energy origin, evaluations and verifications of voluntary approaches taken by business operators under the Commitment to a Low Carbon Society will be conducted along with institutional measures including the formulation, announcement and implementation of emissions control guidelines and various support measures.

Japan's NDC (interim target) (decision by the Global Warming Prevention Headquarters and registration with the U.N. on July 17, 2015; re-submission on March 30, 2020)

<Reduction target>

- Japan seeks to firmly achieve its target of reducing emissions by 26% relative to fiscal 2013 levels (-25.4% relative to fiscal 2005 levels) in fiscal 2030.
- The NDC reduction target will be revisited before the next deadline (every five years) under the Paris Agreement, in line with the revision of Japan's energy mix, by taking a bottom-up approach of building up GHG-related measures and aiming to set up a highly motivated figure that reflects further ambition reduction efforts.

(Explicitly refers to the Commitment to a Low Carbon Society as measures which form the basis for the bottom-up calculation of the GHG emission reduction target.)

"Plan for Global Warming Countermeasures" (Cabinet decision of Oct 22, 2021)

The business community, led by Keidanren, has engaged in emission reduction by formulating the Voluntary Action Plan and has achieved highly successful results. Given the steady GHG reductions achieved while maintaining economic efficiency in many industries under the Commitment to a Low Carbon Society, in order to secure emission reductions toward achieving the reduction target set up under this Plan, measures taken by the business community will continued to be centered upon voluntary approaches.