

Keidanren Carbon Neutrality Action Plan

 Vision toward Carbon Neutrality by 2050 and Fiscal 2024 Follow-up Results (Performance in Fiscal 2023) –

(Provisional Translation)

March 31, 2025

KEIDANREN (Japan Business Federation)

1. Keidanren's efforts to combat climate change

	Keidanren's initiatives	Domestic and international initiatives			
1991 Apr	Keidanren Global Environment Charter				
1992 Jun		Adoption of the Framework Convention on Climate Change			
1997 Jun	Keidanren Voluntary Action Plan on the Environment				
1997 Dec		Adoption of Kyoto Protocol (COP3)			
2013 Jan	The first phase of the plan for Keidanren's Commitment to a Low Carbon Society				
2013 Mar		Current Policy of Global Warming Countermeasures			
2015 Apr	The second phase of the plan for Keidanren's Commitment to a Low Carbon Society				
2015 Jul		Submission of Japan's Intended Nationally Determined Contribution to the UN			
2015 Dec		Adoption of the Paris Agreement (COP21)			
2016 Nov		Entry into force of the Paris Agreement			
2018 Nov	Keidanren's Concept Book "Contributing to Avoided Emissions through the Global Value Chain"				
2019 Jan	Keidanren's "Actions by the Business Community on Long-term Global Warming Countermeasures up to 2050"				
2019 Jun		Japan's Long-term Strategy under the Paris Agreement			
2020 Jun	Starting "Challenge Zero"				
2020 Oct	·	Declaration of challenge of achieving carbon neutrality by 2050			
2021 Nov	Keidanren Carbon Neutrality Action Plan				
2022 May	Toward Green Transformation (GX)				
2023 Jul	·	GX Promotion Strategy			
2024 Jul		Inauguration of the GX Acceleration Agency			
2025 Feb		GX2040 Vision			

2. Outline of Keidanren Carbon Neutrality Action Plan

- Industry associations formulate their industry's vision toward achieving carbon neutrality (CN) by 2050 and an action plan comprising 4 pillars.
- 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 and target levels are continuously reviewed (PDCA).
- 63 industries participate.



3-1. Vision toward Carbon Neutrality by 2050 (status)

Two additional industries have formulated visions, resulting in a total of 47 industries (74.6% of participating industries) with visions.

※2 industries (Japan Soft Drink Association, Limestone Association of Japan) formulated visions. 2 industries (The Real Estate Companies Association of Japan, Japan Building Owners and Managers Association) reviewed visions.

■ In terms of emissions, the coverage rate has increased from 97.0% to 97.4%.

[Status of Vision formulation among participating industries]



* CO_2 emissions after electric power distribution are used for the industry, commercial and transport sectors, and CO_2 emissions before electric power distribution are used for the energy conversion sector.

3-2. Vision toward Carbon Neutrality by 2050 (example)

Sector	Industry	Vision (Basic Policy, etc.)
Energy conversion	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	Contribute to achieving society-wide CN through aiming to net zero CO_2 emissions (CN) and 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 ((1)CO ₂ -free hydrogen, 2)synthetic fuels, 3)CCS/CCU (Carbon recycling), etc.) that can utilize existing.
	Gas	Under the policy to achieve carbon nuetralization 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	Iron and steel	Toward achieveing 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 CO ₂ , 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.).
	Automobile	Deploy electric vehicles (HV, PHV, EV, FCV, etc.) and to achieve a hydrogen economy (spreading FC-based mobility, etc.).
Transportat ion-related	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 railing 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	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.

4-1(1).[Pillar 1]Emission reductions from domestic business operations (targets)

■ 6 industries^{*} have reviewed their targets in fiscal 2023 FU.

■ This is evidence of the business community's will to contribute to achievement of the Government's target to reduce emissions by 46%.

X Japan Federation of Construction Contractors, Japan Industrial Vehicles Association, Limestone Association of Japan, Japan Association of Rolling Stock Industries, Japan Foreign Trade Council, Japan LP Gas Association

[Status of review of 2030 target]



(The total does not match as several industries revisited their target several times.)

4-1(2).[Pillar 1]Emission reductions from domestic business operations (all sectors)

- Total CO₂ emissions from all sectors (industrial, energy conversion, commercial, transportation) decreased by 21.5%(▲129.45Mt-CO₂) from fiscal 2013^{*}to fiscal 2023. (*) Baseline year for Japan's 2030 target
 Emissions have decreased by 2.3% from fiscal 2022 (▲11.22Mt-CO₂).
- This can be mainly attributed to a decrease in economic activity in the industrial sector, especially energy-intensive industries, due to reduced cement demand resulting from prolonged construction periods, as well as smaller international demand for chemical products.



* The Final Version reports CO₂ emissions (after electric power distributions) from 63 industries out of the 63 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.

4-1(3).[Pillar 1]Emission reductions from domestic business operations (each sector)

■ Compared to fiscal 2013, CO₂ emissions were reduced in all sectors in fiscal 2023.

Compared to the previous year, CO₂ emissions increased in the transportation sector in fiscal 2023. On the other hand, CO₂ emissions in industrial, energy conversion and commercial sectors decreased.



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

4-1(4).[Pillar 1]Emission reductions from domestic business operations (factor analysis)

Emission reductions from the previous fiscal year can be explained in terms of the following three factors:
 Change in economic activity

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

(2) Change in CO₂ emission factors (decarbonization of energy)^{*}

Decrease in all sectors

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

FY2023

342.64Mt

Increase in the transportation sector, decrease in the industrial, energy conversion

and commercial sector



[Industrial]

<Main factors> (1)Reduced cement demand resulting from prolonged construction periods, as well as smaller international demand for chemical products (2)Reduced CO_2 coefficient of purchased power due to restart of nuclear power plants, deployment of renewable power (3)Continued energy conservation efforts despite aggravated energy intensity due to decreased production

[Energy conversion]

(2)

▲4.7%

▲1.9%

(1)

FY2022

359.47Mt

▲2.2% ▲0.5%

3

<Main factors>

Reduced electric power
demand, balanced C-heavy oil
demand

Restarting of nuclear power plants and conclusion of periodical examinations

Improved heat efficiency in thermal power generation



[Commercial]

<Main factors>

Increased network traffic
Reduced CO₂ coefficient of purchased power due to restart of nuclear power plants
Improved efficiency of equipment and operations, increased energy savings in office buildings



[Transportation]

<Main factors>

Recovery of airline passengers to pre-COVID 19 levels
Reduced CO₂ coefficient of purchased power due to restart of nuclear power plants
Improved transport efficiency due to increased airline passengers, increased fuel consumption due to changes in shipping routes

(Reference) [Pillar 1] Decadal CO₂ emission trends from 2013

- CO₂ emissions were reduced in all sectors, decreasing 130 Mt-CO₂ (21.5%) relative to 2013.
- Emission reductions from FY2013 can be explained in terms of the following three factors:
- **①Change in economic activity:**

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

(2)Change in CO₂ emission factors (decarbonization of energy)*:

Decrease in all sectors. Restarting of nuclear power plants, increased renewable energy deployment, advancements in energy conversion

3Change in energy consumption per unit economic activity (energy saving efforts): Increase in the transportation sector, decrease in the industrial, energy conversion and commercial sectors



*A comparison of the energy conversion sector is provided for reference because of the discontinuity of the data before and including fiscal 2014 and beyond fiscal 2015.

%Factor analysis for the commercial sector was conducted excluding the Real Estate Association for which FY2013 data is unavailable. %The Electric Power Council for a Low Carbon Society's CO_2 coefficient for the electric power sector is 0.421kg- CO_2 /kWh ($\blacktriangle 0.146$ kg- CO_2 /kWh relative to FY2013).

4-1(5).Status of deployment of renewable energy, energy recovery and utilization

- 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.

%Keidanren's "Recommendations for Revising the Strategic Energy Plan" lays importance on "low cost, stable supply and business discipline" while recognizing that "renewable energy is an important decarbonizing power source that contributes to improving Japan's energy self-sufficiency level.

Deployment of renewable energy	Energy recovery and utilization
 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 (Japan Paper Association, Liaison Group of Japanese Electrical and Electronics Industries for Global Warming Prevention, Japan Automobile Manufacturers Association/Japan Auto- Bodies Industries Association, The Japan Rubber Manufacturers Association, The Federation of Pharmaceutical Manufacturers' Associations of Japan, Japan Aluminium Association, Japan Federation of Printing Industries, Japan Dairy Industry Association, The Japanese Electric Wire & Cable Makers' Association, The Japan Bearing Industry Association, Brewers Association of Japan, Limestone Association of Japan, Japan Machine Tool Builders' Association, Japan Industrial Vehicles Association, Ine Japan Gas Association, The Real Estate Companies Association, Japan Foreign Trade Council, The Real Estate Companies Association of Japan:18 industries) Finance and investment in renewable energy projects (Japanese Bankers Association, The Life Insurance Association of Japan, The General Insurance Association of Japan, Japan Securities Dealers Association 4 industries) 	 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) Utilization of waste heat from boilers as a heat source for HVAC at plants (The Japan Rubber Manufacturers Association) Cogeneration Systems (The Japan Rubber Manufacturers' Association, The Federation of Pharmaceutical Manufacturers' Associations of Japan, Japan Energy Resources Development Association, Brewers Association of Japan, The Japan Gas Association, Japan Foreign Trade Council, Japan Hotel Association:7 industries) Other waste heat recovery and use (Japan Chemical Industry Association, Japan Cement Association, Japan Auto Parts Industries Association, Japan Mining Industry Association, Japan Lime Association, Japan Aluminium Association, Flat Glass Manufacturers Association of Japan, Japan Dairy Industry Association, The Japanese Electric Wire & Cable Makers' Association, Petroleum Association of Japan, Japan Foreign Trade Council:11 industries)

4-2. [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.



•Lightweight paper and cardboard (Japan Paper Association)

Disposal of products (3R)

•Effective utilization of waste and byproducts (Japan Cement Association

4-3. [Pillar 3] Promoting contribution at the international level

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 avoided="" emission="" of="" overseas=""></examples>						
Overseas transfer of technologies and knowhow	Provision of low-carbon products and services					
 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) CCS projects targeting CO₂ emissions from factories, oil fields, and gas fields (Japan Energy Resources Development Association) Organic hydride, maritime transport of liquefied hydrogen, biojet fuels (Petroleum Association of Japan) Renewable power generation (Electric Power Council for a Low Carbon Society, The Japan Gas Association, etc.) 	 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 home appliances, high efficiency IT products (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) 					

%Gas Turbine Combined Cycle

4-4. [Pillar 4] Development of innovative technologies toward CN by 2050

- 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 [*]	2023	2025	2030	2050				
	Development of Hydrogen Reduction Technologies Utilizing Hydrogen From Within Steelworks			Implementation					
The Japan Iron and Steel Federation	Development of Low-carbon Technologies Using External Hydrogen and CO_2 Contained in Blast Furnace Exhaust Gas, development of direct hydrogen reduction technologies			Technology Demonstration	Implementation				
Japan Chemical Industry Association	Plastic feedstock production technologies using CO_2 , etc.	R&D including commercialization using GI Fund		Business phase					
Japan Paper Association	Manufacturing of bio-ethanol for Sustainable Aviation Fuel (SAF)	Demonstration	Launch operation of pilot pland	Increase production					
Japan Cement Association	Lower emission cement	Preliminary considerations	liminary Confirm manufacturing conditions, iderations economic rationality, etc.						
The Japan Rubber Manufacturers Association	Hydrogen utilization technologies	Domestic: demonstration	Domestic: Continue studies - commercialization	Domestic; commercialization – deployment Overseas: studies – commercialization	Domestic: deployment Overseas: deployment				
The Electric Power Council for a Low Carbon Society	Ammonia conversion		20% conversion pilot test	Full operation of 20% conversion 50%+ conversion pilot test	Full operation of 50%+ conversion				
	Hydrogen conversion	Demonstration			Start operations				
The Japan Gas Association	e-methane	Production capacity: Approx. 5~12.5Nm/h	Production capacity: Approx. 400~500Nm ² /h	Production capacity: Approx. 10,000Nm ² /h	Production capacity: Approx. 10,000Nm ² /h				
East Japan Railway Company	Development of hydrogen- powered train	Demonstration		Introduction	Increased deployment				

%Includes transition technologies

5. Conclusion

- The CN Action Plan has a mechanism in place to ensure the credibility and transparency of the plan, including follow-ups by Keidanren's third-party evaluation committee and the government, and effectively serves as the foundation for Japan's global warming countermeasures.
- While maintaining these functions, Keidanren will consider the positioning and proper direction of the plan, taking into account the potential administrative burden on businesses, in anticipation of the full-scale launch of the emissions trading system in FY2026.

