

Japan's National Greenhouse Gas Emissions and Removals in FY2023 <Executive Summary>

1. Greenhouse Gas Emissions and Removals¹

Japan's greenhouse gas (GHG) emissions and removals in fiscal year ^{2,3} (FY) 2023:

1,017 million tonnes of carbon dioxide equivalent (Mt CO₂ eq.⁴), indicating a 4.2% (44.9 Mt CO₂ eq.) decrease compared to FY2022.

- This represented a 27.1% (378.1 Mt CO₂ eq.) decrease compared to FY2013⁵ emissions (1,395 Mt CO₂ eq.).

Japan's emissions⁶ for FY2023: 1,071 Mt CO₂ eq. (a 4.0% [44.9 Mt CO₂ eq.] decrease compared to FY2022)

Japan's removals⁷ for FY2023: 53.7 Mt CO₂ eq. (a 0.2% [0.08 Mt CO₂ eq.] decrease compared to FY2022)

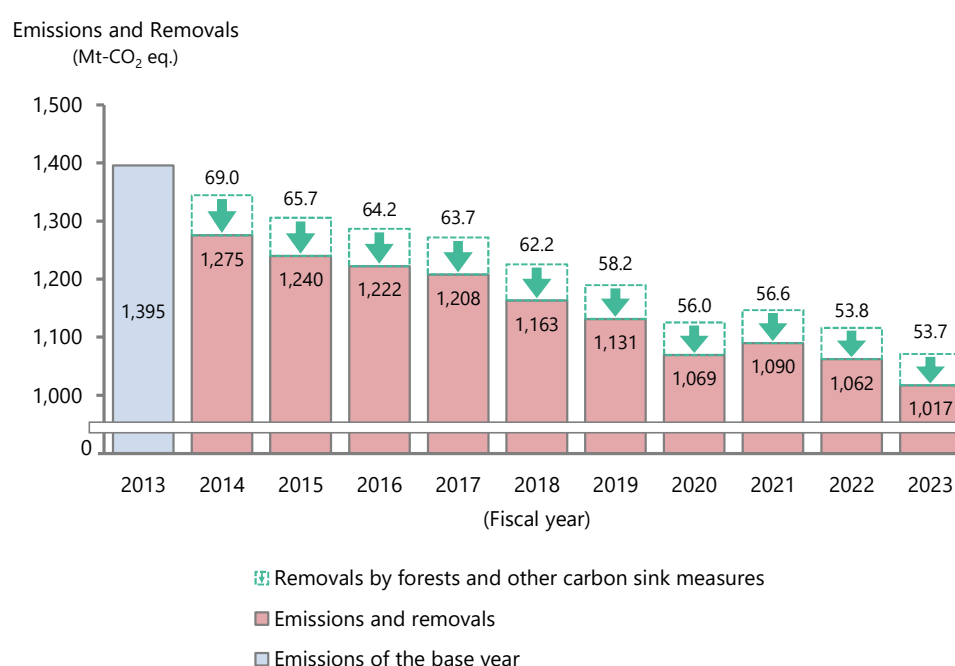


Figure 1 Trends in Japan's national GHG emissions and removals

Footnote:

1. Japan's removals by measures for forest and other carbon sinks were subtracted from the sum of emissions. The compiled figures of the emissions and removals this time may be recalculated when the annual statistical data are updated and/or when estimation methods are revised.
2. Japan's fiscal year runs from April 1 to March 31.
3. Emissions of four types of GHGs (hydrofluorocarbons [HFCs], perfluorocarbons [PFCs], sulfur hexafluoride [SF₆], and nitrogen trifluoride [NF₃]) were estimated on a calendar year basis.
4. Emissions of each GHG were converted into CO₂ equivalents by multiplying the emissions of each gas with their respective global warming potential values (GWP values). GWP values are the degree to which each GHG contributes to global warming and are expressed as a ratio to the global warming effect of CO₂. Based on the Paris Agreement rules, the GWP values for a 100-year time horizon provided in the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (2013) were adopted.
5. The base year for Japan's greenhouse gas reduction target in the Nationally Determined Contribution (NDC), etc. In the updated NDC submitted to the United Nations in October 2021, Japan expressed that it "aims to reduce its greenhouse gas emissions by 46 percent in FY 2030 from its FY 2013 levels, setting an ambitious target which is aligned with the long-term goal of achieving net zero by 2050". Furthermore, in Japan's NDC submitted to the UN in February, 2025, Japan expressed new reduction targets as follows: "Japan aims to reduce its greenhouse gas emissions by 60 percent in FY 2035 and by 73 percent in FY 2040, respectively, from its FY 2013 levels, as ambitious targets aligned with the global 1.5°C goal and on a straight pathway towards the achievement of net zero by 2050". The progress towards reduction targets will be evaluated using the emissions and removals amounts against the emissions amounts in the base year.
6. Sum of Japan's emissions.
7. Contribution of measures for forest and other carbon sinks to GHG removals and reduction. This will be used for evaluation of Japan's Plan for Global Warming Countermeasures and the NDC.

2. Greenhouse Gas Emissions⁸

GHG emissions of Japan in FY 2023: 1,071 Mt CO₂ eq.

- Emissions decreased by 4.0% (44.9 Mt CO₂ eq.) compared to emissions in FY2022 (1,116 Mt CO₂ eq.).
- Emissions decreased by 23.3% (324.4 Mt CO₂ eq.) compared to emissions in FY2013 (1,395 Mt CO₂ eq.).

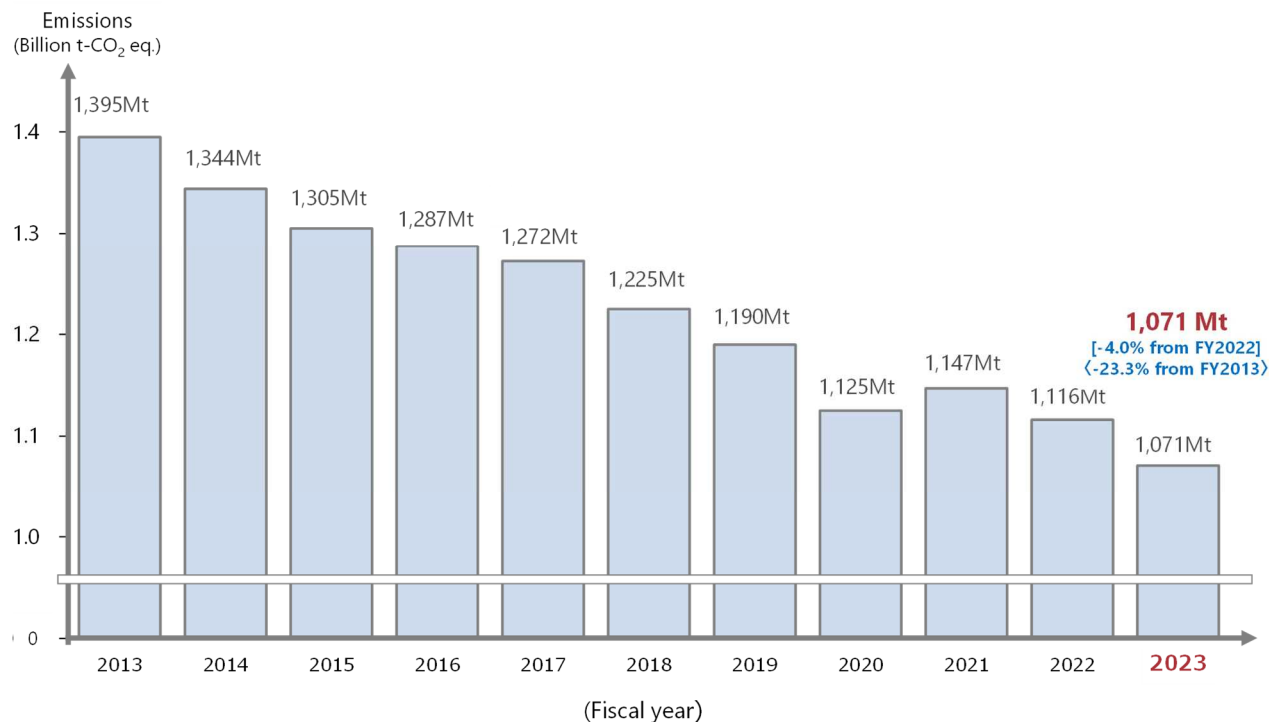


Figure 2 Japan's national GHG emissions

Note:

- The main factors for the decrease: reduced energy consumption and the decrease in CO₂ emissions from electricity production due to the wider use of decarbonized electricity (wider adoption of renewable energy and resumption of nuclear power plant operations).
- The emissions of hydrofluorocarbons, which had been increasing every year from 2005 to 2021, decreased for the second consecutive year.

Footnote:

8. GHG emissions for each fiscal year and the rates of change from the preceding years do not include removals by measures for forest and other carbon sinks.

Table 1 Japan's national GHG emissions by gas in FY2023
(compared to FY2013 and FY2022)

	FY1990 emissions [Share]	FY2013 emissions [Share]	FY2022 emissions [Share]	Emissions [Share]	FY2023	
					Amount of change 《Rate of change》	
					Compared to FY2013	Compared to FY2022
Total	1,272 [100%]	1,395 [100%]	1,116 [100%]	1,071 [100%]	-324.4 《-23.3%》	-44.9 《-4.0%》
Carbon dioxide (CO₂)	1,160 [91.2%]	1,314 [94.2%]	1,031 [92.4%]	989 [92.3%]	-325.4 《-24.8%》	-42.8 《-4.1%》
Energy-related CO ₂	1,068 [83.9%]	1,235 [88.5%]	961 [86.1%]	922 [86.1%]	-313.7 《-25.4%》	-39.3 《-4.1%》
Non-energy-related CO ₂	92.8 [7.3%]	78.8 [5.6%]	70.5 [6.3%]	67.0 [6.3%]	-11.8 《-15.0%》	-3.5 《-5.0%》
Methane (CH₄)	49.9 [3.9%]	32.6 [2.3%]	29.8 [2.7%]	29.4 [2.7%]	-3.2 《-9.9%》	-0.39 《-1.3%》
Nitrous oxide (N₂O)	28.9 [2.3%]	19.7 [1.4%]	16.1 [1.4%]	15.8 [1.5%]	-3.9 《-19.7%》	-0.29 《-1.8%》
F-gases	33.4 [2.6%]	28.9 [2.1%]	38.5 [3.5%]	37.0 [3.5%]	8.1 《+28.2%》	-1.5 《-3.9%》
Hydrofluorocarbons (HFCs)	13.4 [1.1%]	22.0 [1.6%]	33.0 [3.0%]	31.7 [3.0%]	9.7 《+43.8%》	-1.3 《-3.9%》
Perfluorocarbons (PFCs)	6.2 [0.5%]	3.0 [0.2%]	3.0 [0.3%]	3.1 [0.3%]	0.07 《+2.4%》	0.01 《+0.2%》
Sulfur hexafluoride (SF ₆)	13.8 [1.1%]	2.3 [0.2%]	2.1 [0.2%]	2.1 [0.2%]	-0.28 《-11.8%》	-0.08 《-3.6%》
Nitrogen trifluoride (NF ₃)	0.0 [0.0%]	1.5 [0.1%]	0.3 [0.0%]	0.2 [0.0%]	-1.3 《-86.3%》	-0.13 《-38.7%》

Note: "0.0" are values less than 0.05.

(Unit: Mt-CO₂ eq.)

Table 2 Energy-related CO₂ emissions from each sector
(after allocation of power and heat)

	FY1990 emissions [Share]	FY2013 emissions [Share]	FY2022 emissions [Share]	Emissions [Share]	FY2023	
					Amount of change 《Rate of change》	
					Compared to FY2013	Compared to FY2022
Total	1,068 [100%]	1,235 [100%]	961 [100%]	922 [100%]	-313.7 《-25.4%》	-39.3 《-4.1%》
Industry (factories, etc.)	505 [47.3%]	463 [37.5%]	354 [36.8%]	340 [36.8%]	-123.8 《-26.7%》	-14.0 《-4.0%》
Transport (cars, etc.)	208 [19.5%]	224 [18.2%]	192 [19.9%]	190 [20.6%]	-34.1 《-15.2%》	-1.4 《-0.7%》
Commercial and other (commerce, service, office, etc.)	131 [12.3%]	235 [19.0%]	176 [18.3%]	165 [17.9%]	-69.6 《-29.7%》	-10.9 《-6.2%》
Residential	126 [11.8%]	209 [17.0%]	158 [16.5%]	147 [16.0%]	-62.2 《-29.7%》	-10.8 《-6.8%》
Energy transformation	96.6 [9.0%]	104 [8.4%]	81.8 [8.5%]	79.6 [8.6%]	-	-
Power plants, oil refineries, etc.	96.2 [9.0%]	106 [8.6%]	84.2 [8.8%]	81.0 [8.8%]	-25.2 《-23.7%》	-3.2 《-3.8%》
Statistical discrepancy from power and heat allocation	+0.4 [0.0%]	-2.6 [-0.2%]	-2.4 [-0.3%]	-1.4 [-0.2%]	-	-

Note: "0.0" are values less than 0.05.

(Unit: Mt)

"After allocation of power and heat" refers to the allocation of energy-related CO₂ emissions from power and heat generation to each sector based on the consumption of power and heat.

Details of main increases/decreases as compared to emissions in FY2022

1) Energy-related CO₂ emissions (after allocation of power and heat)

- Industry sector (factories, etc.): 14.0 Mt (4.0%) decrease
 - The CO₂ emissions intensity for electricity (CO₂ emissions per unit electricity consumption) improved, and domestic production activity in the manufacturing sector decreased, etc.
- Transport sector (cars, etc.): 1.4 Mt (0.7%) decrease
 - The energy consumption efficiency of passenger traffic improved, and the use of passenger vehicles and the amount of freight traffic decreased.
- Commercial and other sector (commerce, services, office, etc.): 10.9 Mt (6.2%) decrease
 - The energy consumption decreased due to improved energy consumption intensity (energy consumption per tertiary industry activity index), and the CO₂ emissions intensity of electricity improved, etc.
- Residential sector: 10.8 Mt (6.8%) decrease
 - Energy consumption decreased owing to a warmer winter compared to FY2022 and the CO₂ emissions intensity of electricity improved, etc.
- Energy transformation sector (power plants, oil refineries, etc.) (excluding statistical discrepancy from power and heat allocation): 3.2 Mt (3.8%) decrease
 - Emissions from the manufacturing of coal products decreased.

2) Emissions other than energy-related CO₂ (CO₂ eq.)

- CO₂ emissions not related to energy: 3.5 Mt (5.0%) decrease
 - Emissions from the Industrial Processes and Product Use sector decreased owing to reduced cement production.
- Methane (CH₄) emissions: 0.39 Mt (1.3%) decrease
 - Emissions from the Agriculture sector (livestock etc.) decreased.
- Nitrous oxide (N₂O) emissions: 0.29 Mt (1.8%) decrease
 - Emissions from the Energy sector decreased.
- Hydrofluorocarbon (HFC) emissions: 1.3 Mt (3.9%) decrease
 - Emissions from refrigerants decreased owing to the transition to refrigerants with lower GWPs and an increase in HFC recovery during the disposal of commercial refrigeration and air conditioning.
- Perfluorocarbon (PFC) emissions: 0.01 Mt (0.2%) increase
 - Emissions from solvents increased.
- Sulfur hexafluoride (SF₆) emissions: 0.08 Mt (3.6%) decrease
 - Emissions from semiconductors and LCD manufacturing decreased.
- Nitrogen trifluoride (NF₃) emissions: 0.13 Mt (38.7%) decrease
 - Emissions from semiconductors and LCD manufacturing decreased.